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Independent learning program for GPs

Unit 485 August 2012

Sleep disorders

The Royal Australian College of General Practitioners

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Sleep disorders

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The five domains of general practice
Communication skills and the patient-doctor relationship
Applied professional knowledge and skills
Population health and the context of general practice
Professional and ethical role
Organisational and legal dimensions

The Royal Australian College of General Practitioners

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Sleep disorders are a common and perhaps underdiagnosed cause of morbidity in our community. Some sleep disorders can have a significant impact on occupational, psychological and social functioning, increase mortality from cardiovascular events and be implicated in workplace accidents and road crashes. It is vital that general practitioners have a high index of suspicion for sleep disorders and appropriately evaluate patients at risk, or those who present with symptoms. The authors of this unit bring a wealth of clinical and research experience.

The authors of this unit are:

- Jeremy Goldin MBBS, FRACP, a senior respiratory and sleep disorders physician at the Royal Melbourne Hospital, Director of Sleep Services at Western Private Hospital, and Managing Director of Heartwest and Western Sleep and Breathing Clinic. Dr Goldin has a wide spectrum of research and clinical interests including sleep disturbance in menopause, cardiac consequences of obstructive sleep apnoea, insomnia and circadian rhythm disturbance. Dr Goldin currently holds the position of treasurer of the Thoracic Society of Australia and New Zealand (TSANZ) Victorian branch, and sits on the clinical committee of the Australasian Sleep Association.
- Peter Wallbridge MBBS, an advanced trainee in respiratory and sleep medicine at the Royal Melbourne Hospital. He is currently working in the area of sleep medicine at the Royal Melbourne Hospital and intends to pursue a career in this area in the future.
- Su W Hii MBBS, FRACP, a respiratory and sleep physician at the Royal Melbourne Hospital and a general physician at Bayside Health, Victoria. She completed her fellowship training in 2005, after an additional year of fellowship in infectious diseases and intensive care medicine. Her special interests include improving smoking cessation services, menopause research and marijuana-induced lung diseases.

The learning objectives of this unit are to:

- routinely consider the possibility of a sleep disorder in patients who present with symptoms such as sleepiness, tiredness, restless sleep and snoring, and conditions like obesity
- competently obtain a thorough sleep history and perform a focused physical examination as part of the clinical evaluation of symptoms that suggest a sleep disorder
- confidently use clinical assessment tools such as the Epworth Sleepiness Scale and Modified Mallampati score in the assessment of patients who present with sleepiness
- increase competency in the diagnosis and management of some common sleep disorders such as obstructive sleep apnoea, narcolepsy, restless legs syndrome, insomnia from a variety of causes and circadian rhythm sleep disorder
- increase awareness of the various investigations such as a sleep diary, actigraphy, in-laboratory polysomnography and the multiple sleep latency test used in the assessment of suspected sleep disorders.

We hope this unit of check will assist you to confidently assess, diagnose and manage patients who present with symptoms that suggest a sleep disorder.

Kind regards

Catherine Dodgshun MBBS, DRANZCOG, FRACGP

Medical Editor

CASE 1

ERIC IS SLEEPY

Eric, aged 57 years, is a truck driver who presents with sleepiness. He has a past history of ischaemic heart disease, type 2 diabetes mellitus, hypertension and hyperlipidaemia and he is on metformin, irbesartan, atorvastatin and aspirin. Eric smokes 25 cigarettes a day, and consumes 6 standard drinks of alcohol most nights of the week.

Eric describes increasing sleepiness during the day that has been getting worse over the past 12 months. He will often fall asleep inappropriately. He is a loud snorer and his wife says she often stays awake at night because Eric stops breathing and she is worried that he won't wake up. Recently, he has been more irritable and had a number of arguments with his daughters. On further questioning, Eric describes falling asleep at the traffic lights, although he says he has not been involved in any road traffic accidents.

QUESTION 1

What is your working diagnosis?

QUESTION 2

What would you look for on physical examination? What clinical tools might help in your assessment?

FURTHER INFORMATION

On examination Eric is obese, with a body mass index (BMI) of 38 kg/m^2. He has a Modified Mallampati (MMP) score of 3 and a neck circumference of 45 cm. The remainder of his physical examination is normal. His score on the Epworth Sleepiness Scale (ESS) is 18/24.

QUESTION 3

What investigations would you consider requesting to confirm your working diagnosis?

QUESTION 4

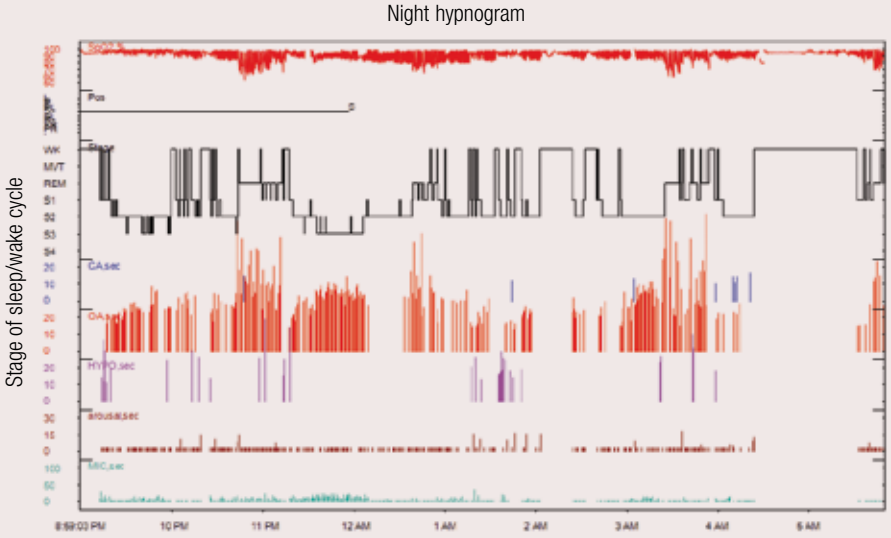
What advice would you give Eric regarding his work while he is being investigated?

FURTHER INFORMATION

Eric undergoes a sleep study (see *Figure 1*).

QUESTION 5

What is the diagnosis?



WK = Awake
MVT = Movement
REM = Rapid Eye Movement sleep
S1 = Stage 1 of non-REM sleep
S2 = Stage 2 of non-REM sleep
S3 = Stage 3 of non-REM sleep
S4 = Stage 4 of non-REM sleep

SpO_2 = saturation of oxygen
Pos = Sleeping position
Stage = Stage of sleep
CA = Central apnoeas
OA = Obstructive apnoeas
HYPO = Hypopnoeas
MIC = Microphone (ie. audible sounds)

Figure 1. Eric's sleep study

QUESTION 6

How would you treat this condition?

QUESTION 7

When would you advise Eric that he is able to return to work?

CASE 1 ANSWERS

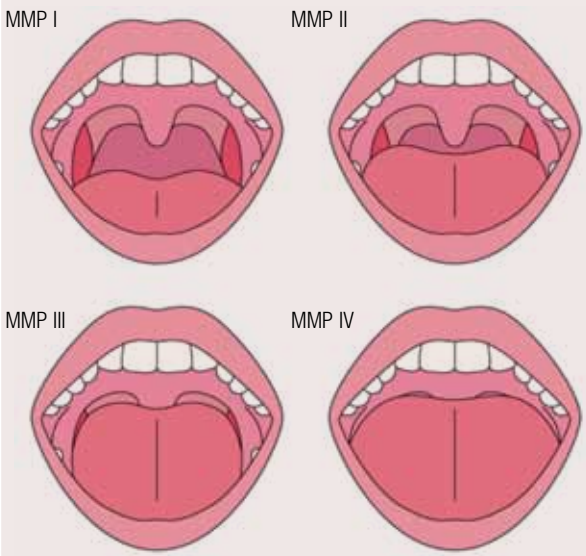
ANSWER 1

Eric has symptoms suggestive of obstructive sleep apnoea (OSA). This is a common problem, affecting up to 25% of adult males in Australia.[1] Common night-time clinical features include snoring, observed apnoeas, nocturnal choking and nocturia.[2] Daytime sleepiness, or fatigue, is the most common daytime symptom with irritability or mood changes also commonly noted.

