Position Statement 20
Sleep and the Older Person

Key Points

1. Normal ageing is associated with multiple physiological changes in sleep; however these changes alone should not impact on sleep quality or quantity.

2. The prevalence of sleep disorders does increase with age.

3. Poor sleep quality may result in cognitive impairment and reduced quality of life, so this requires careful assessment, investigation and treatment.

4. There are multiple medical and psychiatric co-morbidities that may be the cause of the sleep disorder or arise as a consequence of it.

5. Sleep disorders in older persons are often considered difficult to treat by health professionals possibly due to a lack of awareness and expertise in these areas; yet older persons are amongst those who are in the greatest need of treatment.

6. Management of sleep disorders should start with acknowledging the existence of the problem before conducting a comprehensive assessment of the patient, which should include a psychosocial review.

7. The clinical assessment of the older patient with sleep disorders or complaints involves a multidisciplinary approach.

8. Investigations and treatment options should be tailored towards the individual.

9. Both non-pharmacological and pharmacological treatments should be considered and in some cases, these may need to be used concurrently in order to achieve long term remission.

10. If a pharmacological treatment is used, it should be commenced at the lowest dose and up-titrated slowly with frequent review of the patient to assess treatment response and potential adverse effects. Pharmacological agents should always be used sparingly in the older people and ideally after an underlying cause of the sleep disorder has been addressed.

11. Areas for future research may include:
   - Further elucidation of the role of sleep and the impact of sleep disorders in cognitive decline and dementia
   - Optimal intervention(s) and treatment(s) of sleep disorders in residential aged care facilities and management of sleep disorders in the older persons with dementia.

This Position Statement represents the views of the Australian and New Zealand Society for Geriatric Medicine. This Statement was approved by the Federal Council of ANZSGM on 28th November 2011. Authors: Dr Jane Fyfield and Dr Jessyln Lim.
Introduction
Sleep is an important part of life, irrespective of one’s age. Sufficient good quality sleep is essential in maintaining good health and this need does not lessen with age. Normal ageing is associated with physiological changes in sleep; however these changes should not impact on sleep quality or quantity. It is a common misconception that sleeping problems are a natural consequence of ageing.

However, sleep disorders are common in older people and given our ageing population, the prevalence of these disorders will continue to rise. Unfortunately, various factors including a lack of awareness or expertise in clinicians and insufficient access to certain diagnostic tests mean that problems are either under-investigated or completely ignored. Conditions such as diabetes, hypertension, cardiovascular disease, stroke and cognitive impairment have now been linked to various sleep disorders in older people and the potential morbidity and mortality implications from these associations are enormous. In addition, the potential adverse impact on the quality of life of the patient’s bedroom partner(s) and carers must not be overlooked.

Normal Sleep
Physiology of sleep
Sleep is composed of two physiological states: rapid eye movement sleep (REM) and non-rapid eye movement (NREM) sleep. NREM is further divided into 3 stages, based upon their characteristic electroencephalographic profiles (1). Stage N1 is the lightest stage of sleep and Stage N3 the deepest and most refreshing form of sleep. A normal night’s sleep consists of repeating cycles of NREM/REM, which occur approximately every 90 minutes. A cycle usually begins with NREM sleep and enters REM sleep in the second half. Typically 75% of total sleep time is spent in NREM sleep and 25% is REM sleep.

**Table 1: The stages of sleep (2)**

<table>
<thead>
<tr>
<th>Stage</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Awake</td>
<td>“Alert” brain</td>
</tr>
<tr>
<td></td>
<td>Muscles relatively tense</td>
</tr>
<tr>
<td>Non-REM Sleep</td>
<td></td>
</tr>
<tr>
<td>Stage 1</td>
<td>Transition stage</td>
</tr>
<tr>
<td></td>
<td>Light sleep</td>
</tr>
<tr>
<td></td>
<td>Reduced brain-wave activity</td>
</tr>
<tr>
<td></td>
<td>Slow eye movements</td>
</tr>
<tr>
<td>Stage 2</td>
<td>Muscle relaxation</td>
</tr>
<tr>
<td></td>
<td>Decreased body temperature</td>
</tr>
<tr>
<td></td>
<td>Reduced heart rate</td>
</tr>
<tr>
<td></td>
<td>Sleep spindles on electroencephalograph</td>
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<tr>
<td></td>
<td>K-complexes on electroencephalograph</td>
</tr>
<tr>
<td>Stage 3</td>
<td>Deep sleep</td>
</tr>
<tr>
<td></td>
<td>High-voltage, low-frequency delta waves</td>
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<tr>
<td></td>
<td>Restorative sleep</td>
</tr>
<tr>
<td>REM Sleep</td>
<td>Rapid eye movements</td>
</tr>
<tr>
<td></td>
<td>Vivid dreaming</td>
</tr>
<tr>
<td></td>
<td>Increased brain activity</td>
</tr>
<tr>
<td></td>
<td>Increased heart rate</td>
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<tr>
<td></td>
<td>Active inhibition of voluntary muscles</td>
</tr>
</tbody>
</table>

