
Australasian
Society of
Lifestyle
Medicine

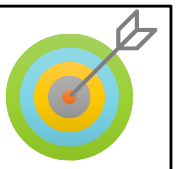
Sleep physiology – Sleep disorders

Unit: 3.3.4

Presenter: Dr Jenny Brockis

Version 1.0

Learning outcomes



By the end of this video, you will be able to:

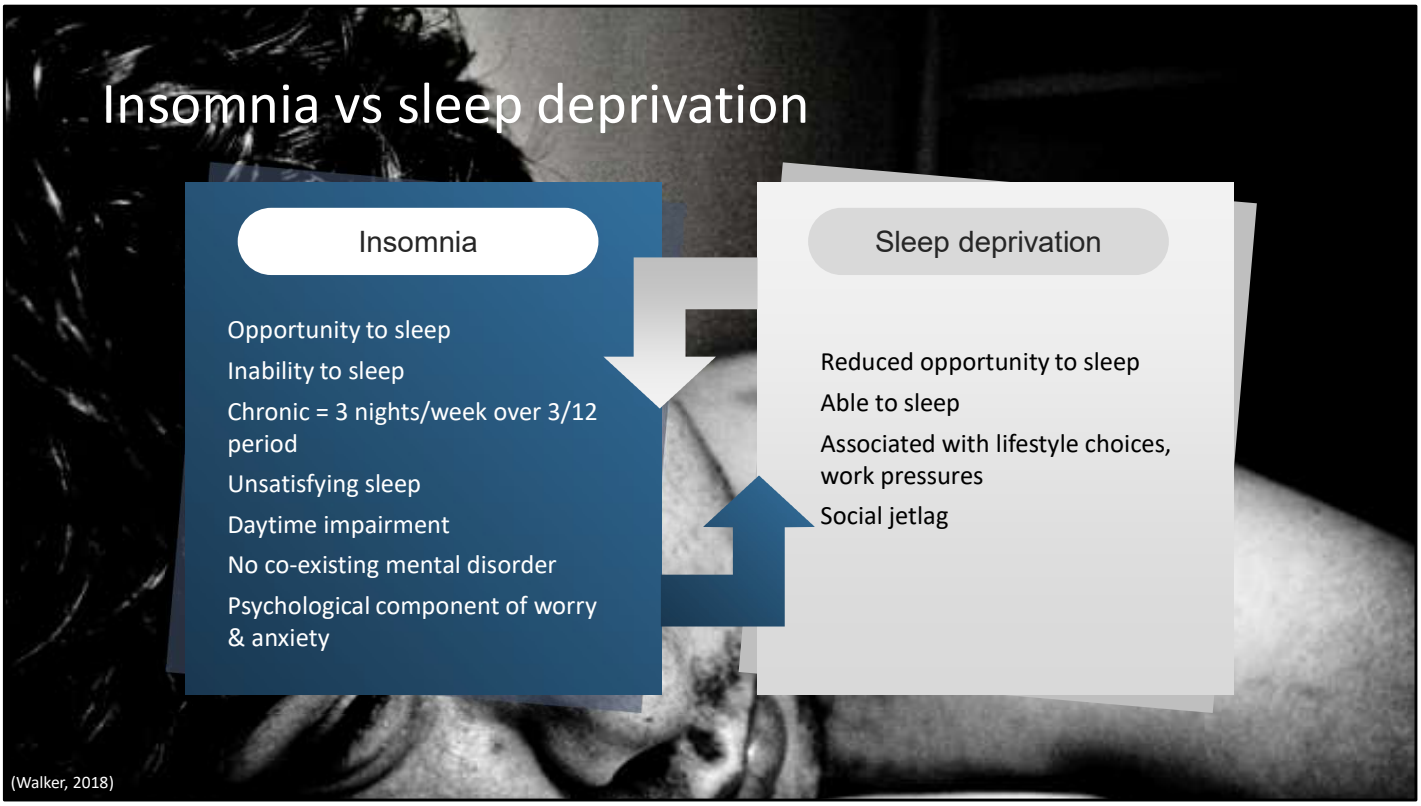
1. Describe the three most common sleep disorders
2. Explain the presentation and impact of the three most common sleep disorders
3. Describe the role of CBT-i in treating insomnia
4. Summarise the evidence for use of medication
5. Summarise the evidence for sleep apps in the monitoring and treatment of sleep disorders
6. Describe the referral pathways in the treatment of sleep disorders

Describe the three most common sleep disorders

OSA – obstructive sleep apnoea
RLS – restless leg syndrome

Explain the presentation and impact of the three most common sleep disorders

- 60% regularly have ≥1 sleep symptom 1-3 times/week
- More common age 55-75 years
  but younger population worry about sleep more