ANSWER 2

There are several examination findings that are useful in the assessment of suspected OSA. These include an elevated BMI, a crowded oropharynx (ie. large tonsils, a thick stumpy uvula and a large set back tongue), increased neck circumference[4,5] and retrognathia.

The most commonly used tool for assessment of the oropharynx is the modified mallampati (MMP) score, which strongly correlates with OSA[6] (see *Figure 2*).



MMP grades range from 1–4 as follows:

- MMP I – tonsils, pillars and soft palate are easily visible
- MMP II – uvula, pillars and upper pole of tonsils visible
- MMP III – tonsils, pillars and tip of uvula not visible; only part of soft palate visualised
- MMP IV – only hard palate visible.

Figure 2. Modified Mallampati (MMP) score

Adapted from: den Herder C, Schmeck J, Appelboom DJ, de Vries N. Risks of general anaesthesia in people with obstructive sleep apnoea. BMJ 2004;329(7472):956.

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A neck circumference of greater than 40 cm has been found to have a sensitivity of 60% and a specificity of 93% for OSA independent of gender.[3] However, clinical examination and history alone are able to predict only approximately 50% of cases of obstructive sleep apnoea,[1] so further investigation is required (see *Answer 3*).

The Epworth Sleepiness Scale (ESS) is a useful tool that evaluates sleepiness by estimating the likelihood of dozing (see *Figure 3*). A score of >10 is considered abnormal, with increasing scores reflecting increasing sleepiness.

Name_____ Today's date_____

Your age_____ Your sex (M/ F)_____

How likely are you to doze off or fall asleep in the following situations, in contrast to feeling just tired?

This refers to your usual way of life in recent times.

Even if you haven't done some of these things recently try to work out how they would have affected you.

Use the following scale to choose the most appropriate number for each situation:

0 = would never doze

1 = slight chance of dozing

2 = moderate chance of dozing

3 = high chance of dozing

It is important that you answer each question as best you can.

Situation	**Chance of dozing (0–3)**
Sitting and reading	_____
Watching TV	_____
Sitting, inactive in a public place (eg. a theatre or a meeting)	_____
As a passenger in a car for an hour without a break	_____
Lying down to rest in the afternoon when circumstances permit	_____
Sitting and talking to someone	_____
Sitting quietly after a lunch without alcohol	_____
In a car, while stopped for a few minutes in the traffic	_____

Figure 3. Epworth Sleepiness Scale

Available at http://epworthsleepinessscale.com

ANSWER 3

The investigations for OSA can be divided into four categories based on the level of evidence for their use.[7] They range from a level one study, which consists of an in-laboratory polysomnography (PSG) undertaken with overnight observation, to a level four study, which consists of overnight pulse oximetry. In-laboratory PSG is the gold standard for the diagnosis of OSA and involves multiple channels to assess sleep quality, adequacy of ventilation, brain function, eye movements and heart rhythm, as well as chest wall and abdominal wall movements. Intermediate tests involve non-supervised home-based sleep studies with fewer monitoring channels. The use of home testing with portable monitors is limited to patients with a high pre-test probability of moderate to severe OSA. These studies are not recommended when there are comorbid conditions including moderate

to severe pulmonary disease, cardiac failure or neuromuscular disease and should be avoided when diagnoses other than OSA are being considered.[8] Patient information regarding sleep studies (and multiple other sleep medicine topics) is available on the Sleep Health Foundation website (see *Resources*).

ANSWER 4

Austroads' *Assessing fitness to drive for commercial and private vehicle drivers* provides information on OSA and driving.[9] Patients suspected of having sleep apnoea should be warned about the potential effect on driving, and it is then their responsibility to avoid driving if sleepy. A person is not fit to hold an unconditional licence if they have self-reported episodes of sleepiness, drowsiness while driving, motor vehicle accident(s) caused by sleepiness or inattention. If they pose a significant driving risk in the opinion of the treating doctor they are also not fit to hold an unconditional licence. The legal responsibility for notifying the relevant state or territory authority regarding medical conditions, which may affect driving, lies with the driver once they are aware of the impact that their condition may have on driving. However, if there are concerns that the patient continues to drive despite appropriate advice and poses a public safety risk then direct reporting to the licensing authority should be considered. In South Australia and the Northern Territory reporting is mandatory, whereas this is not the case in the other states and territories. However, there are statutes that may protect health professionals who report without patient consent from litigation.[9]

ANSWER 5

Eric has severe OSA. The hypnogram (*Figure 1*) shows frequent obstructive apnoeas in all sleep stages associated with profound arterial oxygen desaturations. There are frequent cortical arousals associated with these respiratory events, with resulting fragmented sleep. Consensus guidelines suggest that if respiratory events (obstructive apnoeas, hypopnoeas or respiratory event related arousals) on PSG occur at a frequency of >15 events/hour (also called the apnoea-hypopnoea index, or AHI) then a diagnosis of OSA is confirmed. OSA can also be confirmed in patients with >5 events /hour if there are associated symptoms. OSA severity is considered mild if the AHI is >5 events/hour but <15 events/hour, moderate if the AHI is ≥15 events/hour but <30 events/hour, and severe if the AHI is ≥30 events/hour.[8]

The significance of mild or moderate OSA is controversial and current practice in managing milder forms of OSA is variable. In many facilities, mild or moderate OSA is generally managed conservatively unless the patient wishes to commence active treatment, has significant comorbidities such as difficult to control hypertension or ischaemic heart disease, or if a patient has symptoms such as hypersomnolence that are clearly due to their OSA. Consider excluding non-sleep apnoea causes of hypersomnolence such as chronic sleep deprivation in a patient with mild to moderate sleep apnoea on PSG before offering active treatment.

ANSWER 6

OSA is a chronic condition requiring long-term collaborative management. Treatment for OSA should be multimodal and include weight loss, exercise, avoidance of alcohol and sedatives and positional therapy (strategies to encourage lying on the side rather than the back).[8] Continuous positive airway pressure (CPAP) with heated humidification is the treatment of choice and should be offered to all patients with severe OSA.[8,10] Oral appliances (ie. mandibular advancement splints) are not as efficacious as CPAP, however, they may have a role in patients with mild to moderate OSA based on patient preference or intolerance of other management strategies including CPAP.[11] There is limited evidence to support the use of surgical techniques for OSA as first line treatment – they may be considered in patients with severe OSA who do not tolerate other treatments and have correctable anatomy.[12]

FEEDBACK

Untreated OSA is an independent risk factor for motor vehicle accidents, both in commercial[13] and non-commercial[14] drivers. Sleepiness does not consistently correlate with accident risk, and with treatment, the risk of crashes returns to population levels with improvements after as little as 2 days.[14]

OSA is associated with metabolic effects including altered glucose metabolism,[15] hypertension and dyslipidaemia independent of obesity.[16] Untreated severe OSA (AHI ≥30 events/hour) is also associated with a 2.5 times increased risk of fatal and non-fatal cardiovascular events (acute coronary syndrome including AMI, and stroke) independent of other cardiovascular risk factors, which may return to population levels with CPAP treatment.[17]

ANSWER 7

A sleep specialist may grant a conditional commercial licence after review where there has been a satisfactory response to treatment and the patient has demonstrated treatment compliance. Annual review is recommended.[9]

CASE 2

NICK IS SLEEPY AND HAS VIVID DREAMS

Nick, aged 21 years, is a university student who presents with a 3-year history of hypersomnolence, which is significantly affecting his university studies. He describes falling asleep regularly in lectures and often dozes when stopped at traffic lights. Recently he had a low impact motor vehicle accident after falling asleep at the traffic lights. Nick has no significant past medical history and is on no medications. He is a non-smoker and has an alcohol consumption of one standard drink per day and a caffeine consumption of 6 cups of coffee per day.