Age-related Sleep Changes
With age, there is an expected decline in general physiology which in turn impacts on sleep-wake physiology (Box 1). Whilst these changes predispose older people to sleep disturbances, they are not by themselves causal. Fragoso and Gill (3) proposed a conceptual model that described sleep complaints as a consequence of multiple and interdependent predisposing, precipitating and perpetuating factors, analogous to a geriatric syndrome. The precipitating factors may occur across various areas, including medical, psychological and cognition (Figure 1).
Box 1: Sleep Changes in Ageing (2)

- Decreased total nocturnal sleep time
- Reduced ability to initiate and maintain sleep
- Phase advancement of circadian rhythm
- Reduced slow-wave & REM sleep
- Increased NREM sleep
- Reduced sleep efficiency (time asleep as a percentage of time in bed)
- Reduced threshold for arousal from sleep
- Fragmented sleep with multiple arousals
- Daytime napping

Figure 1: Mechanisms underlying sleep complaints and associated adverse outcomes (Fragoso & Gill).

Sleep Duration
It is a common misperception that the amount of sleep required decreases with age. In a large American sleep survey of adults, those aged 65-84 years had an average nightly total sleep duration of 7.1 hours, which was equal to if not slightly more than that of younger adults (4). However, studies on older adults who experienced disturbed sleep demonstrated the contribution of other medical co-morbidities to sleep duration and hygiene (5-6).

Sleep Architecture
A meta-analysis of healthy individuals by Ohayon et al suggested that with increasing age, less time is spent in the deeper stages of sleep and more time in the lighter stages (7). These changes were most noticeable in adults aged 18-60 years with the main decline after age 60 being in sleep efficiency and daytime wakefulness (eg alertness in the early morning but drowsiness in the early evening). It was also noted that the changes affected men more than women (7).
**Circadian Rhythms**

Physiological responses during sleep such as core body temperature and hormonal regulation, and the sleep-wake cycle are regulated by the hypothalamic suprachiasmatic nucleus. Under the influence of environmental stimuli or zeitgebers, this controls the 24 hour oscillation of the circadian rhythms. The most significant zeitgeber is light.

With age, circadian rhythms become desynchronised and lose amplitude, resulting in frequent night awakening, increased daytime drowsiness, and reduced sleep efficiency. This is mainly due to the deterioration of the suprachiasmatic nucleus (8). Other factors related to ageing, include a reduction in nocturnal melatonin secretion which is thought to have a role in initiating sleep; (9) and a loss of the external cues that help maintain the circadian rhythm, namely a lack of exposure to sunlight or bright light especially in the institutionalised – the latter of which has been well documented (10).

Sleep phase advancement is common in older people – leading to early morning awakening and early evening fatigue or drowsiness. A typical pattern is falling asleep between 7-9pm and waking up 7 – 8 hours later between 2-5am. Those who delay going to bed in an effort to wake up later in the morning, find that this is not beneficial due to the circadian shift. All that occurs is less total sleep time and more daytime drowsiness, which may precipitate daytime napping.

**Causes of Abnormal Sleep**

There are several pathological sleep disorders that are implicated in the inability of older people to achieve sufficient sleep (Box 2). These disorders are not considered part of normal ageing and need comprehensive management.

