

Sleep Disorders 2011

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Overview

- Brief overview of sleep and sleep disorders
- Sleep assessment
- Insomnia – approach to evaluation and treatment

Quiz!!! (with reward for top scorer/s)

1) What are the 2 phases of
sleep?

2) How long is each cycle of sleep? How many cycles are there per night?

3) Average number of hours
of sleep in adults is _____
hours

4) _____% of “good sleepers”
need only 6 hours or less

5) Name 5 causes of hypersomnia or excessive daytime sleepiness

6) what's the commonly used questionnaire to assess or measure daytime sleepiness/ sedation?

7) What are the 2 treatments recommended for someone with Delayed Sleep Phase Disorder?

8) What are the 5 key signs and symptoms of Obstructive Sleep Apnoea?

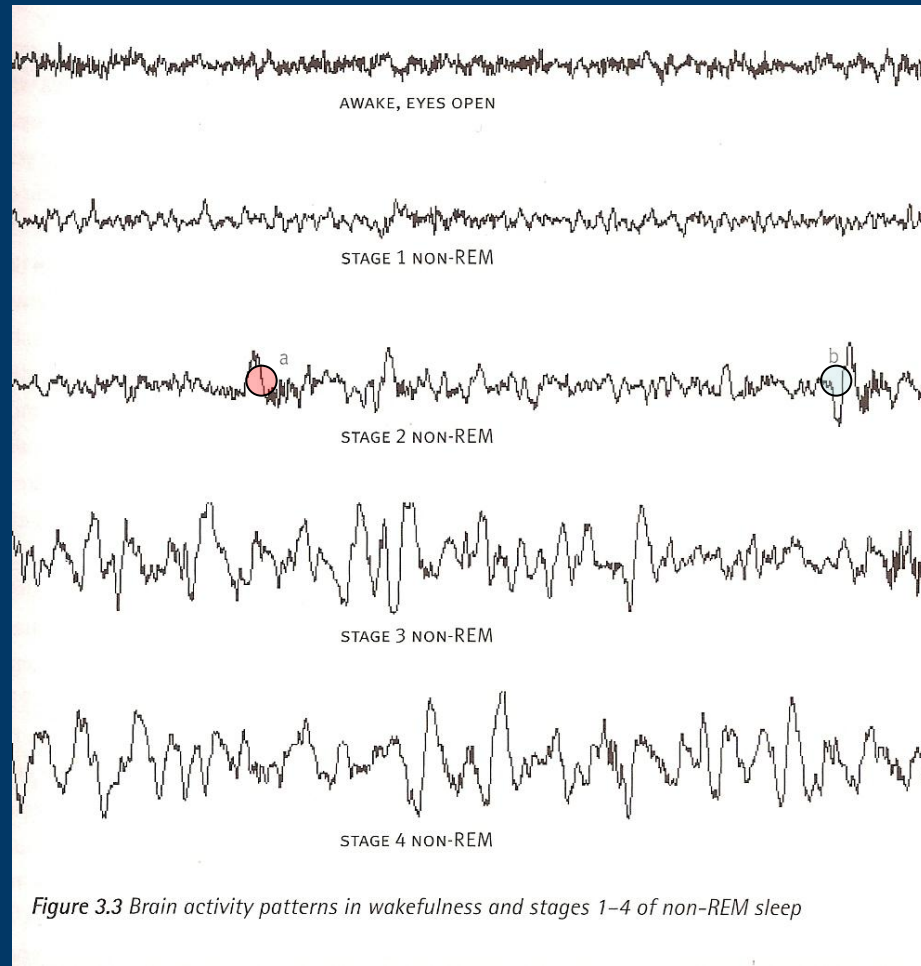
What is sleep?

- A periodic, natural, and reversible state of altered consciousness
- Consciousness is a state of awareness of self and environment that gives meaning or significance to external and internal stimuli (inner needs)
- Sleep = an *active* process
cf
- Coma = *depression* of cerebral metabolic activity

Normal Sleep

- 2 major phases REM & NREM
- REM/dreaming sleep (increased EEG activity)
- NREM/slow wave/EEG synchronised
4 stages on the basis of EEG
 - Stage 1
 - Stage 2
 - Stage 3 and 4 (*known as delta sleep or slow wave sleep*)

Stages of Sleep - non REM



As you start to fall asleep your brain waves slow down

You may drift in and out of stage 1 (light sleep) (lose train of thought, muscle jerks)

Stage 1: transition between waking and deeper sleep

Easily disturbed

Stage 2: Sleep spindles (a) and k-complexes (b) identify the beginning of stage 2

Deeper stage of sleep

Bigger, slower waves (2 cycles/sec cf 15-50 when awake)

Once these slow waves make up 20-50% of pattern =stage 3

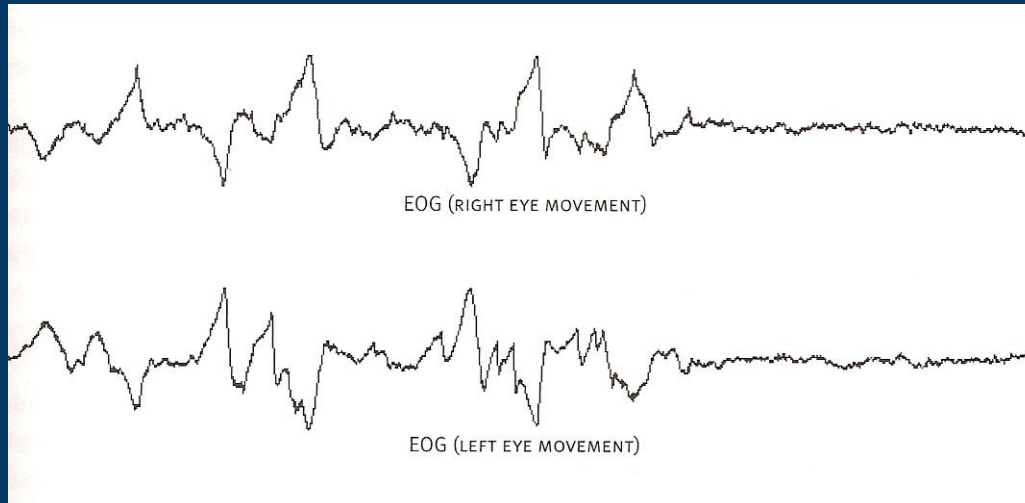
Stage 3: slow waves 20-50% of pattern

Stage 4: slow waves >50% of pattern

Delta/Slow wave sleep

Non-REM: Heart rate and breathing slow and regular, tone in postural muscles

Stages of Sleep - REM



Normal Sleep

- **NREM and REM sleep alternate with a period ~90min**
- **4-5 90 minute cycles of sequential stages recur during the night**
- **NREM sleep is usually 75-80% of sleep**
- **REM sleep is usually 20-25% of sleep**
- **As the night progresses, REM stage episodes increase in duration while slow-wave sleep may disappear beyond the second cycle.**

Why do we sleep?

- **Vital for survival**
- **Sleep is a process the brain requires for proper functioning**

How much do we need?

