Chapter 31: Sleep Wake Cycle Management

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Introduction

Problems with sleep are common in the community. A telephone survey of a representative national sample determined that about 20-35% of those surveyed reported some type of sleep difficulty a few times a week or more, and estimated that about 7% of respondents had a severe clinical insomnia and about 5% had sleep apnoea (Hillman and Lack, 2013). Inadequate sleep has personal and broader health and economic consequences, both direct and indirect. This section introduces strategies to assist in managing primary insomnia, that is, insomnia not secondary to medical or other causes. Apart from the psychological distress and daytime sleepiness it can cause, one analysis suggested that 2.9% of depression and 3.9% of workplace injuries might be attributable to primary insomnia (Deloitte Access Economics, 2011).

DSM-5-TR identifies *Insomnia Disorder* when an individual experiences one or more of: difficulty initiating sleep, difficulty maintaining sleep or early morning awakening with inability to return to sleep; and when these problems cause distress or impairment, occur at least 3 nights per week and have done so for at least 3 months (American Psychiatric Association, 2022). The diagnosis cannot be made where the individual is voluntarily restricting their sleep or where the insomnia can be attributed to another disorder (e.g., depression, anxiety disorder) or a substance, or where it is better explained by another sleep-wake disorder (e.g., narcolepsy). (American Psychiatric Association, 2013: xli).

Assessment

An assessment of sleep problems should include the following:

1. Nature of the problem and phase of sleep (e.g., initial, middle, terminal, trouble getting off to sleep or staying asleep**)**

2. Duration of the problem and any possible precipitants

3. Concern about the problem – what worries the person most about their sleep problem?

4. Careful history around sleep hygiene including:

- pattern and frequency of sleep problems, for example, how many times per week, triggered by stress etc.
- pattern of day time activities that may interfere with sleep, such as exercise or large meals too close to retiring
- any 'napping' through the day
- time to bed
- any 'rituals' before retiring (e.g., checking for noise, having a specific snack or drink)
- activities in bed: especially reading, watching TV, using mobile devices
- time taken to fall asleep: average, minimum, maximum
- any awakenings through the night, their duration and responses to them (e.g., go to toilet, have a snack, take medication or herbal preparations)
- nightmares and abnormal sleep behaviours such as sleepwalking
- time of wakening
- time of rising

The history should clarify whether the pattern differs on weekdays and weekends. Information about the sleep environment is also important, for example, noise, light and heat, physical discomforts, as well as details about caffeine, alcohol, and other substance use.

5. Factors that promote good quality sleep such as exercise and relaxation.

6. Beliefs about the causes and consequences of insomnia: here we are particularly interested in perceived risks and adverse consequences of poor sleep that may contribute to anxiety about not sleeping, which in turn may heighten arousal around bedtime. Examples of such beliefs include fears of losing control the next day (e.g., panicking, having angry outbursts) or being unable to function (e.g., making too many mistakes at work and being fired, being too tired to go to work or study). There may be beliefs that poor sleep will cause physical or mental harm, or impact adversely on relationship or work functioning. You should consider whether there is evidence of overestimation of the cost or likelihood of any feared consequences ('catastrophising').

7. Medical and psychiatric history aiming to identify any causal or contributing factors including illnesses/conditions and their treatment. Remember to ask about painful conditions and restless legs. Consider the possibility of sleep apnoea, especially in the presence of risk factors such as obesity and hypertension.

Factors contributing to insomnia will usually be evident from the history. However, it may be useful to collect additional data. For example, to ask the individual to keep a sleep diary for a week or two. The sleep diary should cover 24 hours each day, and ask the person to note times when they get into bed and out of bed, and when they are asleep. Additional factors such as exercise, stresses or any factors the patient believes may be relevant may also be noted. As 'clock watching' can contribute to anxiety about sleep, the diary keeping period is kept short.

There are also numerous mobile applications for monitoring sleep. Recent data suggest that wearable technology that relies on accelerometer data may be reasonably accurate, although possibly more so for good rather than poor sleepers (Lorenz and Williams, 2017). Nevertheless, it is widely accessible and may avoid the problem of 'clock watching'.

Management

A comprehensive management plan is based on careful assessment. The treatment package should consider biological and psychological elements, including cognitive and behavioural interventions. A stepped approach is often helpful, beginning with psychoeducation about the biology and psychology of sleep, and sleep hygiene. The two-process model of sleep-wake regulation (circadian, or Process C, and homeostatic sleep drive, or Process S) can be explained in an amount of detail and technicality appropriate to the patient's background and desire for information. What is essential is to convey information that the patient will be able to understand

and apply to their situation. Good sleep hygiene is the foundation of an effective sleep-wake cycle management program.