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**Box 2: Factors Contributing to Sleep Disorders in Older Adults**

<table>
<thead>
<tr>
<th>Primary sleep disorders</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sleep disordered breathing (central, obstructive or mixed sleep apnoea)</td>
</tr>
<tr>
<td>Periodic limb movement disorder</td>
</tr>
<tr>
<td>Restless legs syndrome</td>
</tr>
<tr>
<td>REM Sleep Behaviour disorder</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Insomnia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary</td>
</tr>
<tr>
<td>Co morbid with medical and/or psychiatric disorders</td>
</tr>
<tr>
<td>Co morbid with polypharmacy</td>
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<table>
<thead>
<tr>
<th>Dementia</th>
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<tbody>
<tr>
<td>Institutionisation</td>
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**A. Sleep-disordered breathing (SDB)**

This umbrella term includes a range of respiratory disorders that occur periodically throughout sleep, of which apnoeas are the most severe including (obstructive and/ or central sleep apnoea). Apnoeas cause interrupted poor quality sleep, hypoxia and reduced time spent in REM sleep. The diagnosis is made on the basis of an apnoea-hypopnoea index (AHI) of ≥ 5. There is a range of severity, with AHI 14 being defined as mild and AHI≥30 defined as severe. Risk factors for SDB include age, gender, obesity, sedatives, upper airway pathology and previous strokes. The predominant symptoms in older people are snoring and excessive daytime sleepiness. There is increasing evidence that SDB can cause cognitive impairment, nocturia, hypertension and cardiovascular disease including stroke (11-13). Given this evidence, if an older adult has concomitant cardiac disease, hypertension, nocturia and/or cognitive dysfunction in the setting of SDB; or if the SDB is severe, treatment should be considered (14).

**B. Restless Legs Syndrome / Periodic Leg Movements**

Restless legs syndrome (RLS) and periodic leg movement disorder (PLMD) are two distinct clinical entities, with increasing prevalence in the latter decades of life; but
which are often confused with each other. RLS is characterised by an intense urge to move or massage the legs due to paraesthesia in the lower limbs. The sensations are usually described as tingling, cramps, a “creepy-crawly feeling” under the skin or pain. These usually occur in the evening or when the person is getting into bed. The onset of sleep is then delayed due to the need to walk or constantly move their legs in an attempt to obtain relief from the symptoms. RLS has a high prevalence in older people (i.e. 10-35% of those aged over 65 years) (15). Although it can be idiopathic, RLS is also associated with multiple medical co-morbidities including iron deficiency, renal failure, rheumatoid arthritis and peripheral neuropathy (16). There also appears to be a familial predisposition and female predominance (17-18).

PLM is very common in older people with a prevalence of 34% (19). It is an idiopathic condition that is characterised by repetitive (20-40 seconds) leg jerks or kicks during sleep. Each jerk may cause arousal or brief awakening which causes sleep fragmentation. Diagnosis is made on the basis of a sleep study that demonstrates periodic limb movement index (number of limb movements per hour of sleep) of ≥ 5.

Treatment with dopamine agonists is warranted if there is insomnia or daytime sleepiness.

C. REM Sleep-Behaviour Disorder (RBD)

REM sleep is when dreams are most pronounced. During this, there is inhibition of voluntary muscle movements (with the exception of respiratory muscles) to prevent the person from acting out their dreams. However in RBD, skeletal muscle atonia is reduced or absent and affected persons may display a variety of elaborate movements which in extreme cases can be harmful towards themselves or their bed partner. Content of dreams is also frequently altered to include chasing or fighting. Examples of nighttime behaviours include punching, yelling, running, flailing of limbs or eating.

The aetiology is unknown but may preceed (by many years) or be associated with a variety of neurodegenerative disorders (e.g. Parkinson’s disease, Alzheimer’s Dementia and Dementia with Lewy Bodies) (20-22). It is more common in men and the onset is usually in the 6th decade.

D. Insomnia

Insomnia is classified as a primary or secondary sleep disorder. It may consist of difficulty initiating or maintaining sleep, waking up too early or poor quality sleep. Primary insomnia is defined as sleeplessness that is not attributable to a medical, psychiatric, or environmental cause (23). Secondary insomnia is more common and is usually associated with another medical or psychiatric condition. Insomnia is associated with significant morbidity and mortality (24 - 26).

Primary Insomnia

The diagnostic criteria for primary insomnia as defined by the Diagnostic and Statistical Manual of Mental Disorder (DSM-IV-TR), is as follows.

1. The predominant symptom is difficulty initiating or maintaining sleep, or having non-restorative sleep; for at least 1 month.
2. The sleep disturbance (or associated daytime fatigue) causes clinically significant distress or impairment in social, occupational, or other important areas of functioning.
3. The sleep disturbance does not occur exclusively during the course of narcolepsy, breathing-related sleep disorder, circadian rhythm sleep disorder, or a parasomnia.
4. The disturbance does not occur exclusively during the course of another mental disorder (e.g., major depressive disorder, generalised anxiety disorder, a delirium).
5. The disturbance is not due to the direct physiological effects of a substance (e.g., drug abuse, medication) or a general medical condition.
Secondary Insomnia

The high incidence of co-existing medical or psychiatric conditions in an older population, means that insomnia is extremely common. In these cases, the focus of the treatment should be on the underlying disorder, but strategies to improve sleep efficiency must also be incorporated.