- **Average number of hours is between 7-8 hours of sleep**
- **1% of “good sleepers” need less than 5 hours**
- **7.5% of “good sleepers” need 6 hours or less**
- **Sleep quantity versus sleep quality**

How much is enough?

**As much as it takes for you to feel
well rested and fully functional
when you are awake**

Developmental changes across the lifespan

- Average sleep time:
 - Infancy 16-18 hours
 - Early childhood 10-11 hours
 - Mid 20s 7-9 hours
 - Older people: less nocturnal sleep but more daytime napping – total sleep per 24 hours fairly stable from middle to late life. Older people spend more time awake in bed with poorer sleep efficiency.

What happens when we don't get enough sleep?

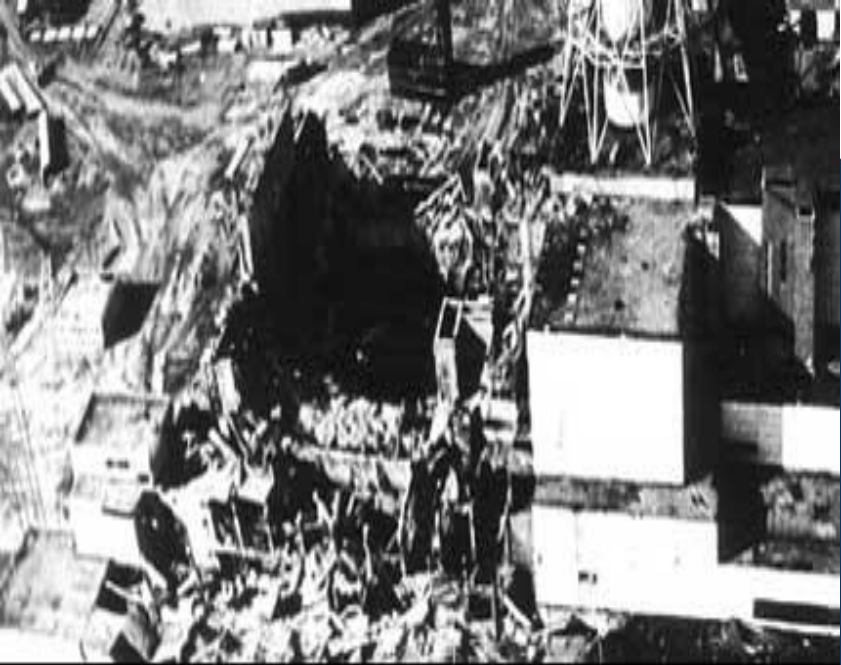
Sleepiness

- Is excessive when occurs at inappropriate or undesirable times, such as at work, while driving and during social activities
- If not relieved by increased amounts of sleep at night \Rightarrow usu a sign of a sleep disorder
- Chronic/Excessive sleepiness \Rightarrow lapses in concentration/attention, unable to resist daytime napping

Fatigue

- Tiredness
- Listlessness
- Weakness
- Loss of energy
- Relentless weariness



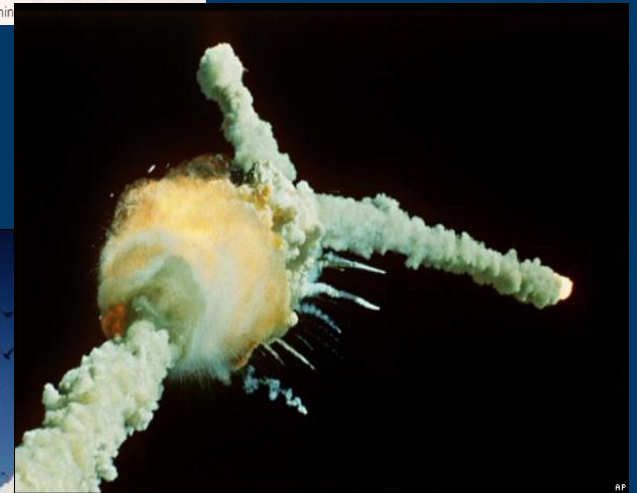


April 26, 1986
CHERNOBYL

Fatigue and human errors due to overwork and sleep deprivation....



22 In 1989 the tanker Exxon Valdez struck a reef and spilled 42 million litres of crude oil in the pristine Prince William Sound in Alaska. The oil slick spread over 28,000 sq km, killing thousands of birds, fish, otters – and 22 killer whales. Almost 20 years later, the area is still contaminated.



The effects of poor sleep



Depression

Anxiety

Alcohol and other substance abuse

Immune dysfunction

Hypertension

Cardiovascular disease

Obesity

Diabetes

Daytime fatigue, workplace accidents
and errors

Motor vehicle crashes



Sleep deprivation has become one of the most significant sources of error and accident throughout our society

Sleep Disorders

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graph TD; A[Sleep Disorders] --- B[Insomnia  
Can't sleep]; A --- C[Hypersomnias  
Always sleeping during day]; A --- D[Parasomnias  
Funny things happen during sleep];
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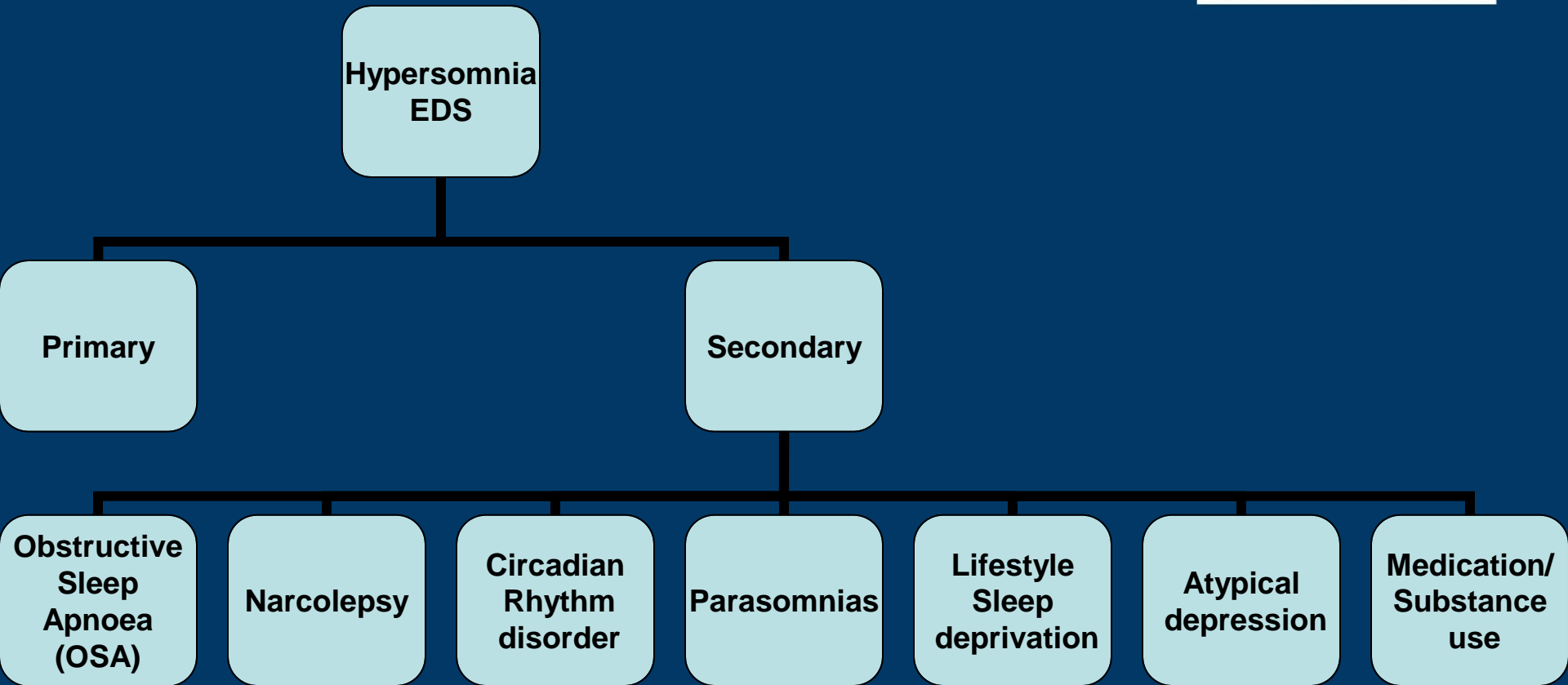
Insomnia
Can't sleep