Nick maintains regular sleep patterns, retiring to bed at 11 pm and rising at 6.30 am. He experiences a couple of nocturnal awakenings without a clear cause. On weekends he sleeps until midday. He describes vivid dreams particularly at the onset of sleep and has experienced frequent episodes of an inability to move after waking, in some cases for minutes. Nick is known to snore, particularly following alcohol consumption, but does not experience any mouth dryness or nocturnal choking. In general, Nick feels refreshed after a night's sleep or after a 'power nap'. There is no family history of any significant sleep disorder. You determine that his score on the ESS is 18/24.

On physical examination, Nick is an overweight male with a BMI of 29 kg/m^2. He has an MMP score of 2 with moderate-sized tonsils, no retrognathia and patent nasal passages.

QUESTION 1

What is your working diagnosis?

QUESTION 2

What is the aetiology of this condition?

QUESTION 3

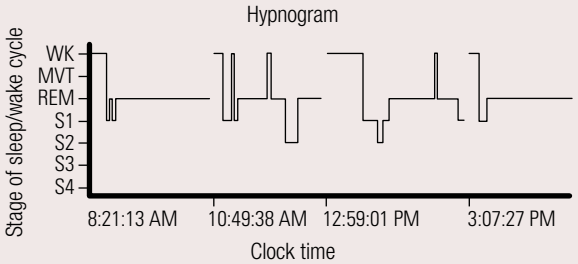
List two other factors/diagnoses that may contribute to Nick's sleepiness.

QUESTION 4

What investigations, if any, would you perform in Nick to confirm your working diagnosis?

FURTHER INFORMATION

Nick completes a 7-day sleep diary and undergoes actigraphy, which confirms that his sleep/wake cycle is regular and his sleep duration is 6.5 hours per night. He then undergoes an overnight in-laboratory PSG. A multiple sleep latency test (MSLT) confirms the diagnosis of narcolepsy (see *Figure 4*).



Summary

	NAP 1	NAP 2	NAP 3	NAP 4
Lights off (clock time)	8:21:13 AM	10:49:38 AM	12:59:01 PM	3:07:27 PM
Sleep onset (SO) (clock time)	8:24:43 AM	10:52:08 AM	1:06:01 PM	3:09:57 PM
Lights ON (clock time)	8:41:13 AM	11:07:38 AM	1:22:01 PM	3:24:27 PM
Time in bed (minutes)	00:20:00	00:18:00	00:23:00	00:17:00
Total sleep time (minutes)	00:16:30	00:14:30	00:15:30	00:14:30
Sleep latency (minutes)	00:03:30	00:02:30	00:07:00	00:02:30
REM latency (minutes)	00:00:00	00:01:30	00:03:30	00:00:30

Average sleep latency (4 values) :00:03:52 minutes
Average REM latency (4 values) :00:01:22 minutes

WK = Awake
MVT = Movement
REM = Rapid Eye Movement sleep
S1 = Stage 1 of non-REM sleep
S2 = Stage 2 of non-REM sleep
S3 = Stage 3 of non-REM sleep
S4 = Stage 4 of non-REM sleep

Figure 4. Nick's multiple sleep latency test.
Reproduced with permission from The Royal Melbourne Hospital Sleep Disorders Unit.

QUESTION 5

What implications, if any, would this condition have for Nick's future vocation?

QUESTION 6

What advice regarding driving would you give to Nick?

QUESTION 7

What is your management plan for Nick?

CASE 2 ANSWERS

ANSWER 1

Nick has clinical features suggestive of narcolepsy. *The International Classification of Sleep Disorders* (see *Resources*) describes narcolepsy as either with or without cataplexy. The four classic symptoms of narcolepsy are excessive daytime sleepiness, cataplexy, sleep paralysis and hypnagogic (sleep onset) hallucinations.

Cataplexy is a sudden loss of muscle tone, typically in response to emotional stimuli such as laughter or surprise. It usually involves the head, jaw or legs.[18] It is not associated with loss of awareness. Sleep paralysis may occur at sleep onset, or on awakening where the patient is unable to move or speak and there may be associated hallucinations. Typically, there is full recollection of these events. Hallucinations tend to be visual or auditory, and the patient may be incorrectly diagnosed with a psychotic disorder.[19] Sleep paralysis and hallucinations are thought to reflect intrusion of rapid eye movement (REM) sleep phenomena into wakefulness.

ANSWER 2

Narcolepsy is thought to be due to deficiency of the central nervous system peptide hypocretin (also called orexin), which is a neurotransmitter that controls wakefulness and appetite.[20] There are specific human leucocyte antigen (HLA) subtypes associated with narcolepsy that suggest that there may be an underlying autoimmune aetiology.[21] There is significantly increased risk in first degree relatives (larger than would be expected by HLA type alone), suggesting there are other genetic factors involved. Twin studies suggest there is also a significant environmental component to the development of narcolepsy,[22] however, the required exposure is yet to be determined.

ANSWER 3

Other potential factors, which may be contributing to Nick's sleepiness include sleep restriction and/or possible circadian rhythm disturbance. It is important to take a careful sleep history to assess for these problems. A sleep history involves defining the specific sleep problem, assessing the onset and course of the problem, assessing 24-hour sleep patterns, obtaining a collateral history from bed partners, assessing for comorbid sleep problems – as well as obtaining a family history – and looking at the impact the problem is having on personal and social functioning.[23]

There is debate over the amount of sleep required by an individual each night. Evidence suggests that chronic sleep restriction to 6 hours per night is equivalent to up to 2 nights of total sleep deprivation and is also associated with reduced cognitive performance and increased sleepiness.[24,25]

Circadian rhythm sleep disorders occur as the result of change in the sleep/wake cycle, and can be due to either extrinsic or endogenous problems. Examples include shift work disorder, jet lag disorder and delayed and advanced sleep phase disorders (disorders in which there is a shift in the body clock when compared with the light/dark cycle of the enviroment).[26]

ANSWER 4

Where a patient reports excessive sleepiness, establishment of a diagnosis of narcolepsy requires confirmation of hypersomnolence with a tool such as the EES (See *Figure 3*) as well as an abnormal diagnostic test such as the multiple sleep latency test (MSLT).

The MSLT consists of four or five 20-minute naps during the day. The average time taken to fall asleep during these naps (the mean sleep latency) is recorded and any REM periods are noted. The sleep the night before is recorded with an overnight PSG to ensure that sleep deprivation or other sleep disorders such as OSA are not contributing factors. Diagnostic guidelines for narcolepsy require that the sleep/wake cycle has been assessed for at least 7 days prior to PSG/MSLT with documentation such as a 7-day sleep diary and actigraphy. Actigraphy is a portable device that records movement over a prolonged period of time and provides information on sleep and waking times, as well as sleep duration and efficiency.

In the absence of cataplexy, to make a diagnosis of narcolepsy, a mean sleep latency of less than 8 minutes is required, with 2 or more sleep-onset REM periods (see *Figure 4*).[27]

The presence of HLA-DQB1*0602 and low CSF hypocretin are also supportive of a diagnosis of narcolepsy, but are not essential for the diagnosis.

ANSWER 5

Narcolepsy often has a significant impact on social, educational and occupational functioning.