Common patterns of insomnia

- The individual who typically falls asleep in front of the television but then feels wide awake as soon as they get into bed. There is typically associated anxiety (performance anxiety) about being able to sleep.
- Initial insomnia (also referred to as increased sleep onset latency) associated with going to bed too early relative to rising time: typically, sleeping in then trying to go to sleep again within less than 16 hours or so, leaving inadequate time for sleep pressure (via Process S) to build.
- Waking at daybreak or with the rest of the family, for example, to get children ready for school, then going back to bed and sleeping for another few hours, followed by initial insomnia that night.
- Restless or broken sleep with awakenings to go the toilet or in response to noise from partner or children.

Evidence Base

CBT for insomnia (CBT-I) is usually delivered as a treatment package consisting of a number of elements including psychoeducation, sleep hygiene, cognitive challenging, relaxation and behavioural strategies such as stimulus control and sleep restriction. Several meta-analyses of randomised controlled studies reported medium to large effect sizes for both subjective and objective measures of sleep quality, maintained until at least 12 month follow-up (Geiger-Brown et al., 2015; Okajima et al., 2011). Psychological measures also improved, and it was noted that total sleep time showed improvement from post-treatment to follow-up.

Fundamentals of Good Sleep Hygiene

The fundamentals of good sleep hygiene are shown in the box below. Other suggestions such as a tryptophan-rich snack or drink (milk, bananas) and a warm shower or bath (avoid overheating) have no evidence to support them, but some people may find these helpful before bed, perhaps especially if such activities come to be associated with 'winding down' towards sleep.

It is appreciated that many people without insomnia do not follow all the sleep hygiene recommendations. However, the health professional can encourage people who are experiencing troubling insomnia to try to implement all these strategies fairly strictly in order to have the best chance of creating change. Once the insomnia has improved, then if they strongly desire, for example, to read in bed or sleep in on weekends, the individual can try a cautious introduction of these activities and see whether they can maintain their healthy sleep patterns.

If psychological factors such as excessive generalised worry, or specific fears around the causes or consequences of insomnia are identified, then cognitive interventions may also be helpful. Depending on the degree of improvement following implementation of sleep hygiene principles over at least a few weeks, it may be advisable to proceed to other levels of intervention. These include *stimulus control* and *sleep restriction*.

Fundamentals of good sleep hygiene

1. Have a regular rising time (most important in regulating Process S) ideally following normal circadian rhythms and aligned to natural cycles of light and dark (to set Process C). The most important factor in setting (entraining) the circadian clock is light exposure in the morning. To entrain a 24-hour regular sleep wake cycle requires getting up in the morning, at the same time every day, including weekends. After a late night or a poor night's sleep, the individual should get up at the usual time and go to bed around the usual time the next night. Ideally the person spends daytime awake and night-time in bed.
2. A regular bedtime is desirable (though not as important as a regular rising time).
3. Manage light exposure: early morning sunlight is helpful, and night-time bright and blue light (such as that emitted by electronic devices such as phones and tablets) is best avoided.
4. Restrict activities in bed to sleep and sex (i.e. no reading, use of electronic devices, watching TV).
5. Spend only the amount of time in bed that is required for sleep, plus 15-20 minutes to fall asleep.
6. Wakefulness can be affected by physical and mental activity levels, fasting/feeding, social interactions, lighting conditions and posture. Therefore, it is helpful to 'wind down' in the hour or two before bedtime: avoid stressful or activating activities, heavy meals and strenuous exercise.
7. Manage alerting substances: caffeine has a long half-life and those experiencing insomnia should at least trial avoiding it after mid-afternoon.
8. The bedroom should be quiet, dark and a comfortable temperature, without excessive bedding likely to cause overheating.
9. Avoid daytime naps longer than 10-20 minutes (the advised time limit varies).

Stimulus Control

Stimulus control refers to strategies that aim to break conditioned arousal and strengthen the bed and bedroom as stimuli for sleep. It is effective in treating sleep onset and sleep maintenance insomnia. The key strategies are:

1. Go to bed when sleepy (not too early, but also not delaying once feeling sleepy). It is important to distinguish physical fatigue from sleepiness.
2. If not asleep within 15-20 minutes, get up out of bed and sit quietly without engaging in stimulating activities or exposure to excessive light. Go back to bed when again feeling sleepy.