Hypersomnias
Always sleeping
during day

Parasomnias
Funny things happen
during sleep

Excessive Daytime Sleepiness (EDS) - causes?





How sleepy are you?

The Epworth Sleepiness Scale

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.

PLEASE TICK ONE BOX ON EACH LINE

	WOULD NEVER DOZE	SLIGHT CHANCE	MODERATE CHANCE	HIGH CHANCE
SITTING AND READING	<input type="checkbox"/> 0	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3
WATCHING TV	<input type="checkbox"/> 0	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3
SITTING INACTIVE IN A PUBLIC PLACE (EG. THEATRE, MEETING)	<input type="checkbox"/> 0	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3
AS A PASSENGER IN A CAR FOR AN HOUR WITHOUT A BREAK	<input type="checkbox"/> 0	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3
LYING DOWN IN THE AFTERNOON WHEN CIRCUMSTANCES PERMIT	<input type="checkbox"/> 0	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3
SITTING AND TALKING TO SOMEONE	<input type="checkbox"/> 0	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3
SITTING QUIETLY AFTER A LUNCH WITHOUT ALCOHOL	<input type="checkbox"/> 0	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3
IN A CAR, WHILE STOPPED FOR A FEW MINUTES IN TRAFFIC	<input type="checkbox"/> 0	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3



Johns MW(1991). A new method for measuring daytime sleepiness: The Epworth sleepiness scale. *Sleep*. 14:540-545.

NZ DATA

- Excessive daytime sleepiness (EDS) reported by Maori 21%, non Maori 14%

Primary Hypersomnia

- Chronic insomnia without cataplexy presumed to be neurological in origin
- Prevalence unknown
- Daytime drowsiness leads to naps that are prolonged and unrefreshing, nocturnal sleep is long and undisturbed
- In the mornings awakening is difficult
- Patients can be aggressive and abusive during the 'twilight' state of 'sleep drunkenness' if awakened-even if this is at their own request

Obstructive sleep apnoea

www.mayoclinic.com/health/obstructive-sleep-apnea/MM00715

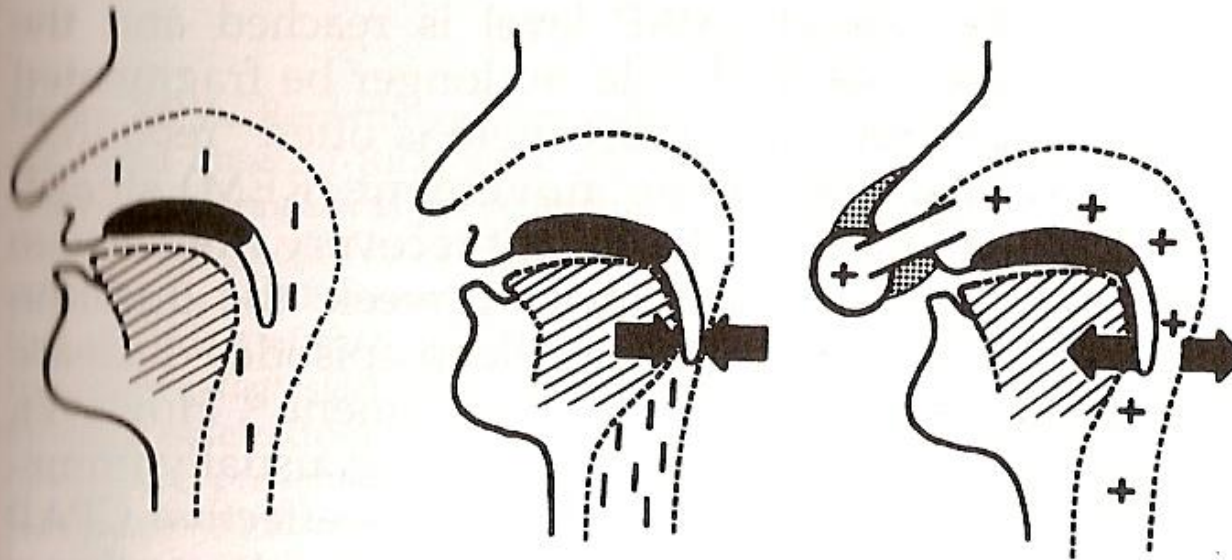


Figure 76-1. Mechanism of upper airway occlusion and its prevention by nasal continuous positive airway pressure (CPAP). When the patient is awake (*left*), muscle tone prevents collapse of the upper airway during inspiration; during sleep, the tongue and soft palate are sucked against the posterior oropharyngeal wall (*middle*). CPAP with low pressure provides a pneumatic splint and keeps the upper airway open (*right*). (Adapted from Sullivan CE, Issa FG, Bethon-Jones M, et al. Reversal of obstructive sleep apnea by continuous positive airway pressure applied through the nares. *Lancet*. 1981;1:862-865.)

Narcolepsy

narkosis (a numbing) lepsis (to overtake)

- Excessive daytime sleepiness
- Cataplexy
- Hypnagogic hallucinations
- Sleep paralysis

Only 1/3 experience all 4 classic symptoms

Cataplexy pathognomonic

Genetic predisposition

Comorbidity with OSA, RLS, PLMS, RBD

Practice point:

Excessive daytime sleepiness (ESS) ⇒ referral to a specialist

Excessive daytime sleepiness

Persistent sleepiness resulting from fragmented nocturnal sleep. Sleep attacks resulting from REM intrusion into wakefulness. Attacks occur on background of essentially continuous drowsiness.

Cataplexy

Abrupt attack of muscle weakness.

Typically lasts a few minutes but occasionally last longer. Patients are usually alert and oriented despite their lack of ability to respond. Characteristically triggered by emotion (positive > negative). Partial symptoms – head drop, jaw drop, slurred speech, bilateral ptosis.

Sleep paralysis

Inability to move upon falling asleep or at awakening, with intact consciousness.

Sleep-related hallucinations

may occur at onset (hypnagogic) or awakening (hypnopompic) and are usually visual (most common), auditory, tactile or multisensory in nature.