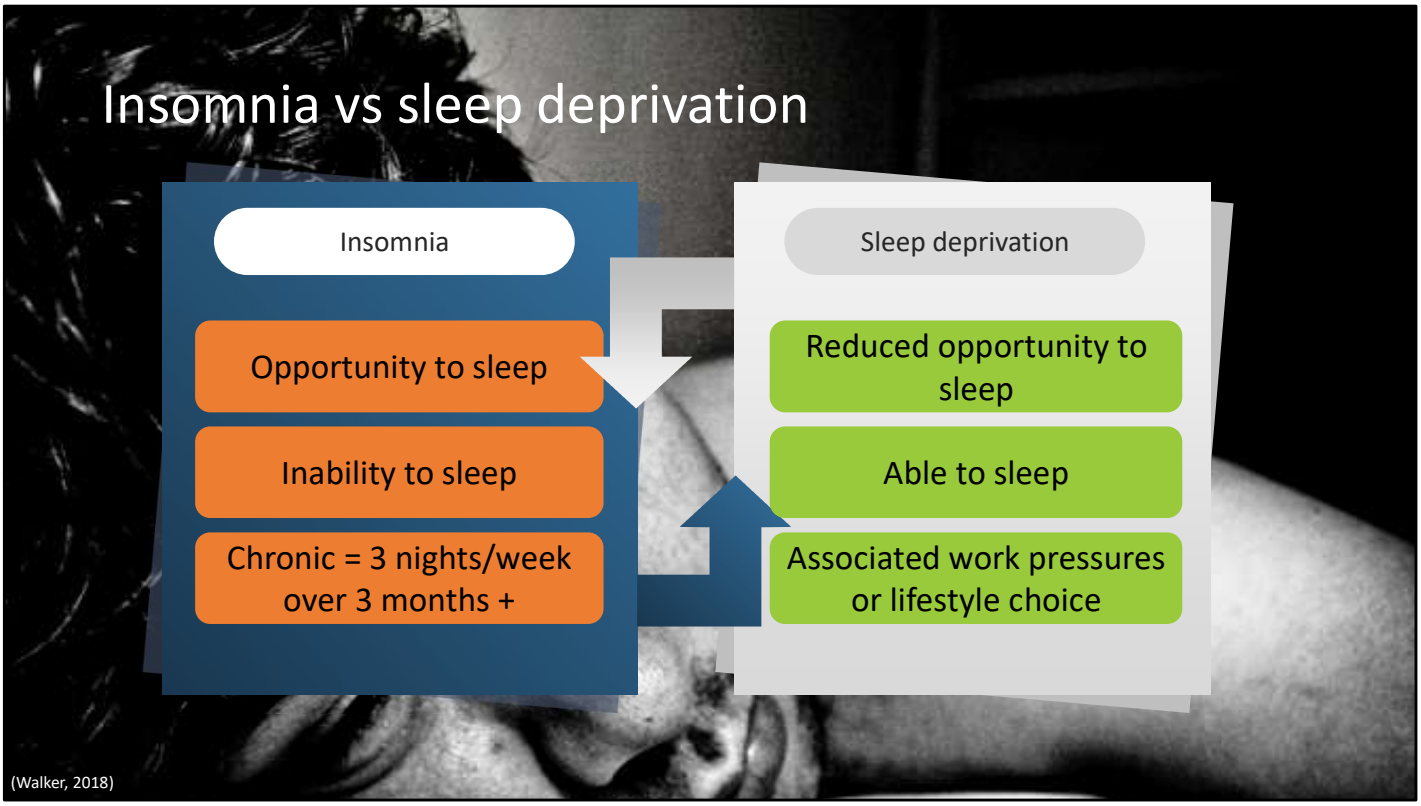


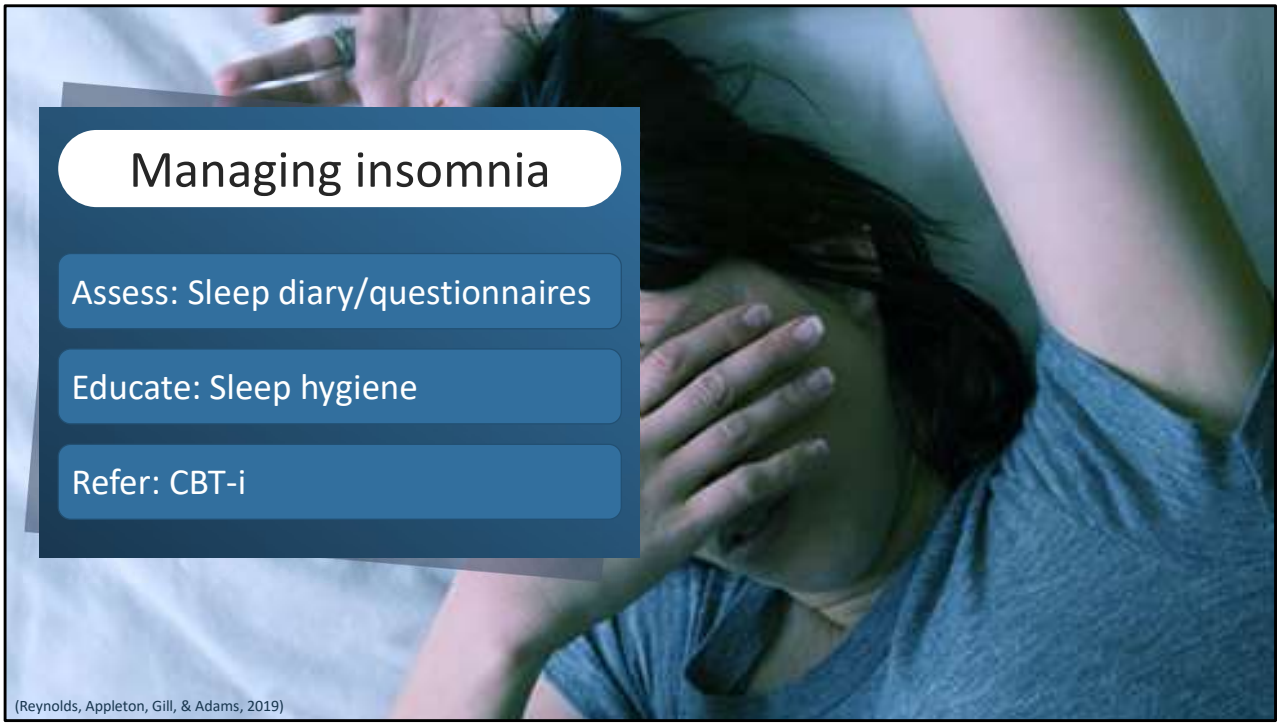
Chronic insomnia disorder is broadly defined as a perceived difficulty with sleep initiation, consolidation, duration, or quality despite adequate opportunity to sleep, plus subsequent daytime impairment, that occur at least three times per week, lasting at least three months. The daytime consequences encompass a wide variety of issues, including significant distress or impairment in social, occupational, educational, academic, behavioural or other important areas of functioning.

The survey was conducted between March and April 2019 on behalf of the Sleep Health Foundation among 2,044 adults aged 18 years and over across Australia, with representativeness for age, sex, location and an indicator of socio-economic status. Researchers from Flinders University, The University of Adelaide and the Appleton Institute of CQUniversity

Sleep problems remain prevalent across the community, irrespective of age and gender. Around 60% of people report at least one sleep symptom occurring 3 or more time per week, and this is consistent across age groups. However, the type of symptom varies with age. Older people are more likely to have difficulty maintaining sleep, while younger adults have trouble initially getting off to sleep. Self-reported daytime impairments related to sleep are more common among female respondents and younger adults.

Most people who fulfill diagnostic criteria for chronic insomnia do not report a prior diagnosis of insomnia. Overall, insomnia according to current diagnostic criteria is more common in older Australians. This occurs despite no apparent change in prevalence in overall sleep symptoms across age, and a decline in daytime symptoms with age, in the population more broadly. The main influence on this is that older adults are far more likely to report adequate opportunity to sleep than younger adults. This indicates that much of the sleep problem among younger adults can be attributed to circumscribed sleep opportunities from external social pressures and behaviour patterns.


Insomnia vs sleep deprivation
Insomnia
Opportunity to sleep
Inability to sleep
Chronic = 3 nights/week over 3 months +
Sleep deprivation
Reduced opportunity to sleep
Able to sleep
Associated work pressures or lifestyle choice
(Walker, 2018)



- CBT-i – cognitive behavioural therapy for insomnia

Paradoxical insomnia

"I don't sleep at all Doc"