Stimulus control should be combined with sleep hygiene principles, particularly avoidance of non-sleep related activities in bed (apart from sex), setting a regular rising time, and avoidance of napping.

This strategy can also be employed to assist in breaking habits such as waking repeatedly to toilet where this is not necessary. Many people habitually go to the toilet when they wake up, and this can of itself present a stimulus to wake. Most people can retrain their bladder to last the night by refraining from immediately getting up to go to the toilet when they wake up. Rather, they might try lying quietly and not focussing on bladder sensations. If not asleep again within 15-20 minutes they should get up. A health assessment for causes of urinary frequency or lowered bladder capacity may be indicated for some patients.

Sleep Restriction

Sleep restriction is more accurately a restriction of time in bed. Many individuals attempt to compensate for poor quality or inadequate sleep during the night by going to bed earlier and earlier. In taking a history it is not uncommon to find that a person is spending 10 hours or more in bed. Most people have a sense of how many hours sleep they need to feel rested and in good health. For adults, this will often be around 6-8 hours, depending on age. If 7 hours sleep would be 'normal' for a person, but they spend 10 hours in bed, it is highly likely that they will be awake for 3 hours during the night. This time may occur through frequent awakenings, or in long stretches. This is an important element of psychoeducation, and based on this information many patients can make immediate changes to their sleep-related behaviours.

More formally, average time asleep and 'sleep efficiency' (proportion of time in bed that the person is asleep) can be calculated by means of a sleep diary or electronic monitoring. A rising time is determined based on factors such as work or

study routines, and normal circadian rhythms. Working backwards, a retiring time is calculated based on the average hours of sleep and allowing 15-20 minutes to fall asleep. Limiting time in bed to the reported average sleep time increases the homeostatic drive to sleep. It is not recommended to restrict time in bed to less than 5-6 hours. When the average sleep efficiency is greater than 0.85 for a week, time in bed can be increased by 15 minutes (Siebern and Manber, 2010). The 'sleep window' ideally will match normal circadian rhythms, for example, going to bed when the sleep drive is highest and the activating process lowest.

Tips for Clinical Practice

Sleep restriction is very effective and improvements can often be seen within a week. However, it requires a significant degree of motivation and commitment from the patient. Careful attention needs to be paid to making the rising and retiring times realistic. As an example, for a patient who has been routinely going to bed at 0100 hours, lying awake for a couple of hours each night, and then sleeping in until 1100, setting a new rising time of 0600 is unlikely to be realistic or consistently achievable. It can also be hard to get up and sit out of the bed when the house is cold in winter. A stepped model of intervention, beginning with the easier strategies to employ, may be a practical approach.

Further Reading

Grima, N. A., Bei, B., & Mansfield, D. (2019). Insomnia management. *Australian journal of general practice*, *48*(4), 198-202.

Sleep Health Foundation: **sleephealthfoundation.org.au/fact-sheets.html**

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References

American Psychiatric Association (2013) *The Diagnostic and Statistical Manual for Mental Disorders DSM 5.* Arlington, VA: American Psychiatric Publishing.

American Psychiatric Association (2022) *Diagnostic and statistical manual of mental disorders : DSM-5-TR.* Washington, DC: American Psychiatric Association Publishing.

Deloitte Access Economics (2011) Re-awakening Australia. The economic cost of sleep disorders in Australia, 2010. (accessed 27 June 2016).

Geiger-Brown JM, Rogers VE, Liu W, et al. (2015) Cognitive behavioral therapy in persons with comorbid insomnia: A meta-analysis. *Sleep Medicine Reviews* 23: 54-67.

Hillman DR and Lack LC (2013) Public health implications of sleep loss: the community burden. *Medical Journal of Australia* 199(8, Supplement): S7-S10.

Lorenz CP and Williams AJ (2017) Sleep apps: what role do they play in clinical medicine? *Current Opinion in Pulmonary Medicine* 23(6): 512-516.

Okajima I, Komada Y and Inoue Y (2011) A meta-analysis on the treatment effectiveness of cognitive behavioral therapy for primary insomnia. *Sleep and Biological Rhythms* 9(1): 24-34.

Siebern AT and Manber R (2010) Insomnia and its effective non-pharmacologic treatment. *Medical Clinics of North America* 94: 581-591.