Automatisms

Indicative of severe sleepiness and result in automatic behaviour, a symptom that allows semiconscious continuation of activity in the midst of sleep attacks with no memory of the event.

Circadian Rhythm disorders

- **Advanced sleep phase syndrome**

People with this syndrome prefer to fall asleep around 8-9pm, and to wake up about 3-5 am. If they try to go to bed later, they still wake up at the same time, so their sleep is restricted.

- **Delayed sleep phase syndrome**

People who have this problem can't fall asleep before about 2-6am, even if they try to go to bed earlier. If left undisturbed, they would typically sleep through to about 11am to 2pm. When they are forced to wake up around 7-8am (for school or work), they may have had only half as much sleep as they need. It is most common in teenagers and young adults, and is believed to affect about 7 in every 100 people in this age range.

- **Irregular Sleep/Wake pattern**

Disorganised sleep/wake behaviour that doesn't follow any regular pattern. Most people with this problem have severe brain abnormalities or brain damage.

- **Non-24-Hour Sleep/Wake pattern**

Cycle length usually longer than 24h, so sleep starts later each day. Most are blind, which suggests that it is the result of problems with the light input pathways to the clock. The majority of blind people living in the community have non-24h rhythms in the clock marker rhythms of melatonin and cortisol.

Parasomnias

Sleep terror

**Sleep walking
Sleep talking**

**Nightmare
disorder**

Bruxism

**Restless legs
Syndrome
(RLS)**

**Periodic Limb
Movement
Disorder
(PLMD)**

**REM
Behaviour
Disorder(RBD)**

The woods are lovely, dark, and deep.

But I have promises to keep,

And miles to go before I sleep,

And miles to go before I sleep.

—Robert Frost



Insomnia

Goals of session

- Know the definition of insomnia
- Be able to evaluate the complaint of “insomnia”
- Be familiar with the treatment options for someone with insomnia

What is Insomnia ?

- Not a diagnosis
- Is a symptom
- Is a complaint of:
Poor, unsatisfactory, unrefreshing sleep
→resulting in daytime dysfunction

'Insomnia'

- Insomnia is a symptom
- *The term 'insomnia' commonly means 'sleep disturbance' and therefore encompasses all the potential causes of sleep disorders*
- A diagnosis of 'Insomnia' requires meeting the general criteria for insomnia. This could be caused by any of the sleep disorders
- When talking about the different sorts of sleep disorder diagnoses 'Primary Insomnia' is often shortened to 'Insomnia' and denotes a specific diagnosis

Insomnia and depression

- Untreated insomnia is a risk factor for the development of depression
- Insomnia contributes to symptom burden
- May worsen depression outcomes
- May prevent full remission
- Treating insomnia as well as depression may improve depression outcomes and prevent relapse

Insomnia and mental health

- Anxiety can esp cause sleep-onset type insomnia
- Insomnia often precedes relapse in mania – therefore is a useful warning sign

Common comorbidity

Cardiovascular

Pulmonary

Neuromuscular

Endocrine

Gastrointestinal

Neurologic

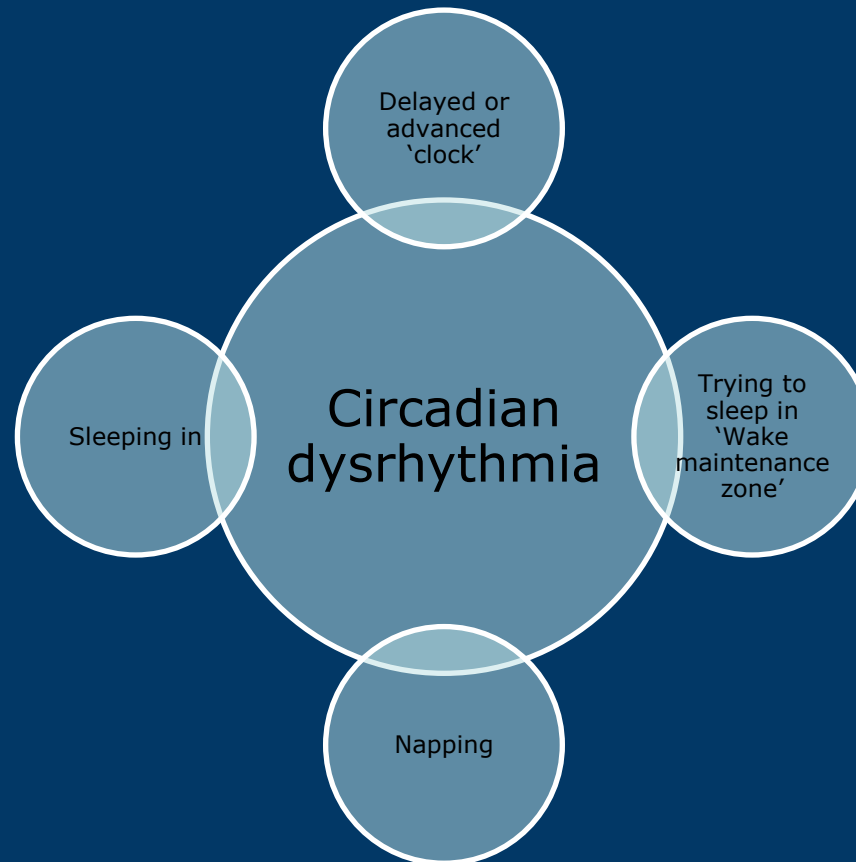
Epidemiology

- Median prevalence for all insomnia of about 35% (about 20 epidemiological surveys each with $n \geq 1000$)
- 10-15% assessed as moderate to severe
- Generally higher in women
- Increases with age
- Higher among medically and psychiatrically unwell

Insomnia conceptualisation

- Disruption of the normal sleep processes:
 - Homeostatic
 - Circadian
 - Arousal