Over 50% of those with narcolepsy who are attending formal schooling have reduced academic achievement and difficulty concentrating. This extends to their work life where more than 35% of those with narcolepsy have lost or left a job due to their symptoms.[28] Patients with narcolepsy should be advised to avoid occupations where there is the possibility of physical harm from inattentiveness or sleepiness. The methods of dealing with a diagnosis of narcolepsy vary between individuals with some welcoming a diagnostic label as a way of being able to explain their symptoms, and others finding that it leads to assumptions and stereotypes about their behaviour and personality.[29]

The use of stimulant medication, such as dexamphetamine for the treatment of narcolepsy, also has the potential to impact on occupations where drug testing is utilised.[30]

ANSWER 6

Nick should be advised not to drive until his symptoms are controlled. Anyone with a confirmed diagnosis of narcolepsy is not considered fit to hold an unconditional driving licence. A non-commercial conditional licence may be granted to a patient who is considered to have responded to treatment on periodic review by a sleep disorders specialist. Commercial licences are not available to those with cataplexy, and a conditional commercial licence can be considered in those who have an annual review by a sleep specialist and who:

- have not had cataplexy as a feature in the past
- regularly take medication
- have not had symptoms for 6 months, and
- have a normal sleep latency on maintenance of wakefulness test, which is a specialised test evaluating an individual's ability to maintain vigilance in a passive situation.[9]

ANSWER 7

There is currently no cure for narcolepsy. Therefore, management focuses on reduction in daytime sleepiness and management of REM dissociative symptoms.

The management of excessive sleepiness is typically achieved using stimulant medication in conjunction with non-pharmacologic methods. Non-medication management includes strict attention to sleep hygiene, naps prior to attention-intensive tasks, and avoidance of alcohol and carbohydrate rich meals.[18] Currently in Australia dexamphetamine is used as first line treatment. Modafinil, a wakefulness-promoting agent, can be considered if there is a contraindication to dexamphetamine. It has several advantages over other stimulants – it is long acting, has a low potential for abuse and has good randomised trial evidence.[20]

Management of REM phenomena including cataplexy requires use of serotonin-noradrenaline reuptake inhibitors, which are effective in reducing the amount of REM sleep.[18] Alternative medications include tricyclic antidepressants (clomipramine is considered the treatment of choice) and fluoxetine.[31]

CASE 3

DIANNE HAS RESTLESS SLEEP

Dianne, aged 38 years, presents with 5 years of restless and unrefreshing sleep resulting in daytime sleepiness. Her past history includes a tonsillectomy and she is on no medications. She smokes 20 cigarettes a day and has done so for the last 10 years. Dianne rarely consumes alcohol and has a caffeine intake of 2 cups of coffee per day.

Dianne works as a personal assistant from 9 am until 5 pm weekdays. She goes to bed at 10 pm and it usually takes her more than an hour to get to sleep. She wakes frequently throughout the night, particularly in the first part of the night, and wakes unrefreshed at 7 am. She snores intermittently, particularly when lying on her back, but there is no history of observed apnoeic events, nocturnal choking or dry mouth. She says that she has leg pains and an irresistible urge to move her legs at rest occurring every day, particularly in the evening. This improves when she gets up and walks. Dianne holds a motor vehicle licence and mainly drives on weekends. Her score on the ESS is 12/24.

On examination, Dianne is a thin woman with a BMI of 18 kg/m^2. She has an MMP of 1, there is no retrognathia or nasal congestion and her neck circumference is 34 cm.

QUESTION 1

What is the most likely diagnosis?

QUESTION 2

What blood tests would you request to exclude secondary causes of this condition?

QUESTION 3

Under what circumstances would you consider referral for a sleep study for this condition?

QUESTION 4

What treatment options are available?

FURTHER INFORMATION

You request iron studies, urea, electrolytes and creatinine and thyroid stimulating hormone, which are all normal. You discuss the diagnosis and treatment with Dianne then commence a dopamine agonist, pramipexole.

QUESTION 5

What specific side effects should you warn Dianne about and monitor her for?

FURTHER INFORMATION

Nine months after starting pramipexole, Dianne presents to you with worsening symptoms progressively earlier in the night.

QUESTION 6

How would you manage this?

CASE 3 ANSWERS

ANSWER 1

Dianne has restless legs syndrome (RLS). The International Restless Legs Syndrome Study Group has developed diagnostic criteria, consisting of four essential and three supportive criteria. The essential criteria are:

- an urge to move the legs, usually accompanied by uncomfortable or unpleasant sensations in the legs
- the urge to move or unpleasant sensations usually begins during periods of rest or inactivity
- this urge is partially or completely removed by movement such as walking or stretching, at least as long as the activity continues, and
- the urge to move or unpleasant sensations are worse at night or in the evening than during the day or only occur at night.[32]

The suggested supportive clinical features are not essential to make a diagnosis of RLS, but may be helpful where there is diagnostic uncertainty. These features are a family history of RLS (more than 50% of patients with RLS had a family history of the condition in one series),[33] additional periodic leg movements during wakefulness or sleep (periodic leg movements are described as rhythmic big toe extension with ankle dorsiflexion and occasional knee or hip flexion) or improvement after starting a dopaminergic agent.[32]

ANSWER 2

Dianne should have iron studies, urea, electrolytes and creatinine and a test for thyroid function. The most common secondary cause of RLS is iron deficiency. RLS is often associated with renal failure, with uraemic patients having poor sleep quality,[34] and can also be associated with hypothyroidism.

ANSWER 3

Referral for a sleep study should be considered in cases of suspected RLS if:

- fewer than four of the essential clinical criteria of the International Restless Legs Syndrome Study Group are present. However, as Dianne meets all the four essential clinical criteria, a sleep study is not necessary
- there are concerns about the possibility of a comorbid sleep problem. Individuals with RLS often have periodic limb movements in sleep (PLMS), which may be demonstrated with an in-laboratory PSG and can be associated with sleep fragmentation. These are present if there are four consecutive leg movements lasting 0.5–5 seconds.[32] The presence of PLMS supports the diagnosis of RLS in the appropriate clinical setting, occurring in approximately 80% of cases, but PLMS are non-specific and have also been described in association with other sleep disorders.[34]

ANSWER 4

The treatment of primary RLS is pharmacological. Secondary causes should be excluded, and if a patient is iron deficient this should be corrected first. There are four categories of medications used in the treatment of RLS: dopaminergic agents, anticonvulsants, benzodiazepines and opiates.

Effective dopaminergic medications include levodopa-carbidopa and synthetic dopamine agonists (pramipexole, pergolide and ropinirole). Dopamine agonists are now the preferred medication due to better efficacy and a better side effect profile. Ergoline dopamine agonists, such as pergolide, are associated with significant nausea, but more concerning are the rare side effects of pleuropulmonary and retroperitoneal fibrosis and cardiac valvulopathy.[35] For this reason the medication of choice in Australia tends to be pramipexole, a non-ergoline dopamine agonist.[36] Other options such as gabapentin, long-acting benzodiazepines (i.e. clonazepam) and opiates are considered second line agents.[34]

ANSWER 5

Pramipexole is generally well tolerated, with nausea being the most frequent side effect. The most important potential side effects of pramipexole (and all non-ergoline dopamine agonists) are impulse control disorders. These may manifest as compulsive shopping, pathological gambling, hypersexuality or punding (repetitive purposeless actions) with a mean duration of treatment of 9.5 months prior to the onset of such an adverse effect.[37]

ANSWER 6

A problem with the use of dopaminergic agents in the treatment of RLS is augmentation. Augmentation is defined as the usual daily onset of restless legs symptoms starting earlier than they did before treatment. Augmentation may also result in increased severity of symptoms, the spread of symptoms to other parts of the body and reduced duration of relief from symptoms with treatment.[38] Augmentation occurs much more frequently with levodopa treatment than with the dopamine agonists. Augmentation with pramipexole occurs on average after 8 months of treatment and is generally mild. These mild symptoms can typically be managed by giving the dose earlier in the day.[39] When symptoms are more severe, the medication may need to be substituted for a non-dopaminergic agent for a month and then recommenced.