When subjective experience doesn't match objective data

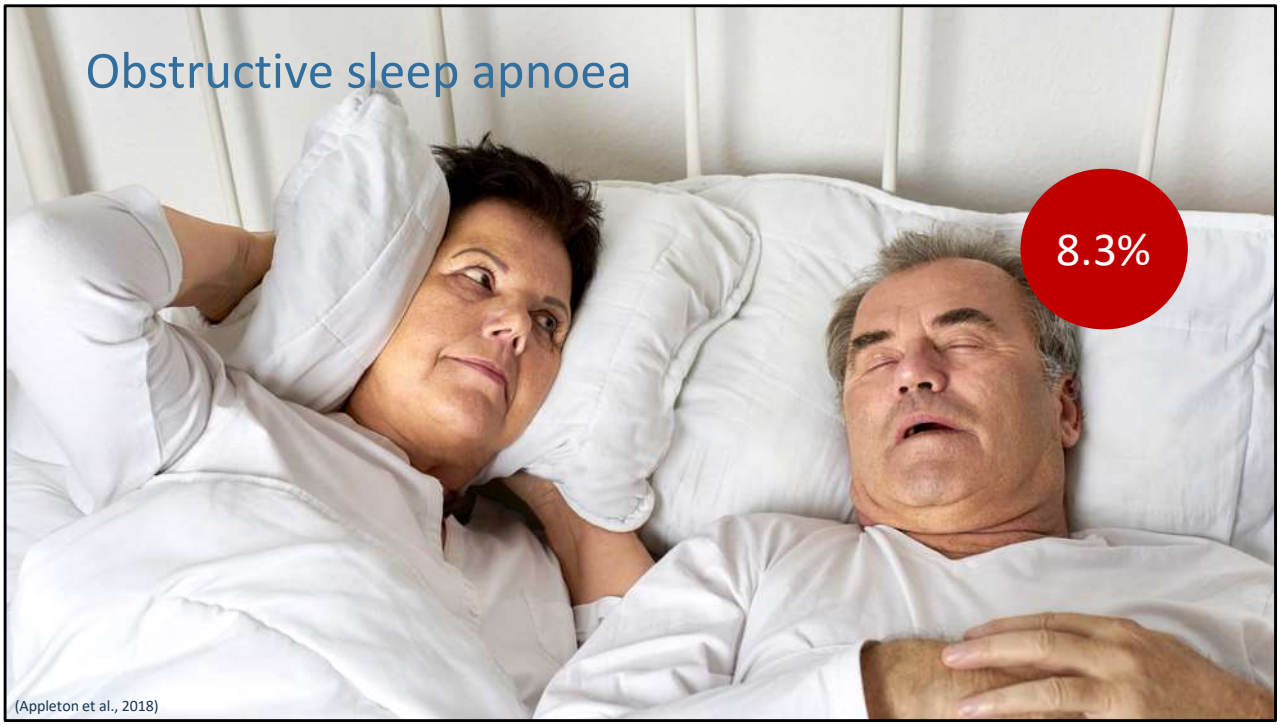
(Hermans et al., 2019; Moon et al., 2015)

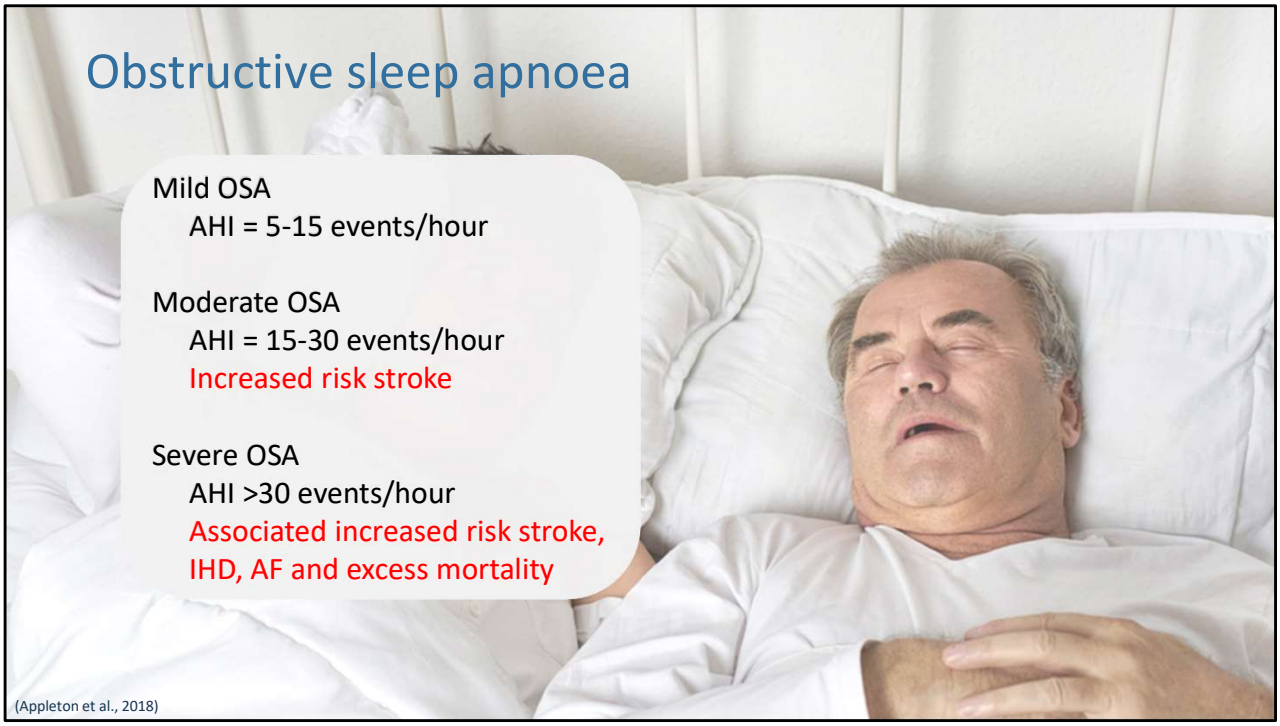
Affects 5% of the population

Best managed with

- Patient education
- Sleep hygiene
- CBT-i

The subjective experience of not sleeping well but objective sleep studies indicate otherwise


Obstructive sleep apnoea
8.3%
(Appleton et al., 2018)



- OSA – obstructive sleep apnoea
- AHI events – apnoea hypopnoea index

- Independent risk factor for CVD, stroke
    - Obesity is the major risk factor
    - Metabolic factors of hypertension, hyperlipidaemia and insulin resistance are commonly also present at time of diagnosis as well as increased risk of CVD
- Metanalysis review home tests vs in lab sleep study
    - Level 3 portable devices showed good diagnostic performance compared with level 1 sleep tests in adult patients with a high pre-test probability of moderate to severe obstructive sleep apnoea and no unstable comorbidities. For patients suspected of having other types of sleep-disordered breathing or sleep disorders not related to breathing, level 1 testing remains the reference standard.
- Metanalysis 2014 Intensive lifestyle intervention are effective in reducing sleep apnoea severity
    - Greater benefit on reducing CVD risk
- Continuous positive airway pressure (CPAP) works safe effective reduces sleepiness and improves mood and quality of life
    - CVD benefits uncertain

Restless legs

- Discomfort = urge to move
- Worse in evenings – Impacts sleep
- Occurs 2-5% ↑ with age & family history
- Can occur last 6 months of pregnancy
- Associated with other conditions
- Associated with iron deficiency, excess caffeine

(Brain Foundation, n.d.; Czesnik et al., 2019)

"People have the sense of needing to move their legs, usually worse at night, and these symptoms improve if they can get up and move around," said specialist sleep physician David Cunnington of the Melbourne Sleep Disorders Centre.
Symptoms can range in severity from uncomfortable to painful, and relieving them is what motivates the restlessness, whether it be pacing, or tossing in bed, or even jumping on an exercise bike.
It's also made worse if they're forced to sit still
"A lot of patients who have iron deficiency have an increased risk of developing restless legs. And when you get their iron levels back up the restless legs goes away."
There is also a potential link to the brain chemical dopamine, which is important for movement.
"There may also be some problems with dopamine signalling, and some people have found dopamine treatments to be quite useful," Dr Yee said.
"I think those two [dopamine and iron] are probably important in terms of the mechanism behind restless legs."
There may also be a genetic component to getting restless legs syndrome.