Circadian dysregulation



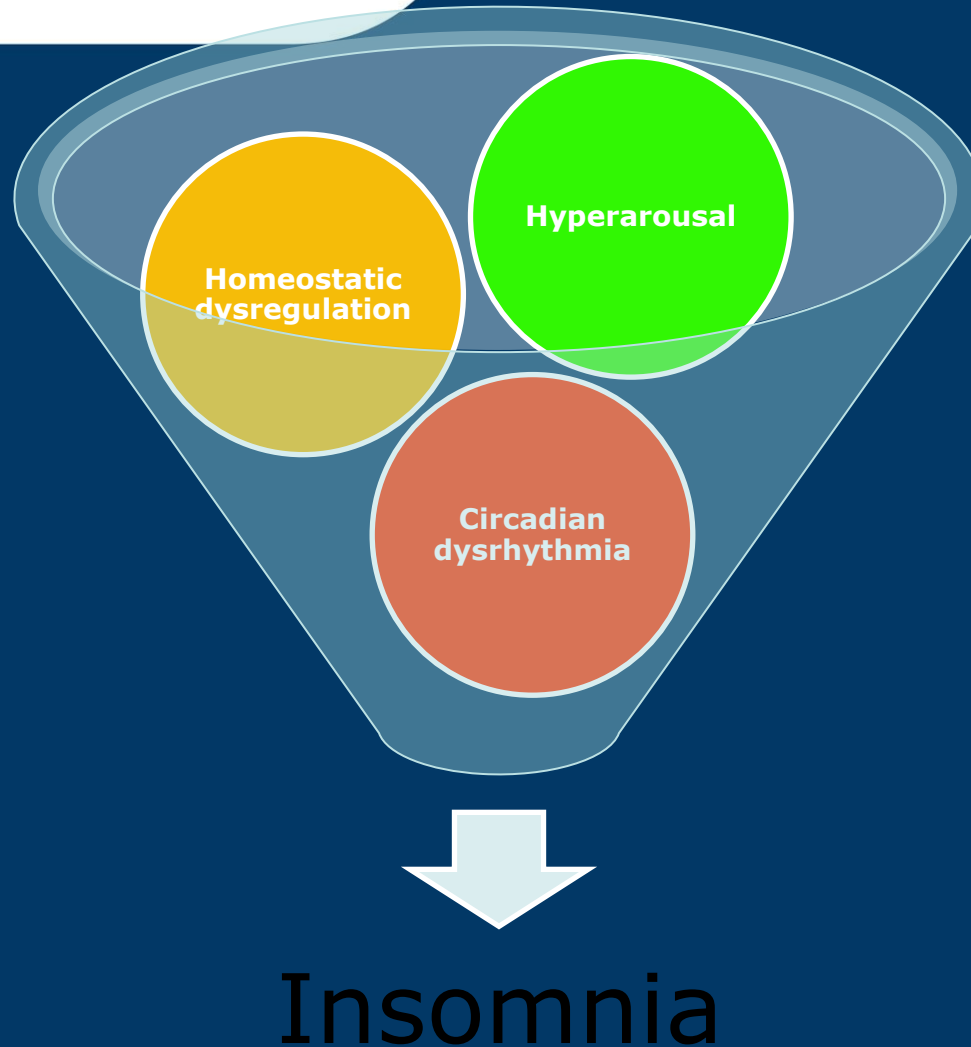
Insomnia conceptualisation

- Disruption of the normal sleep processes:
 - Arousal

Counteracts sleep drive through promotion of Alertness

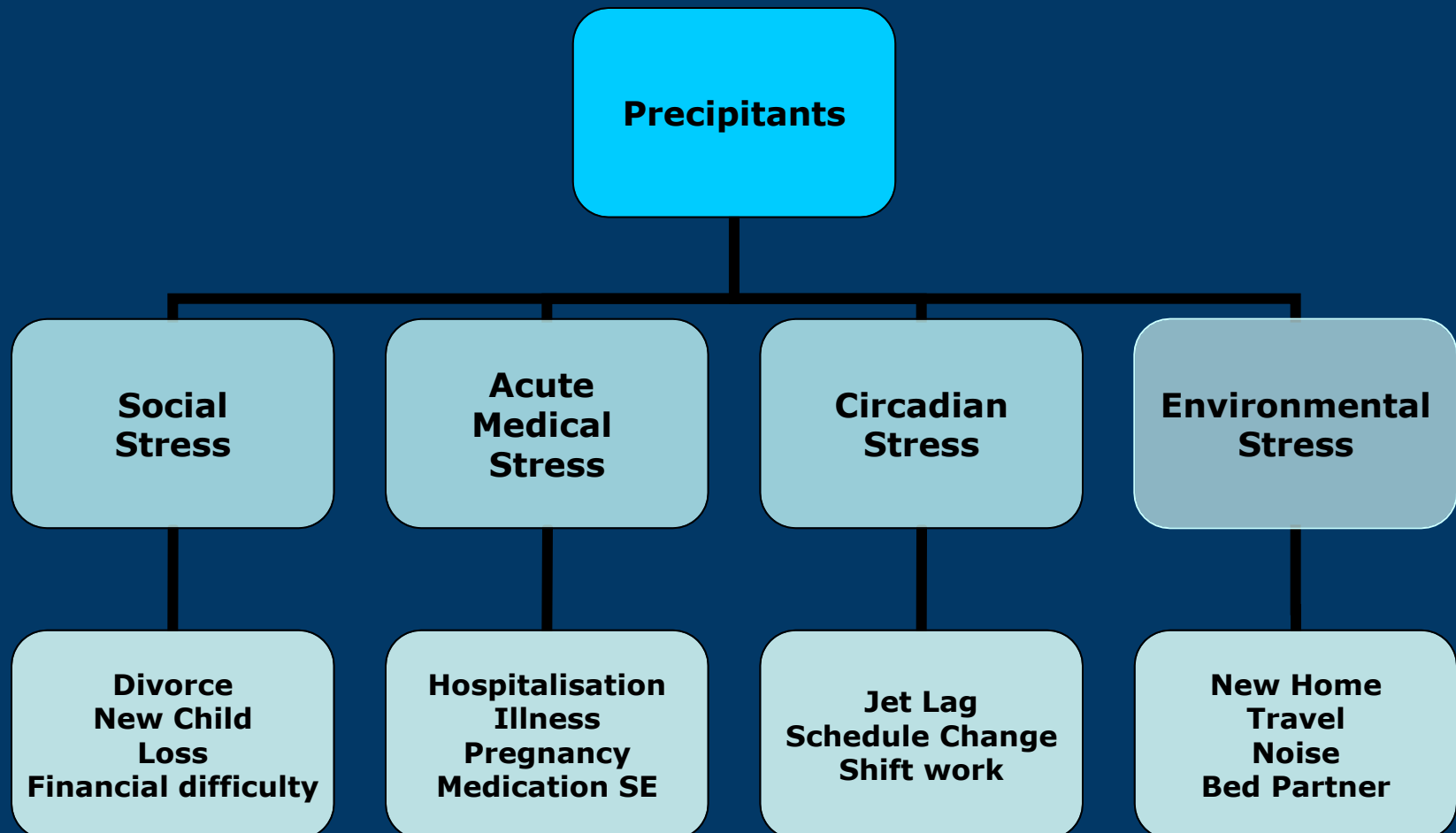
Activated by stress/emotions/environmental stimulation etc