Common medical conditions associated with insomnia are arthritis, chronic pain, dyspnoea from cardiopulmonary disease, cancer, prostate disease causing nocturia, gastroesophageal reflux and neurological disorders e.g. Alzheimer’s dementia or Parkinson’s disease. Psychiatric disorders that are commonly linked to insomnia are depression, anxiety and panic disorders (27).

The medications used to treat the aforementioned conditions may themselves cause or exacerbate insomnia. When polypharmacy is present, the drug interactions may also have an additive effect. A careful drug history is therefore an important part of the assessment of insomnia. Examples of offending drugs include antihypertensives (β-blockers), respiratory medications (theophylline), hormones (corticosteroids, thyroxine), psychotropics (SSRI, MAO inhibitors), diuretics, levodopa and phenytoin. In addition to prescription medications, it is important to consider over-the-counter preparations which may be missed. Examples of these include cold and flu medications that contain pseudoephedrine, and nicotine gum or patches. Caffeine and alcohol are other common culprits.

Psychosocial stressors can lead to disturbed sleep. Those who have to provide full time care to a partner or family member often experience disrupted sleep-wake cycles. This may particularly occur in circumstances such as dementia or stroke where the carer may be frequently woken up in the middle of the night. In addition, the mental and emotional toll this burden exacts upon the carer places them at a high risk of physical and psychiatric disorders. Bereavement has also been found to be associated with the development of insomnia, particularly in widows (28). Social isolation and loss of a regular daytime schedule (e.g. after retirement), often leads to inactivity and poor sleep-wake habits. The tendency to stay in bed for prolonged periods or indulge in daytime napping (especially late afternoon or evening) causes inadequate sleep hygiene. The reduction of exposure to normal zeitgebers then leads to irregular sleep-wake patterns that manifest as insomnia.

E. Circadian Rhythm Sleep Disorder

The combination of age-related changes in sleep and circadian rhythm coupled with low levels of light exposure and exercise predispose to the development of this disorder. The hallmark is that quality and duration of sleep is normal but occurs at unconventional times. Typically in older people, there is advancement of the sleep phase so that sleep begins and finishes unusually early e.g. sleep onset prior to 9pm and wake times between 2-5am. Problems arise when the patient stays up later in the evening instead of going to bed when they start feeling sleepy due to societal norms, but then still wake up early. This leads to excessive sleepiness during waking hours. Diagnosis is based on a sleep diary or a sleep wrist monitor to document the advanced sleep-wake cycle.

F. Older People in Residential Care Facilities

Residents in high level residential aged care facilities have a significantly higher incidence of sleep disorders compared to their peers in the community. A study of 147 nursing home residents found that the prevalence of significant insomnia was 39% (29). Among these residents, 66% had at least one potentially remediable cause identified, with the most common being pain (39%) and/or depression (30%). Other reasons for disturbed sleep include a higher prevalence of frailty and cognitive impairment, multiple medical conditions, lower levels of physical activity, a higher proportion of time spent indoors and sleep disruptions due to noise from regimens designed to facilitate care delivery e.g. nocturnal incontinence checks or personal care provision to the individual involved or their roommate (30-31).
Sleep disturbances can lead to significant adverse events including increased mortality, poor quality of life, greater functional impairment and greater need for assistance for personal activities of daily living (31).

**Clinical Evaluation of Sleep**

Generally, an assessment of any sleep disorder should begin with a comprehensive medical and psychiatric evaluation including screening for depression, anxiety and substance abuse. A review of medications is also imperative.

A detailed account of specific sleep complaints is necessary, and if available, with input from the bed partner, caregiver, or facility staff (residential care). A sleep diary should also be completed if possible. The following questions may serve as an initial assessment (32)

1. What time do you wake up in the morning?
2. What time do you fall asleep at night?
3. Do you have difficulties falling asleep?
4. How long does it take for you to fall asleep?
5. How many hours do you sleep per night?
6. How many times do you wake up during a typical night? If you wake up, do you usually have trouble falling back to sleep?
7. Do you feel that you are excessively drowsy during the daytime?
8. Does your bed partner say (or are you aware) that you frequently snore, gasp for air or stop breathing?
9. Does your bed partner say (or are you aware) that you kick, thrash about or scream while asleep?
10. Do you nap during the day?
11. Do you doze off without planning to during the day?