Associated with renal disease, diabetes, arthritis & Parkinson's
Occurs in 2-5%
↑ with age
Family history ↑ risk 30-50%

Restless legs

No specific test

No specific treatment

Self-help

Treat any associated condition

Medication

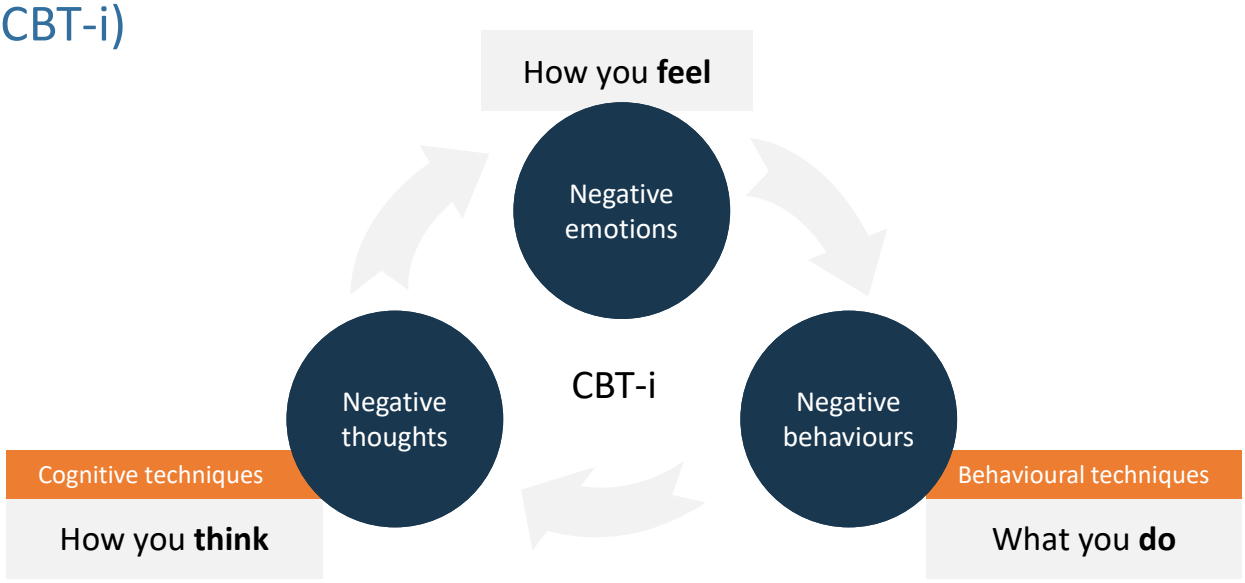
Ropinirol
Pramipexol
Rogitotine

(Brain Foundation, n.d.; National Institute of Neurological Disorders and Stroke (NINDS), 2019)

- No specific test
  - Family history
  - Response to dopaminergic medication
  - periodic limb movement during wakefulness/sleep suggestive
- Treatments
  - Self help: warm bath, cut caffeine and alcohol,
  - Regular exercise, good sleep hygiene
  - Treat any specific cause
- Medications
  - Moderate to severe dopaminergic medications Ropinirol, Pramipexol & Rogitotine as patch
  - Some antiepileptics

Describe the role of CBT-i in treating insomnia

Cognitive Behaviour Therapy – Insomnia (CBT-i)

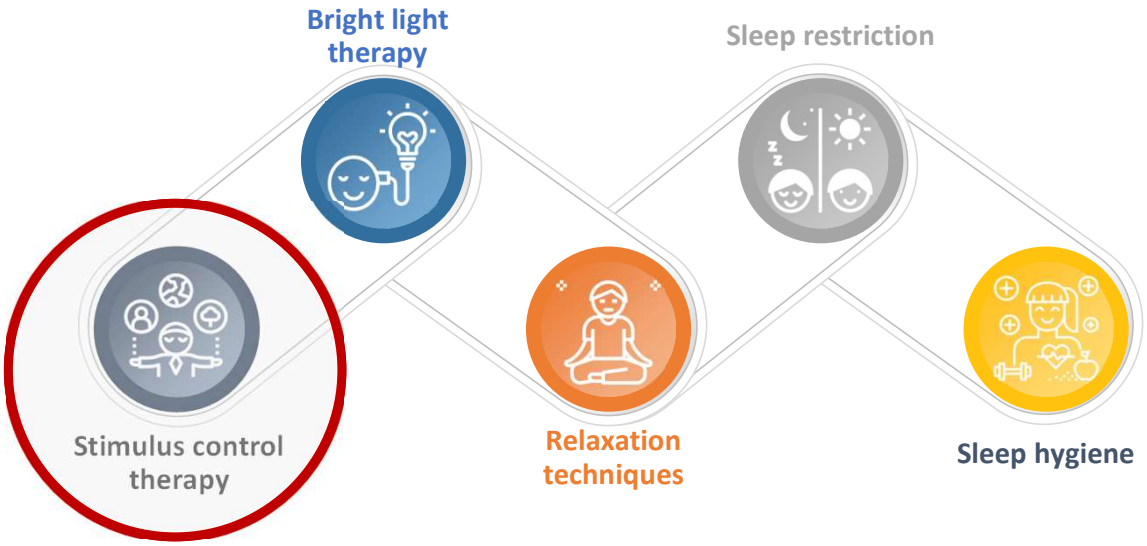


(Grima et al., 2019)

CBT-i – cognitive behavioural therapy for insomnia
CBT-i refers to a range of evidence-based techniques packaged into a multiple-session treatment that includes behavioural and cognitive strategies**.** Invariably, CBT-i includes all of these components, delivered over several sessions by a psychologist or trained healthcare professional.
Meta-analysis of randomised controlled trials (RCTs) shows unequivocally that CBT-i reduces sleep onset latency and nocturnal arousals while improving sleep efficiency (i.e. the length of time asleep relative to the amount of time spent in bed), with effect sizes comparable in magnitude to hypnotics such as benzodiazepines and non-benzodiazepines. Unlike hypnotics, improvements in sleep following CBT-i are maintained after treatment cessation for up to three years. Improvements in sleep have also been observed in patients prescribed CBT-I in combination with temazepam and zolpidem; however, sleep improvements are better maintained in patients who are not medicated.
Stand-alone CBT-i is safe and well tolerated by a large number of clinical populations. The possibility of manic states precipitated by sleep restriction in patients with bipolar illness has been raised, and one study found CBT-i resulted in mild increases in hypomania.