Can be constitutionally-based

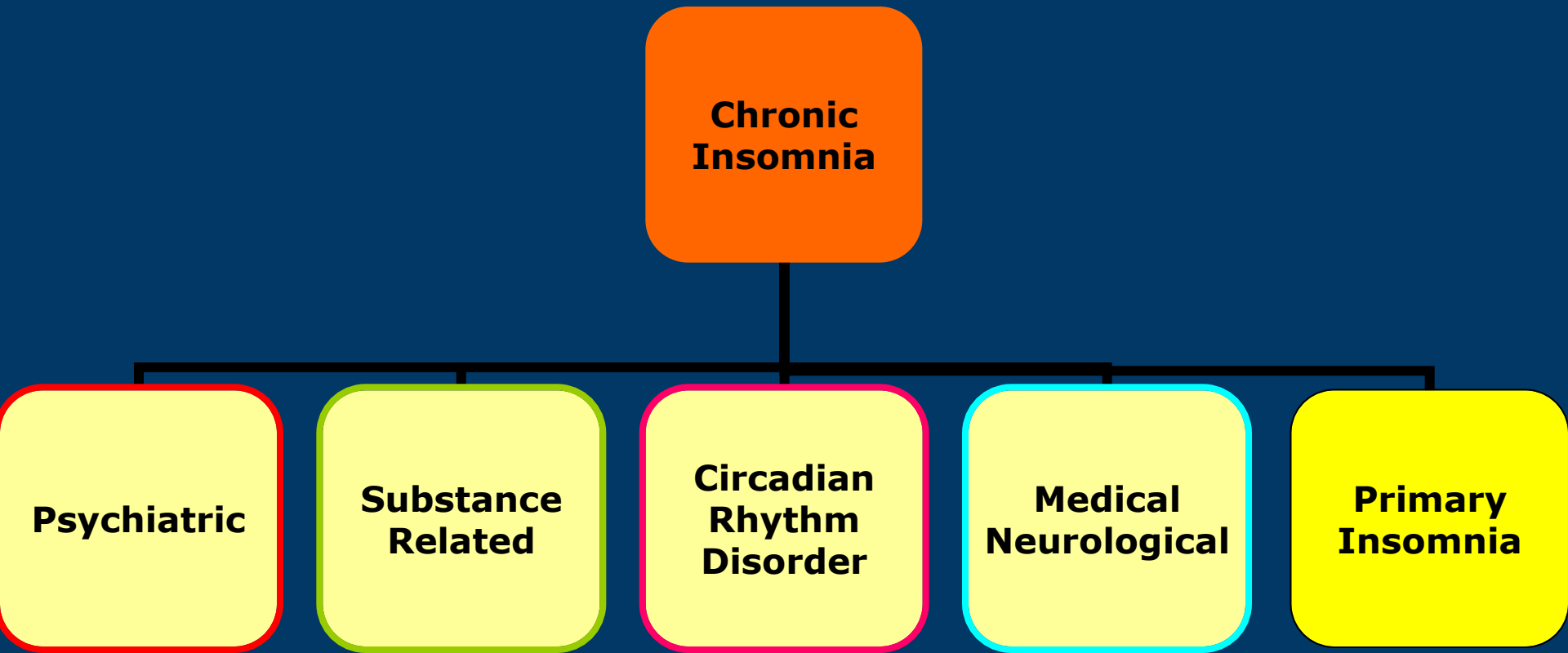


Difficulty sleeping can stem from any of the above factors or a mixture

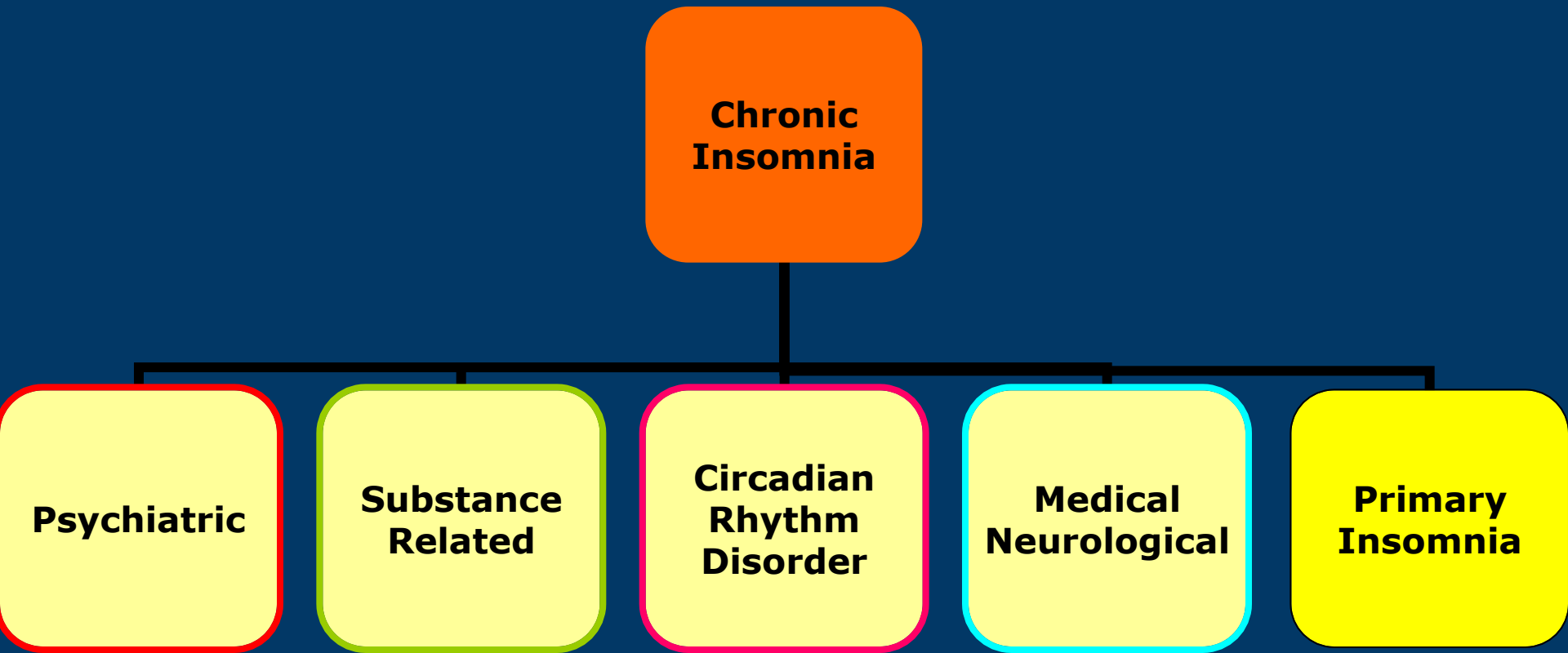
Common causes of transient/acute insomnia



Common causes of chronic insomnia

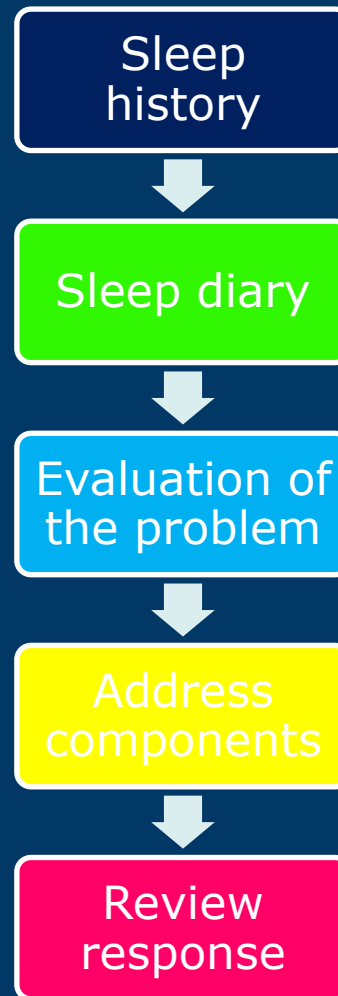


Common causes of chronic insomnia



Diagnosis of exclusion 

How to approach insomnia:



Auckland Sleep Questionnaire (ASQ)

- **Developed at University of Auckland (Arroll, Fernando, Falloon)**
- **Screens for common causes of sleep symptoms**
 - **Insomnia**
 - **Hypersomnia**
 - **Parasomnia**
 - **Depression, Anxiety, Substances**
 - **Circadian Rhythm Disorders**
 - **Parasomnias**
 - **Sleep Apnoea**

ASQ – a good place to start...