CASE 4

WENDY FEELS TIRED

Wendy, aged 32 years, is a mother of two children aged 7 years and 5 years. When her children commenced primary school Wendy went back to work as a nurse in a busy rural hospital. She works night shifts with 5 nights on and 2 nights off on weekends. Wendy presents with a 3-month history of tiredness that is starting to affect her work performance. She also describes difficulties getting to sleep when she returns home from work. Wendy has no significant past medical history, is on no regular medications, rarely drinks alcohol, is a non-smoker and drinks the occasional cup of coffee.

QUESTION 1

What further information do you believe you need?

FURTHER INFORMATION

Wendy had no problems previously with her sleep until she commenced shift work. She says she goes to bed at approximately 10 am and wakes at 3.15 pm with her alarm. On days off she goes to bed at 10 pm and it takes her some time to get to sleep before she wakes at approximately 8am. She trialled sleeping tablets, but found they made her more tired. Wendy says she does not snore and you determine that she is not depressed or anxious. A symptom review is otherwise negative. Her score on the ESS is 12/24.

On examination Wendy is a tired-looking woman. Her BMI is 28 kg/m^2, she has patent nasal passages, an MMP of 1, and no retrognathia.

QUESTION 2

What is the most likely diagnosis?

QUESTION 3

What would be your next step? What investigations would you request?

FURTHER INFORMATION

A sleep diary and actigraphy confirm Wendy's history of her hours of sleep to be accurate. They show that on her off days she does not get to sleep until 3 am, and then wakes at about 8 am. Full blood examination, urea, electrolytes and creatinine, thyroid stimulating hormone and iron studies are all normal.

QUESTION 4

What simple interventions may assist Wendy to sleep during the day?

FURTHER INFORMATION

Wendy is keen to discuss medication options.

QUESTION 5

What would you advise her?

QUESTION 6

How would you suggest that Wendy manage her sleep during her days off?

CASE 4 ANSWERS

ANSWER 1

A careful sleep history is paramount. This includes identifying the onset of Wendy's symptoms and their relationship to her commencing shift work, evaluating her sleep environment – particularly noise and light entering into the room during the day – and determining her sleep/wake times on both work and non-work days. A thorough history should aim to exclude sleep disorders such as OSA and periodic leg movement disorder, chronic medical conditions (such as iron deficiency), mood disorders (such as depression and anxiety), and medications – all of which can cause tiredness.

Physical examination should be targeted depending on the history elicited. In general, where there is a possibility of a sleep disorder such as OSA, physical examination should include measurement of BMI, examination of the patency of the nasal passages, assessment for retrognathia and assessment of the MMP score.

ANSWER 2

Sleep disturbance in shift workers is common, with more than 30% of night shift workers and 26% of rotating shift workers complaining of either insomnia or excessive sleepiness.[40]

In Wendy, the most likely diagnosis is a circadian rhythm sleep disorder, more specifically shift work sleep disorder. The circadian rhythm is the 'body clock' that assists in maintaining the sleep/wake cycle. The normal circadian rhythm is slightly longer than 24 hours, and so to be kept in check we rely on 'environmental time cues', the most important of which is the light/dark cycle from the sun[41] (see *Figure 5*). Non-photic (not related to light exposure) cues also play a role although these are much less potent than the light/dark cycle. When this is disrupted for any reason, there are significant impacts on an individual's sleep (for example, jet lag).

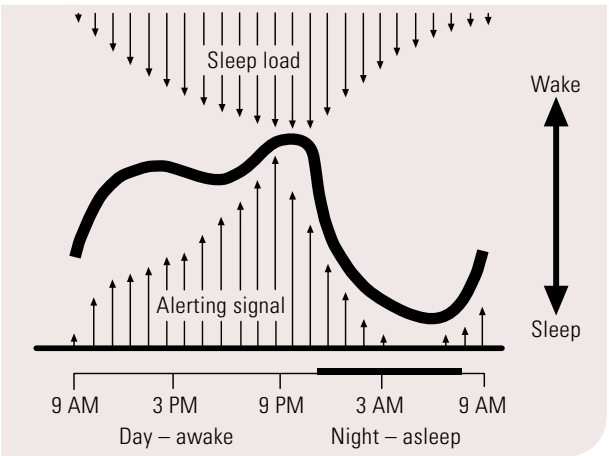


Figure 5. The normal circadian rhythm

Adapted from: Blatter K, Cajochen C. Circadian rhythms in cognitive performance: methodological constraints, protocols, theoretical underpinnings. Physiol Behav 2007;90(2–3):196–208. Reproduced with permission.

ANSWER 3

The most appropriate initial strategy is to request a sleep diary to be completed. A sleep diary is typically filled out for at least 7 days, and records meals, caffeine intake and exercise as well as bedtime, estimated time of getting to sleep and waking. There is no standardised sleep diary format so their format and content vary between practitioners.

Seven-day actigraphy can be a useful adjunct to a sleep diary. Actigraphy (described in *Answer 4, Case 2*) correlates strongly with total sleep time on PSG and provides information on sleeping habits.[42] Guidelines rate the use of actigraphy in assessment of patients with suspected circadian rhythm sleep disorder as an 'option'.[42]

Other useful investigations relate to the exclusion of other possible causes of sleepiness. Full blood examination, urea, electrolytes and creatinine, iron studies and a test for thyroid function are useful to look for the presence of anaemia, renal failure, iron deficiency and thyroid disorders.

ANSWER 4

One of the major problems faced by night shift workers is that typically the brightest light they are exposed to in a 24-hour period is on their way home to sleep. If bright light is given after the nadir in body temperature (typically corresponding to maximal sleepiness), it results in phase delay (the circadian rhythm is delayed, and falling asleep is more difficult). This results in obvious problems for shift workers.[43] It has been shown that exposure to bright light (typically using a light box) during a night shift, in combination with wearing dark sunglasses on the commute home as well as a dark sleep environment, helps entrain the circadian rhythm and improve work function.[44] Melatonin administration prior to sleep has also been shown to be effective, however, it is worth noting that the effect of light on circadian rhythm is much stronger than melatonin, and so a combined approach is required. See *Figure 6* for a suggested strategy to help entrain the circadian rhythm to a night shift.[45]

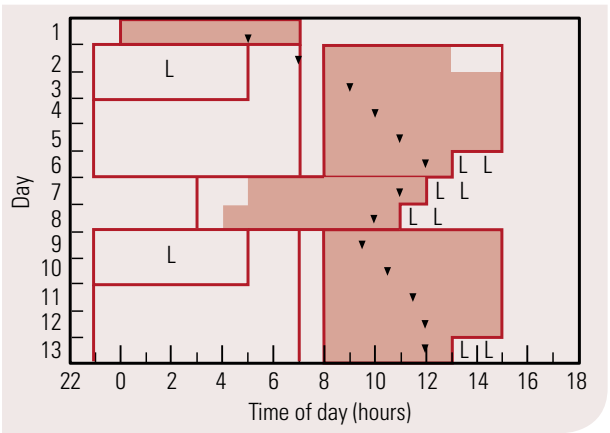


Figure 6. A light and sleep schedule designed to produce partial circadian adaptation to permanent night work.
Day 1: typical sleep time (midnight to 7 am) and temperature minimum (at 5 am) for an individual before starting night work. Days 2–6 and 9–13: typical night work schedule. Days 7–8: nights off. Shaded areas show sleep/dark periods, when the worker should be in bed.

L = appropriate times for light exposure. ▼ = temperature minimum.

Adapted from: Burgess HJ, Sharkey KM, Eastman CI. Bright light, dark and melatonin can promote circadian adaption in night shift workers. Sleep Med Rev 2002;6(5):417. Reproduced with permission from Elsevier.