How you think affects how you act & feel
How you **feel** affects how you think & do
What you **do** affects how you think & feel

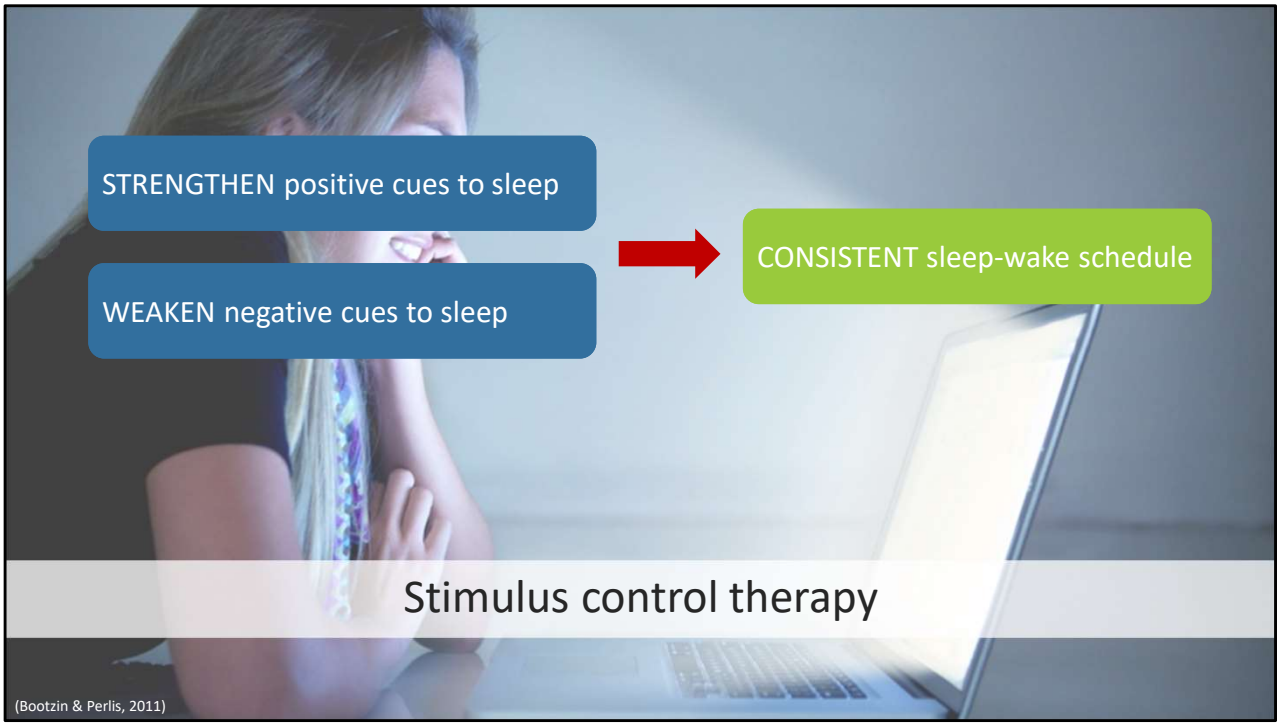
Cognitive Behaviour Therapy – Insomnia



(Siebern & Manber, 2011)

Cognitive behavioural therapy for insomnia

- CBT-i refers to a range of evidence-based techniques packaged into a multiple-session treatment that includes behavioural and cognitive strategies
- Invariably, CBT-i includes all these components, delivered over several sessions by a psychologist or trained healthcare professional.
- Meta-analysis of randomised controlled trials (RCTs) shows unequivocally that CBT-i reduces sleep onset latency and nocturnal arousals while improving sleep efficiency (i.e. the length of time asleep relative to the amount of time spent in bed), with effect sizes comparable in magnitude to hypnotics such as benzodiazepines and non-benzodiazepines. Unlike hypnotics, improvements in sleep following CBT-I are maintained after treatment cessation for up to three years. Improvements in sleep have also been observed in patients prescribed CBT-I in combination with temazepam and zolpidem; however, sleep improvements are better maintained in patients who are not medicated.
- Stand-alone CBT-i is safe and well tolerated by a large number of clinical populations. The possibility of manic states precipitated by sleep restriction in patients with bipolar illness has been raised, and one study found CBT-i resulted in mild increases in hypomania.

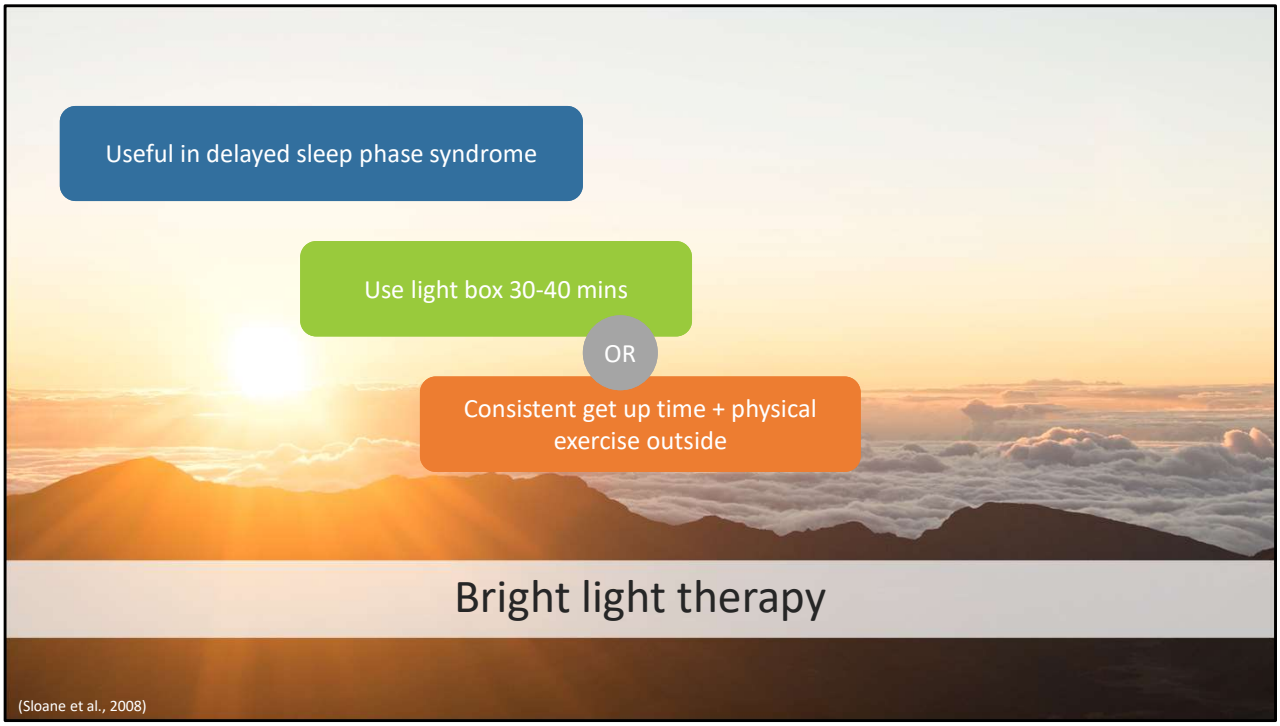


- Strengthen positive ques to sleep
  - Bed and bedroom for sleep only
  - Go to bed ONLY when sleepy
  - Consistent going to bed/wake up time even on weekends and on holiday
  - Getting up get out into bright light
- Weaken negative cues to sleep
  - Get out of bed if unable to sleep approx. 15 mins
  - Don’t try HARD to fall asleep
  - No napping during the day