- Do you have trouble sleeping?
- Can you describe your problem?
- Does it interfere with your activities the following day ?
 - e.g. unrefreshed in the morning
 - fatigued
 - poor concentration
 - irritability
- Do you have a poor nights sleep at least 3 nights per week?
- If you sleep well, is this with the help of sleep medication?
- Has your poor sleep ever been investigated or treated?

ASQ continued:

1 Shift work
2 Depression

Are you a shift worker?

- a) During the past month have you often been bothered by feeling down, depressed or hopeless?
- b) During the past month have you often been bothered by having little interest or pleasure in doing things?
- c) If you answered yes to either of the above, is this something with which you would like help?

3 Anxiety

- a) During the past month have you been worrying a lot about everyday problems?
- b) Is this something with which you would like help?

4 OSA

- a) Do you snore very loudly at night?
- b) Do you find yourself falling asleep during the day ie in waiting rooms/as a passenger in a vehicle?

5 Circadian Rhythm

- a) When you can choose do you go to bed late at night ie after midnight
- b) When you can choose to (ie weekends) do you sleep late into the morning ie after 10am?

6 Parasomnias

Do you do anything unusual when you are asleep ie sleep walking/talking or restless legs or grinding your teeth?

7 Medical

Do you have any significant health problems such as pain or breathing difficulty or acid reflux or night cough or hot flushes that affects your ability to sleep well?

8 Alcohol use

- a) Do you ever feel the need to cut down on your alcohol drinking?
- b) In the last year have you ever drunk more alcohol than you meant to?
- c) If you answered yes to either of the above, is this something with which you would like help?

9 Drug use

- a) Do you ever feel the need to cut down on your non-prescription or recreational drug use?
- b) In the last year have you ever used non-prescription or recreational drugs more than you meant to?
- c) If you answered yes to either of the above, is this something with which you would like help?

Sleep Diary

- Minimum 2 weeks data
- Entries made just before sleeping and after waking up in the morning
- Important not to “clock watch”
- Just before sleeping
 - Pre bedtime activities, naps during the day, caffeine intake, medications, ETOH
- Morning
 - Estimated time went to bed, time to sleep onset, number of awakenings, duration of awakenings, total duration of sleep, causes for awakenings, wake up time, feelings of restedness upon arising, quality of sleep

Sleep Diary

- Minimum 2 weeks to minimize variability
- Tendency of insomniacs to underestimate Total Sleep Time, and overestimate Sleep Latency, Time awake but able to show treatment changes
- www.sleepeducation.com

TWO WEEK SLEEP DIARY

INSTRUCTIONS:

1. Write the date, day of the week, and type of day: Work, School, Day Off, or Vacation.
2. Put the letter "C" in the box when you have coffee, cola or tea. Put "M" when you take any medicine. Put "A" when you drink alcohol. Put "E" when you exercise.
3. Put a line (l) to show when you go to bed. Shade in the box that shows when you think you fell asleep.
4. Shade in all the boxes that show when you are asleep at night or when you take a nap during the day.
5. Leave boxes unshaded to show when you wake up at night and when you are awake during the day.



SAMPLE ENTRY BELOW: On a Monday when I worked, I jogged on my lunch break at 1 PM, had a glass of wine with dinner at 6 PM, fell asleep watching TV from 7 to 8 PM, went to bed at 10:30 PM, fell asleep around Midnight, woke up and couldn't get back to sleep at about 4 AM, went back to sleep from 5 to 7 AM, and had coffee and medicine at 7:00 in the morning.

Today's Date	Day of the week	Type of Day Work, School, Off, Vacation	Noon	1PM	2	3	4	5	6PM	7	8	9	10	11PM	Midnight	1AM	2	3	4	5	6AM	7	8	9	10	11AM
sample	Mon.	Work		E					A				l													

week 1
week 2

Diagnostic Tools / Technical Devices

- PSG
 - Not usually utilised in insomnia unless other conditions (ie PLM's, parasomnias)
 - Failure of treatments for primary insomnia (?)
 - Utility in research
- Actigraphs
 - Useful as an adjunct in the evaluation of insomnia
 - Utility in research



Sleep like a baby...

**Overview of
management of
Primary Insomnia**

Treatment possibilities

- Sleep Hygiene
- Stimulus control
- Sleep restriction
- Cognitive Behavioural Treatment
- Relaxation Therapy
- Medications
- Herbal Preparations
- Melatonin

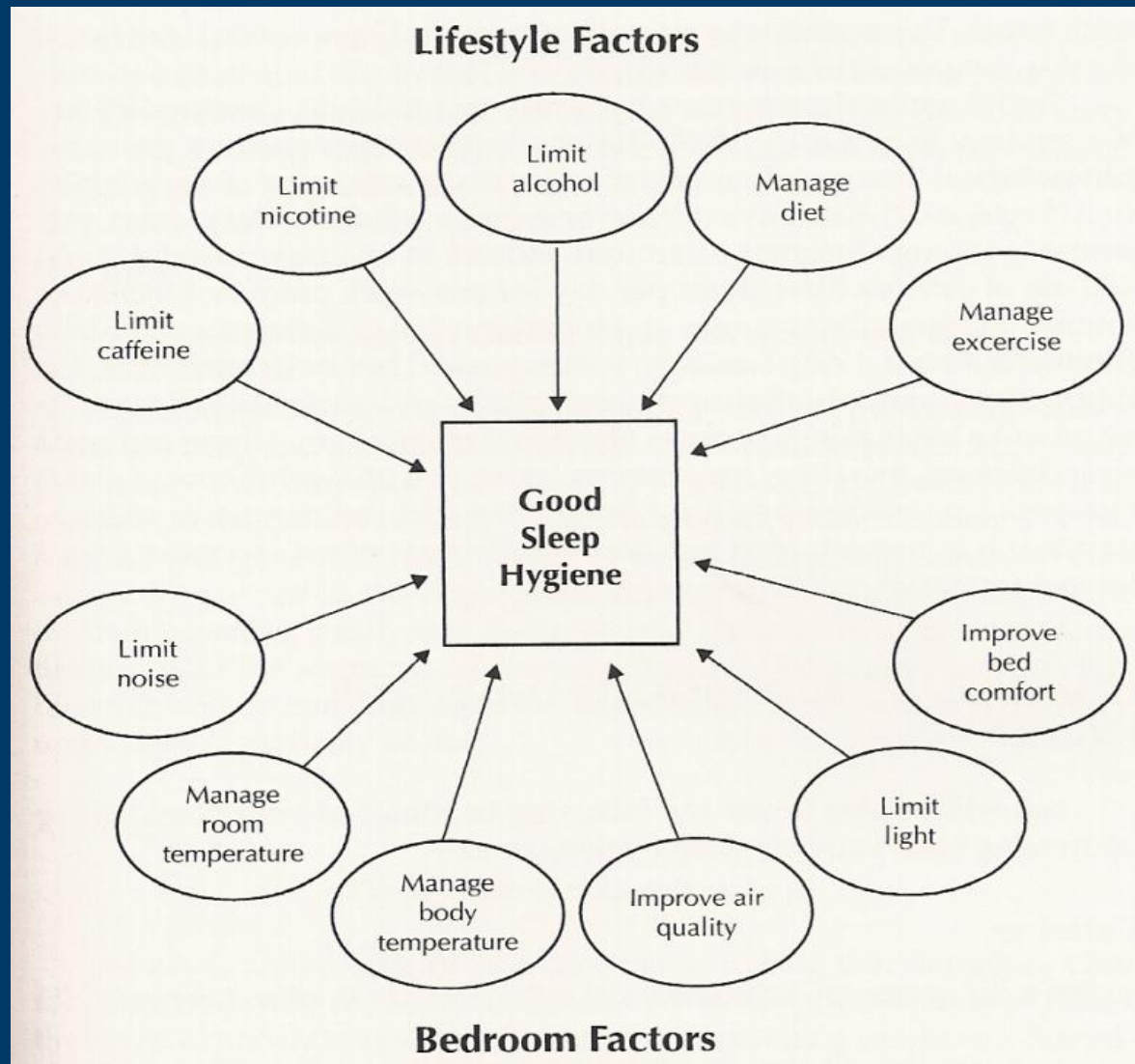
First get the basics right...