ANSWER 5

The administration of melatonin prior to daytime sleep improves sleep quality and duration, and in some patients can result in a shift in circadian rhythm. Melatonin does not appear to improve nocturnal work function. Effectiveness does not appear to correlate with dose, but good quality studies showed efficacy from doses ranging from 1.8–3 mg.[46] Modified release preparations of melatonin are available in Australia and may be a more suitable preparation for this indication.

Hypnotic medications, such as benzodiazepines, improve duration and perceived quality of sleep without appearing to improve night time alertness or function. Given this and their potential for dependence we recommend these be avoided.

With regards to enhancing alertness during the night in those with shift work disorder, guidelines suggest that the use of modafinil or caffeine may be indicated.[46] Evening naps 2 hours prior to the start of a night shift with caffeine taken immediately prior have been shown (in the short term) to improve night shift work performance.[47]

ANSWER 6

Following the final night of work for the week, a shortened daytime sleep with some bright light exposure (preferably outdoor light) after sleep with the aim of advancing the circadian clock slightly is recommended.[48] It is advised that this is then followed by sleeping as late as possible on the days off (ie. from 3–4 am to 11 am–12 pm), which minimises the impact to the circadian adaption that takes place during workdays. Hopefully, this will result in a small enough shift in the circadian rhythm that it will not have a significant impact on sleep when returning to work on the Monday night (see *Figure 6*).

CASE 5

GABRIELLA CAN'T SLEEP

Gabriella, aged 55 years, is a seamstress who presents with a 4-year history of difficulty initiating and maintaining sleep resulting in daytime tiredness and lowered mood. Her symptoms have gradually increased in severity and are significantly affecting her quality of life. Gabriella has no significant past medical history, is on no medications, does not smoke and drinks alcohol occasionally. She is active, exercises regularly and often volunteers to support local community groups.

QUESTION 1

What are the possible causes for Gabriella's presentation?

QUESTION 2

What further clinical information may assist in identifying the cause(s) of Gabriella's symptoms?

FURTHER INFORMATION

Gabriella works day hours only. She exercises in the evening and goes to bed at 10.30 pm, but may take up to an hour to fall asleep. She said she sleeps lightly and wakes up 3–4 times during the night and may have difficulty re-initiating sleep. She wakes at 6 am unrefreshed. Gabriella's husband has observed that she snores and has occasional leg movements with no witnessed apnoeas. Her last menstrual period was 4 years ago and she continues to experience vasomotor symptoms including hot flushes. Her score on the ESS is 9/24. On examination, she has a BMI 28 kg/m^2, an MMP score of 1, no retrognathia and clear nasal passages.

QUESTION 3

What investigations would you request?

FURTHER INFORMATION

You request blood tests, a sleep diary, 7 day actigraphy and a PSG. The results are:

- full blood examination, urea, electrolytes and creatinine, thyroid stimulating hormone and erythrocyte sedimentation rate – all within normal limits
- sleep diary – frequent caffeine use throughout the day, strenuous exercise close to bedtime, variable sleep/wake times with an average time in bed of 7.5 hours
- actigraphy – sleep efficiency 89% with average sleep duration 6.7 hours
- PSG – total sleep time of 6 hours with frequent brief awakenings. Intermittent snoring with occasional hypopnoeas. Apnoea-hypopnoea index of 14 events/hour. The saturation of oxygen (SpO2) was maintained above 90%. There were no periodic leg movements.

QUESTION 4

What is the cause (or causes) of Gabriella's symptoms?

QUESTION 5

How would you manage Gabriella's symptoms?

CASE 5 ANSWERS

ANSWER 1

Insomnia is a common problem with an estimated prevalence of 3.4–5% in Australia.[49] Peri- and post-menopausal women appear to be particularly at risk with 25% of women aged 50–64 years complaining of sleep disturbance.[49]

Classification of insomnia is:[50]

- primary insomnia
  - idiopathic
  - psychophysiological: maladaptive conditioned response to an acute stressor where the bedroom is a place of heightened arousal
  - sleep state misperception: mismatch between the patient's perceived and actual sleep duration/quality.
- secondary insomnia, which is due to one or more of the following factors:
  - poor sleep hygiene or behaviours
  - an active psychosocial stressor
  - a psychiatric disorder such as depression or anxiety
  - an abnormality of sleep causing arousal/awakening such as OSA, RLS, chronic pain or hot flushes
  - a medication such as a beta blocker, or substance such as caffeine or alcohol.

ANSWER 2

A thorough sleep history and clinical examination can assist in identifying factors that may be contributing to Gabriella's symptoms. Important aspects of history taking in evaluating sleep are:

- comorbidities
- medications
- alcohol, caffeine and smoking history
- occupation and current work hours
- sleep hygiene including routine prior to sleep, sleep environment and sleep/wake cycles
- consequences of poor sleep such as feeling unrefreshed, inattention, poor concentration, lowered mood and hypersomnolence (obtain a score on the ESS)
- symptoms such as snoring, nocturnal awakenings or abnormal leg movements that suggest a sleep disorder
- changes in weight
- menopausal symptoms
- symptoms of depression or anxiety

Important aspects of the physical examination are determining the:

- BMI
- patency of the nasal passages
- presence or absence of retrognathia
- MMP score.

ANSWER 3

Consider requesting the following investigations:

- Full blood examination, urea, electrolytes and creatinine, thyroid stimulating hormone and erythrocyte sedimentation rate – to help exclude medical conditions (such as anaemia, renal failure, thyroid disorders) and chronic inflammatory disorders (such as rheumatoid arthritis and sarcoidosis) that may contribute to symptoms.
- A sleep diary – this can assist in evaluating sleep/wake cycles and sleep hygiene. This can be used with 7 day actigraphy.
- In-laboratory PSG – this should be considered if a specific sleep disorder such as OSA needs to be excluded. Home-based sleep studies are generally not recommended in patients like Gabriella due to the complexity of the problem.

ANSWER 4

Gabriella's insomnia is likely to be multifactorial in origin. The sleep diary and actigraphy suggest that suboptimal sleep hygiene, circadian factors, sleep restriction and sleep state misperception may all be playing a role in her symptoms. Another factor affecting her sleep may be hot flushes causing nocturnal awakenings. It is also suggested that hormonal changes, which occur early during menopause, may play a role in promoting sleep disturbance.[51]

Nocturnal awakenings and awareness of those awakenings are common in older individuals and may not represent significant sleep pathology.[52] The problem may not necessarily be the awakening itself, but the individual's response to it (such as frustration and anxiety). Therefore, this response and the possibility of mood disorder may need to be explored further.

Although there is evidence of mild sleep disordered breathing on Gabriella's PSG, in the setting of her clinical history this is more likely to be an incidental finding of no clinical significance and may therefore not require further treatment.

ANSWER 5

Gabriella's symptoms could be managed by:

- addressing her frustrations and misperceptions
- teaching her strategies to assist in coping with difficulties in getting to sleep and the difficulties in re-initiating sleep following nocturnal awakenings
- focusing on the sleep environment and removing distractions including clocks, radios and televisions to address the circadian cycle (see *Figure 7*).

How to ensure a good night's sleep

- **Obtain an appropriate amount of sleep**

  Most adults (including shift workers) require 7.5–8 hours of sleep.
- **The bedroom is a place for sleep and intimacy only**

  Avoid eating, watching television or working in the bedroom.
- **Develop a routine prior to retiring to bed**

  A routine prior to bed could involve reading or relaxing.
- **Remove or reduce any environmental distractions in the bedroom**

  Remove enviromental distractions such as light (wear an eye mask), noise (wear ear plugs), temperature extremes and pets in the bedroom.
- **Use a comfortable mattress and pillow**
- **The most common cause of sleep onset insomnia is 'racing thoughts' or dwelling on the day's events**

  Learn techniques to take your mind away from this.
- **If you are unable to fall asleep within 30 minutes, leave the bedroom and perform a non-stimulating task in dim light. Only return to bedroom if ready to fall asleep**
- **Wake up at the same time every day and be exposed to natural light and exercise (ie. a brief walk is adequate)**
- **Avoid daytime naps**

  If a nap is necessary, nap in a room separate to your bedroom that is lit.
- **Avoid vigorous exercise within 4 hours of bedtime**
- **Avoid coffee, tea, chocolate, cola and cigarettes**
- **Avoid large meals close to bedtime**
- **Reduce alcohol intake and avoid sedative medications**

  Use of alcohol or sedatives do not solve the problem.
- **Address all medical issues that may interfere with sleep**

  Medical conditions causing symptoms such as pain, breathlessness, cough, reflux, chest pain, frequent urination may need to be addresssed.