If the answers to these questions suggest a sleep disorder then further questioning may be indicated as below.

1. Do you have the urge to move your legs or do you experience discomfort in your legs during rest or at night?
2. How often do you have to get up to urinate at night?
3. Do you do any physical activity or exercise?
4. How much time do you spend outdoors each day?
5. What medications do you take and what time do you take them? Do you experience any side-effects from these medications?
6. How much caffeine or alcohol do you consume in a day?
7. Do you feel sad or anxious?
8. Have you noticed any problems with your memory?
9. Have you had any stressful events or bereavements recently?

The responses to these questions should help direct any further questions, focused physical examination and laboratory investigations. A diagnostic algorithm by Bloom, Ahmed, et al is demonstrated in Figure 2 below (32).

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Figure 2: A diagnostic algorithm (Bloom, Ahmed, et al)
Sleep Measurement

There are several validated methods of assessing sleep. Some of these are completed by the subject, and others are performed by an observer. The subject's cognition is a key factor in determining whether they are able to complete an assessment by themselves. The following are examples of assessment tools.

1. Timed behavioural observations.
   This involves an observer documenting whether a person is asleep or not, on a regular basis (e.g. every hour), over a certain time period. This could be expanded to include the subject's behaviours, responses to care routines and signs of other sleep disorders. This has been validated in the residential care setting (33).

2. Pittsburgh Sleep Quality Index (PSQI).
   This 19-item instrument which assesses sleep quality and disturbances over a one month period, has been validated in older people (34). Scores of 5 or greater are considered indicative of poor sleep.

3. Insomnia Severity Index (ISI).
   This is a self-rated scale of 7 questions that characterises the symptoms and consequences of insomnia. Its contents are based on the DSM-IV criteria for insomnia. It has been validated in community-dwelling older adults both for detection of insomnia and evaluation of treatment response. (35-37)

   The scale contains 8 questions about nocturnal sleeping problems and behaviours of those in residential care facilities. It is usually completed by nursing staff and is helpful for patients with cognitive impairment (38).

5. Actillume wrist monitor.
   This is a matchbox size device worn on the wrist, which is able to record sleep variables such as total minutes of nighttime sleep, percent time asleep, number of awakenings, duration of time awake at night, total daytime sleep, and circadian rest-activity variables. In a validation study, this was deemed to be the most feasible technique for studying sleep and wake activity in nursing-home patients with dementia when compared to traditional polysomnography and clinical observations (39).
6. Epworth Sleepiness Scale (ESS). This validated measure of daytime drowsiness rates the likelihood of dozing off or falling asleep in a variety of 8 daytime situations (e.g. whilst watching television). The higher the score, the greater the drowsiness. It is useful as a screening tool for sleep disorders such as sleep apnoea.

7. A sleep diary. This should be completed daily for at least 2 weeks. The recording is usually carried out by subjects after arising each morning. The diary typically includes the time the subject went to bed, total sleep time, time taken to fall asleep, the number of awakenings per night, use of sleep medications, time getting out of bed in the morning, a rating of subjective sleep quality and daytime symptoms.

8. A polysomnograph (PSG). This refers to the simultaneous recording of multiple physiologic parameters during sleep. Sleep is staged by monitoring brain wave activity via electroencephalography (EEG - typically two channels); muscle activity (typically the chin muscles via electromyography); and eye movements via electrooculography. In the older population, especially those in residential care facilities, the complexity and intrusiveness of PSG, and the need for this to be carried out in specialised centres are some of the limiting factors in its usage.

**Box 3: Indications for Polysomnography (40)**

<table>
<thead>
<tr>
<th>Indications</th>
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</thead>
<tbody>
<tr>
<td>Diagnosis of sleep-related breathing disorders</td>
</tr>
<tr>
<td>Continuous positive airway pressure titration for sleep-related breathing disorders</td>
</tr>
<tr>
<td>Obstructive sleep apnoea documentation before uvulopalatopharyngoplasty</td>
</tr>
<tr>
<td>Assessment of treatment results before multiple sleep latency tests for suspected narcolepsy</td>
</tr>
<tr>
<td>Violent or injurious sleep-related behaviours</td>
</tr>
<tr>
<td>Atypical or unusual parasomnias</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Not Indications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Epilepsy not related to a sleep disorder</td>
</tr>
<tr>
<td>Diagnosis or treatment of restless legs syndrome</td>
</tr>
<tr>
<td>Circadian rhythm sleep disorders</td>
</tr>
<tr>
<td>Uncomplicated and non-injurious parasomnias</td>
</tr>
</tbody>
</table>

**Treatments**
All treatments should be individualised and tailored according to the nature and severity of the problem. Referrals to sleep specialists, neurologists, psychologists and other health professionals may be required.