Results in unlearning conditioned insomnia

Cognitive Behaviour Therapy – Insomnia

(Siebern & Manber, 2011)



Difficulty falling asleep at desired time and difficulty awakening i.e. chronological owls and teenagers

Bright light between 6 and 9 am
Aim 30-60 mins 20 may be enough
In evening keep lights dimmed

Cognitive Behaviour Therapy – Insomnia

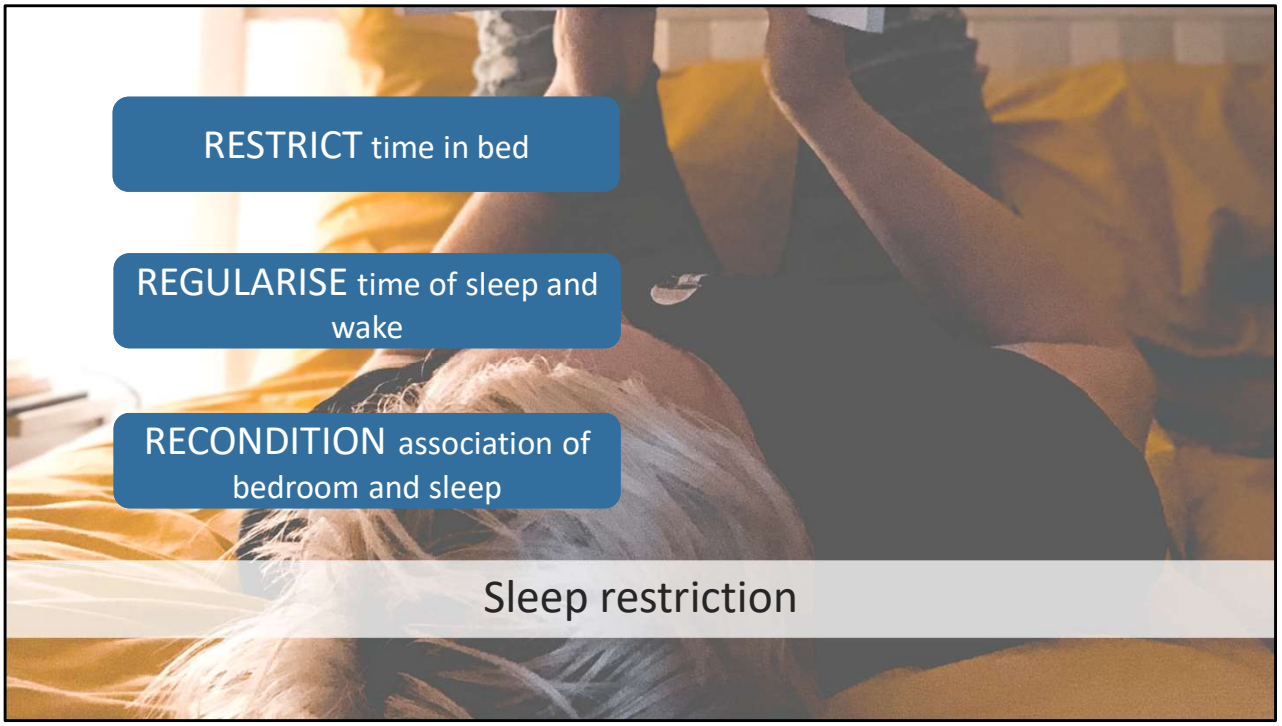
(Siebern & Manber, 2011)

Breathing 478
Progressive muscular relaxation
Visualisation – guided imagery
Meditation
Autogenic training exercises that focus mild on cultivating sensations of warmth and heaviness in different parts of the body
Biofeedback using sensors of breathing HR sweating body temp muscle contraction sleep stages

Evidence is sparse

Cognitive Behaviour Therapy – Insomnia

(Siebern & Manber, 2011)



THE *TRIPLE-R* MODEL OF SLEEP RESTRICTION THERAPY (SRT)

Chronic insomnia develops from a mix of physiological, psychological, and behavioural factors, and SRT, the Oxford researchers say, influences all these factors at once. In effect, SRT walks us back to a time when sleep was less of a problem by doing three main things. It

Restricts time spent awake in bed

Regularises the timing of sleep and wake

Reconditions the association between bedroom factors and sleep

All together, the Triple-R process produces physiological and cognitive-behavioural alterations which in turn lead to better, healthier sleep.

Summarise the evidence for use of medication

Medication and sleep

- Guidelines recommend use in transient insomnia
- As adjunct to stress management where symptoms < 4 weeks
- Drug choice depends on type of insomnia
- Approved use < 3 months (hypnotics 4 weeks)

(Grima et al., 2019)

Use medication for bouts of insomnia occurring for less than 3 months WITH monitoring use lowest dose and shortest duration
Useful is specific circumstances
CBTS best for insomnia lasting >3 months and can also be used to wean pts off hypnotics

- Guidelines recommend use in transient insomnia (less than 3 months) along with behavioural intervention and ongoing monitoring
- As adjunct to stress management where symptoms < 4 weeks
- Choice of drug depends on type of insomnia; sleep onset, maintenance, comorbidities
- Most approved use <3 months (hypnotics 4 weeks)

Medication and sleep

Use medication for bouts of insomnia occurring for less than 3 months WITH monitoring use lowest dose and shortest duration
Useful is specific circumstances
CBTS best for insomnia lasting >3 months and can also be used to wean pts off hypnotics

- Benzodiazepines: Temazepam, Oxazepam, Nitrazepam, Flunitrazepam Useful for reducing sleep onset latency and increase sleep duration. Anxiolytic effect Risk daytime drowsiness memory impairment and LT dependency.
- Non-Benzodiazepines: Zolpiderm, Zopiclone. Short half–life 2-6 hours reduce sleep onset latency and increase sleep duration Common s/e delirium, ataxia, memory disturbance
- Dual-Orexin receptor antagonist: Suvorexant Work by inhibiting wake promoting neurotransmitters orexin A and orexin B Improves subjective total sleep time and sleep onset latency Useful for patients who “can’t switch off”
- Other drugs include sedating antidepressants for comorbid depression Amitriptyline, mirtazapine, doexepin. Calcium channel alpha-2 delta ligands Gabapentin and pregabalin.
    - Melatonin: Circadin used in >55s
    - Antihistamines are not recommended

The body's natural melatonin level tends to go down as we age. Low levels of melatonin can also be caused by not having enough sleep, travelling across time zones, doing shift work and taking some medicines. Coffee, alcohol and nicotine can also lower melatonin levels.