Figure 7. How to ensure a good night's sleep – improving your sleep hygiene. Adapted with permission from The Royal Melbourne Hospital Sleep Disorders Unit.

Circadian rhythm training involves managing the sleep/wake cycle. Setting a fixed waking time and using techniques such as sleep restriction can be effective. Modified release melatonin and/or morning bright light therapy may assist in enhancing the circadian drive to sleep and to maintain wakefulness.[46,53] Benzodiazepines should be avoided. Although these medications are often prescribed they do not address the main issues, can have significant effects on sleep architecture, often exacerbate daytime sleepiness and can lead to dependence and rebound insomnia.

In Gabriella's case, management of her hot flushes may assist in improving symptoms. Studies have shown hormone replacement therapy and selective serotonin reuptake inhibitor antidepressants may be effective.[54]

It is important to work closely with a patient such as Gabriella and to emphasise that there is no quick fix for most presentations of insomnia. The aim is to achieve gradual improvement over time. Patient compliance is crucial to achieve optimal results. In treatment-resistant patients, consider referral to a psychologist with expertise in providing cognitive behavioural therapy for insomnia. The American Academy of Sleep Medicine has outlined guidelines for the evaluation and management of insomnia (See *Resources*).[55]

CASE 6

VINCE IS A SNORER

Vince, aged 42 years, presents at the request of his wife with a history of snoring in the absence of any perceived abnormalities with sleep. He has a past history of hypercholesterolaemia currently treated with simvastatin, and he is a current smoker of 20 cigarettes per day. He consumes a bottle of wine over the weekend and this will exacerbate his snoring. At least twice a week his wife asks him to leave the bedroom. He has trialled various over-the-counter snore treatments without benefit and recently completed a Buteyko breathing program with no improvement. Vince generally sleeps 8 hours per night and wakes refreshed. He denies daytime sleepiness and his score on the ESS is 4/24.

On examination, Vince has a BMI of 28 kg/m^2, an MMP of 2 and small tonsils, patent nasal passages and no retrognathia.

QUESTION 1

What is your working diagnosis?

QUESTION 2

Does Vince require a sleep study?

QUESTION 3

What initial advice would you give Vince to reduce his snoring?

FURTHER INFORMATION

Vince undergoes overnight PSG. This demonstrates snoring with no sleep disordered breathing. The apnoea-hypopnoea index is 4 events/hour and the SpO2 is maintained above 90%. Sleep architecture is consolidated with all sleep stages present. Cortical arousal index is within normal limits.

QUESTION 4

What are the treatment options to address Vince's snoring?

QUESTION 5

What are the health consequences of simple snoring?

CASE 6 ANSWERS

ANSWER 1

Vince most likely has simple snoring. The differential diagnosis includes OSA or upper airway resistance syndrome.

In general, the evaluation and management of asymptomatic snoring can pose a challenge to the medical practitioner. There are a number of considerations in evaluating and managing asymptomatic snoring including:

- the frequency of snoring and circumstances that it may be isolated to such as supine sleep position or following alcohol
- clinical assessment to determine the probability of OSA
- comorbidities
- medications
- alcohol and smoking history
- living circumstances
- the effect that snoring has on their partner's sleep and their relationship
- the receptiveness of the individual to investigations and treatment.

Snoring is a respiratory sound generated in the upper airway and typically occurs in inspiration, but may also occur in expiration.[27] Endoscopic and imaging observations of the upper airway in snorers demonstrate that any membranous part of the upper airway that lacks cartilaginous support may vibrate.[56] Snoring is common, with estimated prevalence of up to 40–86% in men and 24–57% in women.[57,58]

ANSWER 2

The decision to perform a sleep study in a snorer is dependent on the pretest probability for significant OSA and whether the results of the study will alter management. For example, an individual who is clearly low risk for OSA and occasionally snores probably does not need a sleep study. However, practice varies and there are practitioners who will refer for sleep studies in all individuals who snore regardless of pre-test odds. The type of study is also important. In some institutions if a sleep study is required in asymptomatic snorers, it is usual practice to perform an in-laboratory PSG. However, there is widespread practice performing home-based studies for this indication. Current Medicare Benefit Schedule (MBS) guidelines allow for reimbursement of home PSG only if it is performed in an individual who has high probability of having OSA (see MBS item number 12250). Recommendations from the American Academy of Sleep Medicine suggest that portable home-based sleep studies should only be performed in individuals with high risk for OSA.[59]

ANSWER 3

General advice to reduce the frequency and intensity of snoring includes weight loss, reduction in alcohol intake, smoking cessation, avoidance of supine sleep and ensuring adequate sleep duration. This advice is relevant for anyone who snores, regardless of whether they are likely to have OSA.

ANSWER 4

The decision to treat asymptomatic snoring is dependent on the individual's wishes and should involve a discussion with the patient and their partner. Conservative measures (as described in *Answer 3*) for many patients are satisfactory. It is important to identify the partner's concerns and how the snoring affects them. Consider suggesting ear plugs for a partner and explore the possibility of separate sleeping. If the patient wishes to seek further treatment, options include specific positional devices (to restrict supine sleep), mandibular advancement splints or CPAP. Newer devices that may assist in reducing snoring include therapies such as disposable valves that generate a positive pressure to splint the upper airway.[60]

In general, surgical treatments for simple snoring are not usually indicated. However, if medical devices have failed and there are significant psychosocial consequences of snoring, such as relationship breakdown or mood disorder, surgical options could be explored.

Over-the-counter therapies including anti-snore sprays, snore pillows, hypnosis and breathing techniques (such as the Buteyko technique) have little, or in some cases, no clinical data supporting their use. There may be a role for intra-nasal corticosteroids in snorers with symptoms of allergic rhinitis, although data of efficacy in reducing snoring is lacking.

ANSWER 5

It is unclear whether simple snoring conveys any risk for ischaemic heart disease, stroke or hypertension. Early epidemiological evidence suggested a relationship,[61–63] but more recent studies, particularly studies evaluating risk for ischaemic heart disease and hypertension have not replicated those results.[17,64,65] The exception is stroke, with evidence suggesting that non-apnoeic heavy snorers have an increased risk for carotid atherosclerosis compared with non-snorers.[66] As a general rule treatment decisions for simple snorers rarely take into account ischaemic heart disease or hypertensive risk. However, consider treatment such as CPAP, a mandibular advancement splint or nasal devices in an individual with loud habitual snoring (ie. snoring for >50% of the night) who has other risk factors for stroke).

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RESOURCES FOR DOCTORS

- Australasian Sleep Association is available at www.sleep.org.au and provides information for health professionals on a range of topics related to sleep, as well as clinical practice guidelines, a sleep services directory and links to related organisations.
- American Academy of Sleep Medicine provides clinical practice guidelines for health professionals on a range of sleep disorders, as well as The international Classification of Sleep Disorders. It is available at www.aasmnet.org.
- Epworth Sleepiness Scale developed by Dr Murray Johns is available at http://epworthsleepinessscale.com.
- Austroads' *Assessing fitness to drive for commercial and private vehicle drivers* is available at www.onlinepublications.austroads.com.au/items/AP-G56-12 and provides information on sleep disorders and driving.
- Australasian Menopause Society provides information for health professionals on topics related to menopause, including insomnia, and is available at www.menopause.org.au.