- Consistent waking time
 - This is more important than bed time
- Go to bed when you are sleepy
- Regular daily exercise
- Early morning light exposure
 - Suppresses melatonin
 - Resets the sleep clock
 - Sets daily sleep/wake cycle
 - Be outside 30-40 daily (no sunglasses)

- Try to relax and wind down in evenings
 - Mindfulness meditation
 - Other relaxation techniques
 - www.calm.auckland.ac.nz
- Don't clock watch in bed

Sleep Hygiene

- Mainly education that targets health practices and environmental factors
 - No caffeine and nicotine 4-6 hours before sleeping
 - Avoidance of alcohol in the evening
 - Exercising 5-6 hours before bedtime but not closer than 3 hours
 - Minimising noise, light, excessive temperature
 - **Avoid evening computer use!!!**



Sleep Hygiene

- Not effective as single therapy in chronic insomnia (?)
- You want to make sure you have ruled out these factors as contributory and have given this advice as baseline (but don't expect massive changes to take place in most chronic insomniacs- they may have tried it all before).
- Encourage compliance in those who, for example, think caffeine doesn't affect them
- Effective in combination with CBT

Stimulus Control

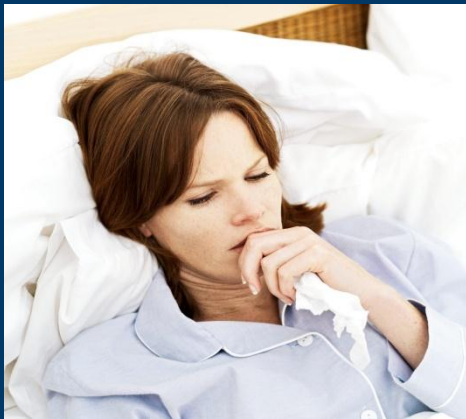
Goal is train the insomnia patient to reassociate the bed and bedroom with sleep and relaxation

- Go to bed only when sleepy
- Using the bedroom only for sleep and sex
- Get out of bed and go into another room when unable to fall asleep or return to sleep within 15-20 minutes, and return to bed only when sleepy
- Maintain a regular waking up time regardless of sleep quality or duration the previous night
- No daytime napping

Sleep restriction (bedtime restriction)

- Curtailing the amount of time spent in bed to match the amount of estimated time asleep
 - see example
- Time allowed to spend in bed is adjusted regularly so that sleep efficiency is about 80-90%

Sleep restriction



Bedtime 9pm
Out of bed 6am

Hours slept/hours in bed
= $6/9 \times 100\% = 67\%$



Bedtime 11pm
Out of bed 6am

Hours slept/hours in bed
= $6/7 \times 100\% = 86\%$

Goal is to create a state of mild sleep deprivation



more rapid sleep onset
more efficient sleep
less internight variability

Cognitive therapy

- Reframing patient's misconceptions regarding sleep.
- Goal is for patient to have a more realistic view of what is happening in their life in relation to sleep. This will lessen the anxiety and anger relating to not sleeping. This in turn can decrease the hyperarousal before sleep and at the same allow the patient to be more open to behavioural strategies.

Cognitions or Beliefs about Sleep that can lead to chronic insomnia

- Catastrophising transient sleep difficulties; losing “control” over sleep
- Blaming sleep for daytime impairments
- Unrealistic expectations regarding sleep requirements
- Misunderstanding “catch-up” sleep – eg if one usually sleeps for 7 hrs and doesn’t sleep for 1 night it doesn’t mean they need 14 hrs the next night

Cognitive Behavioural Therapy i

- CBTi : Standard treatment for primary insomnia, effective short term and long term (very good evidence)
- **Cognitive therapy**
 - Addressing cognitive distortions/ false beliefs about sleep
- **Behavioural treatment**
 - Stimulus control
 - Sleep restriction
- Daily sleep diary during the treatment (4-8 weeks)

Relaxation Techniques

- **Progressive Muscle Relaxation** (good evidence)
- **Imagery** (insufficient evidence)
 - Counting sheep, neutral, relaxing scenes
- **Biofeedback** (good evidence)
- **Meditation** (some evidence)

Medications

- Benzodiazepines
- Benzodiazepine analogues (ie zolpidem, zopiclone, zaleplon)
- Sedating antidepressants/ antipsychotics
- Sedating antihistamines
- Melatonin

Medications

- Benzodiazepines and benzo analogues
 - Usual indication is only for short term insomnia (stress related) but if justified, can be used for chronic insomnia
 - Use lowest effective dose
 - Use intermittent dosing (2-4 times a week)
 - Short term use (not more than 4 weeks) if possible
 - Gradual discontinuation and watching for rebound insomnia

Medications

- Benzodiazepine and benzo analogues
 - Shorter half lives preferred to limit daytime sedation
 - Risks (dependence, *tolerance*, excessive sedation, motor effects, worsening of sleep apnea) have to be discussed
 - Issue of tolerance now questioned based on 2 long term trials (eszopiclone and zolpidem 6-12 months)
- Benzos increase stage 1&2 sleep and decrease slow wave sleep (which may be the restorative sleep needed)

Medications

- Melatonin
 - Insufficient evidence for chronic insomnia
 - Potentially useful for elderly insomniacs
 - Definitely helpful in jet lag and circadian rhythm problems

Medications

- Sedating antidepressants
- Sedating antihistamines
 - Anticholinergic effects
 - No dependence potential
 - Toxicity on overdose

Herbal/Natural Preparations

- Valerian root
 - Some GABA like effects
 - Increase stage 2 sleep, decrease slow wave sleep
 - Highly tolerated
 - Need further study
- Kava kava
- 5HTP

Take home message

- Don't just prescribe sleeping tablets
- Take a good history and establish cause – psychiatric, other medical
- If primary insomnia– CBT/ Sleep Restriction



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