There are 2 ways to use melatonin pills. The first is to take them so you feel sleepy and fall asleep more easily. It normally takes about 20 minutes to start to feel sleepy after you take the melatonin. Discuss the best way to do this with your doctor.
The other reason is to help re-set your body clock. Take the pill around bedtime in the time zone you are travelling to. It works better if you combine it with bright light therapy – going outdoors into the light during the morning.

Melatonin

Prescribed:
2 mgs SR taken 1 hour before bed

Side effects include
- Headache
- Dizziness
- Nausea
- Drowsiness

Herbal medication and supplements

Chamomile, Passionflower, Valerian+ Hops, St John's wort	more research needed
Valerian, Kava, Wuling, Hops	low evidence
Magnesium	limited evidence

(Cao et al., 2018; Leach & Page, 2015; Taslaman, 2014)

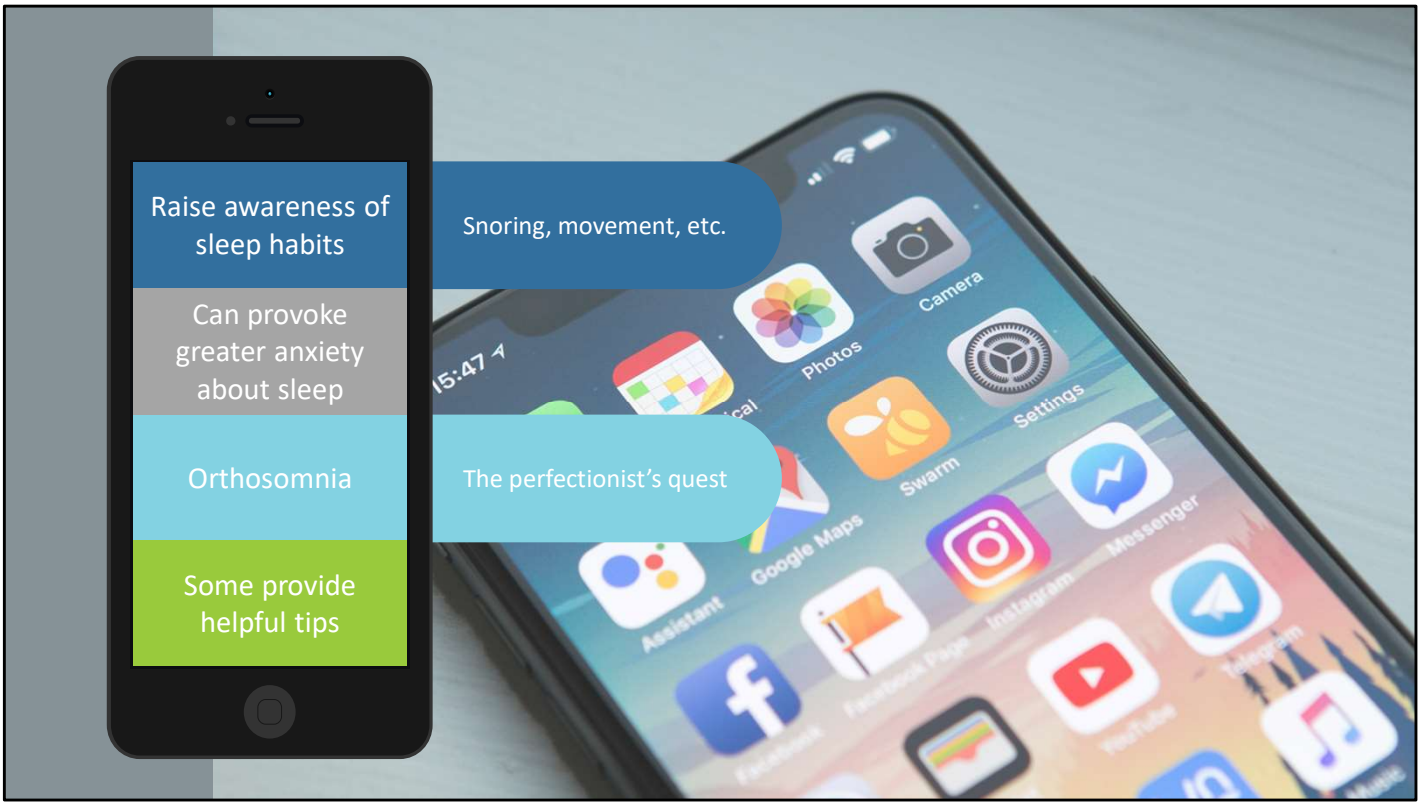
- Chamomile, Passionflower, Valerian+ Hops, St John's wort
  - more research needed
- Valerian, Kava, Wuling, Hops
  - low evidence
  - Valerian and hops boost GABA that promotes sleep Valerian antianxiolytic Hops sedative properties
  - St Johns Wort used in depression and menopause BEWARE Interactions with other meds
  - KAVE risk of liver damage
- Magnesium supplement
  - limited evidence – Used in restless leg syndrome Increases GABA encourages relaxation as well as sleep ?deficiency negative effect on gut health and link to anxiety 5 year study 1500 subjects suggested long term benefit in reducing daytime falling asleep in women No association in daytime sleepiness or night snoring Iran 2012 MG shown to reduce insomnia in elderly adults Italian double blind placebo controlled trial n small group pats in LT care facility used nightly mix of MG plus melatonin and zinc

Leafy greens vegetables whole grains, nuts, legumes

(Cao et al., 2018; Leach & Page, 2015; Taslaman, 2014)

- Dietary sources
  - leafy green vegetables whole grains, nuts, legumes
  - Peukhuri Finland investigating mechanism between diet and sleep possible link those foods impacting the availability of tryptophan and or synthesis of serotonin and melatonin