RESOURCES FOR PATIENTS

- Sleep Health Foundation is available at www.sleephealthfoundation.org.au. It provides information sheets for patients on a range of topics relating to sleep such as the circadian rhythm, good sleep habits, insomnia and obstructive sleep apnoea.
- Australasian Sleep Association is available at www.sleep.org.au and provides information for patients on a range of topics related to sleep as well as links to other organisations for patients.
- Sleep Disorders Australia provides information and support to individuals with sleep disorders and their families. It is available at www.sleepoz.org.au.
- NODDS (Narcolepsy and Overwhelming Daytime Sleep Society of Australia) is a support group for individuals with sleep disorders and is available at www.nodss.org.au.

Sleep disorders

In order to qualify for 6 Category 2 points for the QI&CPD activity associated with this unit:

- read and complete the unit of *check* in hard copy or online at the *gplearning* website at www.gplearning.com.au, and
- log onto the *gplearning* website at www.gplearning.com.au and answer the following 10 multiple choice questions (MCQs) online, and
- complete the online evaluation.

If you are not an RACGP member, please contact the *gplearning* helpdesk on 1800 284 789 to register in the first instance. You will be provided with a username and password that will enable you access to the test.

The expected time to complete this activity is 3 hours.

Do not send answers to the MCQs into the *check* office. This activity can only be completed online at www.gplearning.com.au.

If you have any queries or technical issues accessing the test online, please contact the *gplearning* helpdesk on 1800 284 789.

QUESTION 1

Ricardo, aged 57 years, is brought in to see you by his wife, Celeste. Celeste is kept awake by Ricardo's snoring and she has observed that Ricardo stops breathing during sleep. You suspect Ricardo may have obstructive sleep apnoea (OSA). In general, which of the following is true regarding the diagnosis of OSA?

A. History combined with clinical examination is able to predict most cases of OSA.

B. A neck circumference of greater than 40 cm in men is very sensitive for predicting OSA.

C. The Modified Mallampati score weakly correlates with OSA.

D. Home-based sleep studies are useful in patients in whom mild, moderate or severe OSA is suspected.

E. In-laboratory polysomnography is the gold standard for the diagnosis of OSA.

QUESTION 2

You ask Ricardo to complete the Epworth Sleepiness Scale. The scale is useful:

A. as a diagnostic tool in itself

B. as an accurate measure of sleep debt

C. in gauging the level of daytime sleepiness in an individual

D. in measuring the sedative effect of a single dose of sedative medication

E. in excluding a sleep disorder if the score is normal.

QUESTION 3

You arrange further assessment for Ricardo, which confirms that he has severe obstructive sleep apnoea. Ricardo is reluctant to undergo treatment as he feels it is too troublesome. You inform him of the potential consequences and associations of untreated severe obstructive sleep apnoea, which include(s):

A. fatal and non-fatal cardiovascular events including acute myocardial infarct and stroke

B. hypertension

C. dyslipidaemia

D. motor vehicle accidents

E. all of the above.

QUESTION 4

Joel, aged 28 years, works as a security guard in a casino on night shift during the week and day shift on some weekends. He is concerned that he has difficulty falling asleep on returning home after night shift. He says this is resulting in chronic tiredness and deteriorating work performance. You diagnose shift work sleep disorder. Which of the following would be most effective to BOTH entrain his circadian rhythm and improve his nocturnal work functioning?

A. Administration of melatonin prior to sleep.

B. Administration of temazepam prior to sleep.

C. Administration of modafinil prior to sleep.

D. Consumption of a carbohydrate-rich meal prior to sleep.

E. Use of bright light at work and sunglasses during the trip home.

QUESTION 5

Rod, aged 32 years, is an office worker. He presents with excessive daytime sleepiness and says he frequently dozes off while working on the computer. He wakes refreshed, does not snore, reports no choking at night and his wife reports no episodes suggestive of apnoea. You suspect that he may have narcolepsy. His score on the Epworth Sleepiness Scale is 20. Which of the following would confirm a diagnosis of narcolepsy in Rod?

A. A history suggestive of cataplexy.

B. An abnormal actigraphy result.

C. An abnormal multiple sleep latency test.

D. The presence of HLA-DQB1*0602.

E. Low CSF levels of hypocretin.

QUESTION 6

Bao Yu, aged 45 years, presents with an urge to move her legs, which is accompanied by an uncomfortable sensation in her legs. You consider whether she has restless legs syndrome. In patients with this syndrome:

A. the urge to move the legs is usually present during activity and partially or completely removed by rest

B. the urge to move the legs is usually worse during the day than the evening or night
C. the presence of a family history of restless legs syndrome is essential for the diagnosis
D. a sleep study is essential for the diagnosis
E. improvement after commencing a dopaminergic agent supports the diagnosis.

QUESTION 7

Cara has insomnia and you determine it is due to poor sleep hygiene. You offer several suggestions to improve her sleep and help her insomnia including:

A. restricting sleep time to less than 7 hours per night
B. waking up at the same time every day
C. taking regular daytime naps
D. exercising vigorously in the sunlight as late as possible in the day
E. considering long term use of melatonin.

QUESTION 8

Frank, aged 30 years, snores heavily when he is lying on his back, which he does for most of the night. He also snores heavily after he has had a few standard drinks of alcohol. He wakes refreshed. His bed partner reports that he has no nocturnal choking and no episodes suggestive of apnoea. He has a body mass index of 25 kg/m^2, a score on the Epworth Sleepiness Scale of 8, a Modified Mallampati (MMP) score of 2, patent nasal passages and no retrognathia. Which of the following is true?

A. Frank is at high risk of obstructive sleep apnoea.
B. Recent studies indicate that he is at increased risk of hypertension and ischaemic heart disease.
C. Recent studies indicate that he is at increased risk of the formation of carotid atherosclerosis.
D. Home-based sleep studies are indicated and reimbursable by the MBS.
E. Over the counter therapies such as snore pillows are likely to reduce his snoring.

QUESTION 9

Tatiana, aged 32 years, has difficulty getting to sleep at night. She also finds herself dozing at her desk after lunch and recently did so in a meeting at work. She has a hectic schedule, combining full time work and being a mother to her two young children. She goes to bed anywhere between 11 pm and 1 am, except on weekends when she retires at 8.30 pm. She wakes and arises anywhere between 4 am and 8 am. She rarely has time for regular meals and eats 'on the run'. She drinks up to 6 cups of coffee during the day in order to 'make it through the day'. Her husband reports that she does not snore. She is not overweight and has no retrognathia. Which of the following three causes acting together are MOST likely to be contributing to her symptoms?

A. Narcolepsy, sleep deprivation, circadian rhythm disturbance.
B. Poor sleep hygiene, circadian rhythm disturbance, sleep deprivation.
C. Poor sleep hygiene, circadian rhythm disturbance, premature menopause.
D. Sleep deprivation, poor sleep hygiene, poor coping strategies.
E. Circadian rhythm disturbance, poor sleep hygiene, obstructive sleep apnoea.

QUESTION 10

You are giving a presentation to other doctors in your practice about investigations in the presence of a suspected sleep disorder. Which of the following is true regarding investigations in the presence of a suspected sleep disorder?

A. A sleep diary is typically filled out over 2 consecutive nights and records information solely pertaining to sleep.
B. Sleep actigraphy is a test that is performed in a sleep laboratory and measures arterial oxygen saturations and adequacy of ventilation.
C. A multiple sleep latency test provides information on the time taken to fall asleep in individuals with insomnia.
D. An in-laboratory polysomnogram is the diagnostic test of choice in narcolepsy.
E. Iron studies, urea, electrolytes and creatinine and a test of thyroid function should be performed in patients with symptoms suggestive of restless legs syndrome.