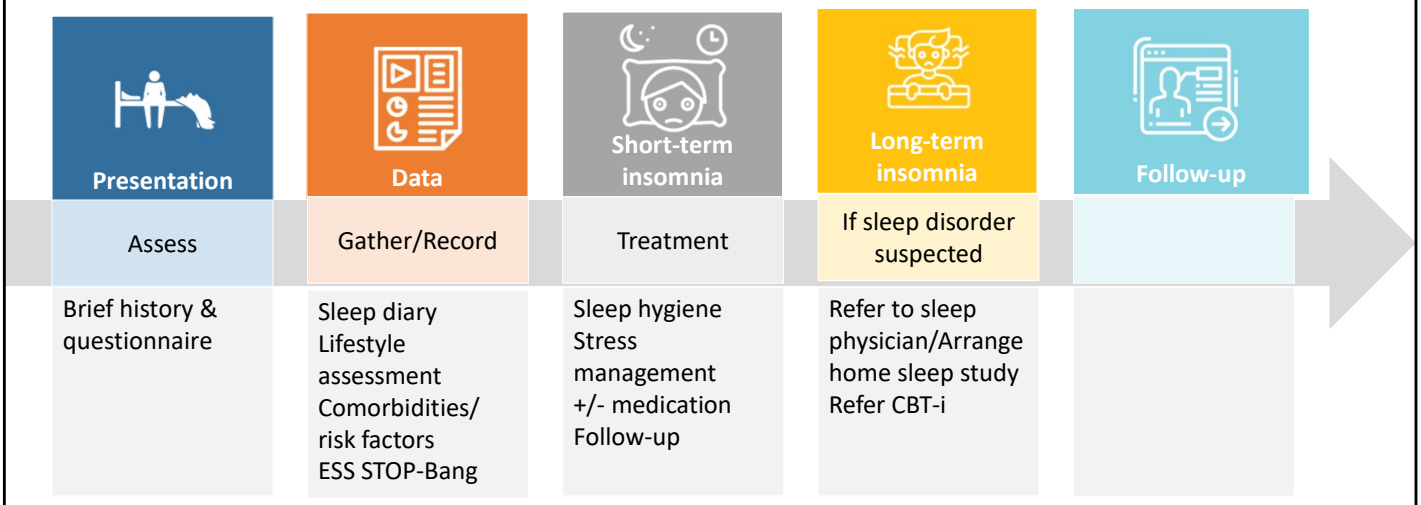
Summarise the evidence in the monitoring and treatment of sleep disorders



- Indicate trend
- ENTRAIN University of Michigan Type in sleep habits and new destination will advise when to sleep on plane and how to adapt to new environment using light exposure

Describe the referral pathways in the treatment of sleep disorders

Summary



ENT – ear, nose and throat
ESS – Epworth sleepiness scale
STOP-Bang - snoring, tiredness, observed apnoea, high BP, BMI, age, neck circumference, and male gender (STOP-Bang)

Refer psychologist?
Refer ENT

References (1/2)

Appleton, S. L., Gill, T. K., Lang, C. J., Taylor, A. W., McEvoy, R. D., Stocks, N. P., Gonzales-Chica, D. A., & Adams, R. J. (2018). Prevalence and comorbidity of sleep conditions in Australian adults: 2016 Sleep Health Foundation national survey. *Sleep Health, 4*(1), 13-19. https://doi.org/10.1016/j.sleh.2017.10.006

Baron, K. G., Abbott, S., Jao, N., Manalo, N., & Mullen, R. (2017). Orthosomnia: Are some patients taking the quantified self too far? *Journal of Clinical Sleep Medicine, 13*(2), 351-354. https://doi.org/10.5664/jcsm.6472

Bootzin, R. R., & Perlis, M. L. (2011). Stimulus control therapy. In *Behavioral treatments for sleep disorders* (pp. 21-30). https://doi.org/10.1016/B978-0-12-381522-4.00002-X

Brain Foundation. (n.d.). *Restless Legs Syndrome*. https://brainfoundation.org.au/disorders/restless-legs-syndrome/

Cao, Y., Zhen, S., Taylor, A. W., Appleton, S. L., Atlantis, E., & Shi, Z. (2018). Magnesium Intake and Sleep Disorder Symptoms: Findings from the Jiangsu Nutrition Study of Chinese Adults at Five-Year Follow-Up. *Nutrients, 10*(10). https://doi.org/10.3390/nu10101354

Czesnik, D., Howells, J., Bartl, M., Veiz, E., Ketzler, R., Kemmet, O., Walters, A. S., Trenkwalder, C., Burke, D., & Paulus, W. (2019). Ih contributes to increased motoneuron excitability in restless legs syndrome. *Journal of Physiology, 597*(2), 599-609. https://doi.org/10.1113/JP275341

El Shayeb, M., Topfer, L.-A., Stafinski, T., Pawluk, L., & Menon, D. (2014). Diagnostic accuracy of level 3 portable sleep tests versus level 1 polysomnography for sleep-disordered breathing: A systematic review and meta-analysis. *Canadian Medical Association Journal, 186*(1), E25-E51. https://doi.org/10.1503/cmaj.130952

Grima, N. A., Bei, B., & Mansfield, D. (2019). Insomnia management. *Australian Journal of General Practice, 48*(4). https://www1.racgp.org.au/ajgp/2019/april/insomnia-management

Hermans, L. W. A., Leufkens, T. R., van Gilst, M. M., Weysen, T., Ross, M., Anderer, P., Overeem, S., & Vermeeren, A. (2019). Sleep EEG characteristics associated with sleep onset misperception. *Sleep Medicine, 57*, 70-79. https://doi.org/10.1016/j.sleep.2019.01.031

References (2/2)

Leach, M. J., & Page, A. T. (2015). Herbal medicine for insomnia: A systematic review and meta-analysis. *Sleep Medicine Reviews, 24*, 1-12. https://doi.org/10.1016/j.smrv.2014.12.003

Maurer, L. F., Espie, C. A., & Kyle, S. D. (2018). How does sleep restriction therapy for insomnia work? A systematic review of mechanistic evidence and the introduction of the Triple-R model. *Sleep Medicine Reviews, 42*, 127-138. https://doi.org/10.1016/j.smrv.2018.07.005

Moon, H. J., Song, M. L., & Cho, Y. W. (2015). Clinical Characteristics of Primary Insomniacs with Sleep-State Misperception. *Journal of Clinical Neurology, 11*(4), 358-363. https://doi.org/10.3988/jcn.2015.11.4.358

National Center for Complementary and Integrative Health (NCCIH). (2016). *Relaxation techniques for health*. National Institutes of Health (NIH). https://www.nccih.nih.gov/health/relaxation-techniques-for-health

National Institute of Neurological Disorders and Stroke (NINDS). (2019). *Restless Legs Syndrome Information Page: What research is being done?* National Institute of Health (NIH). https://www.ninds.nih.gov/Disorders/All-Disorders/Restless-Legs-Syndrome-Information-Page

Reynolds, A. C., Appleton, S. L., Gill, T. K., & Adams, R. A. (2019). *Chronic Insomnia Disorder in Australia: A report to the Sleep Health Foundation*. Sleep Health Foundation. https://www.sleephealthfoundation.org.au/news/special-reports/chronic-insomnia-disorder-in-australia.html

Siebern, A. T., & Manber, R. (2011). New developments in cognitive behavioral therapy as the first-line treatment of insomnia. *Psychology Research and Behavior Management, 4*, 21-28. https://doi.org/10.2147/PRBM.S10041

Sloane, P. D., Figueiro, M., & Cohen, L. (2008). Light as therapy for sleep disorders and depression in older adults. *Clinics in Geriatric Medicine, 16*(3), 25-31.

Taslaman, M. (2014). The efficacy and safety of herbal medicine for insomnia in adults: An overview of recent research. *Australian Journal of Herbal Medicine, 26*(3), 86-93.

Walker, M. P. (2018). *Why We Sleep: Unlocking the power of sleep and dreams*. Simon & Schuster.

Image sources: The images used in this presentation are Microsoft stock images or the presenter's own, unless otherwise attributed.