**A. REM Sleep Behaviour Disorder**
The treatment of this disorder should start with ensuring safety in the bedroom environment e.g. by removing dangerous or sharp objects or padding hard surfaces. Cessation of any medications which may exacerbate the disorder, such as selective serotonin-reuptake inhibitors (SSRI) and beta blockers, may be beneficial. Pharmacotherapy includes low
dose clonazepam (usually 0.5-1mg) at bedtime. As there is good clinical response to this therapy, and discontinuation of treatment usually results in recurrence of symptoms, lifelong therapy with clonazepam may be necessary. When REM sleep disorder is associated with a neurodegenerative condition, treatment of the primary disorder should be attempted. Because clonazepam can reduce respiratory drive it should be used with caution if the patient has severe airways disease, obstructive sleep apnoea or a hypoventilation syndrome.

B. Sleep-disordered breathing (SDB)
Continuous positive airway pressure (CPAP) is the treatment of choice for SDB. It ameliorates sleep symptoms in addition to improving motor speed, nonverbal learning and memory; vascular resistance and nocturia (41). If possible, weight loss and other lifestyle modifications (e.g. alcohol reduction and avoiding lying on one’s back), should be encouraged.

C. Restless Legs Syndrome / Periodic Leg Movements
Non-pharmacological approaches to the management of these conditions include education, exercise, sleep hygiene, exclusion of underlying iron deficiency and cessation of alcohol, smoking and caffeine (see Table 2). Pharmacotherapy of choice is a dopamine agonist e.g. ropinirole 0.5mg or pramipexole 0.125mg at bedtime (42). Treatment side effects include nausea, orthostatic hypotension, sleepiness, headache and impulse control disorders (e.g. compulsive gambling) and punding (stereotypic behaviour). If dopamine agonists are contraindicated, low dose opioids e.g. slow-release oxycodone(10-20mg) may also be used. Third-line drugs are gabapentin, pregabalin or low dose clonazepam. If iron replacement is indicated, the ferritin level should be kept above 50 µg/L.

D. Insomnia
Treatment should ideally include non-pharmacological and pharmacological modalities and a multidisciplinary team approach. Combination therapy in older people has been shown (in a randomised controlled trial setting) to be more efficacious than pharmacological or behavioural therapy alone (43). However, if the sleep disorder is secondary to another condition(s), it is essential to treat that first, as this alone may significantly improve the patient’s sleep.

Behavioural Treatments
Irrespective of the cause of insomnia, behavioural treatment has been shown to be highly effective across all age groups. Cognitive behavioural therapy (CBT) used in combination with medication during the initial 6 weeks of treatment, followed by CBT alone for a further 6 months provided the best remission rate (44). CBT combines several different modalities, along with cognitive restructuring. The aim of the cognitive component is to address counterproductive thoughts or dysfunctional beliefs, by establishing realistic expectations. The behavioural component includes methods such as relaxation techniques, massage therapy, stimulus reduction, sleep education and sleep restriction.

Sleep Hygiene and Sleep Education
These treatments are best used in combination with other modalities as they are inadequate on their own. Sleep hygiene addresses external and internal factors that can impair sleep both in the younger and older population (Table 2).
**Table 2: Good Sleep Hygiene**

<table>
<thead>
<tr>
<th>What To Do</th>
<th>What To Avoid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Develop and maintain sleep rituals that make going to sleep a routine</td>
<td>Heavy exercise, large meals, excessive caffeine, nicotine or alcohol, and liquids within 2 hours of bedtime</td>
</tr>
<tr>
<td>1. Prepare with a 20-30 minute relaxation period by performing meditation, yoga or listening to soft music.</td>
<td>Daytime napping. If necessary, limit naps to 30 minutes and do not nap after 2 pm</td>
</tr>
<tr>
<td>2. Having a hot bath 90 minutes before bedtime</td>
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<tr>
<td>3. Have a light snack from one of the following</td>
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<tr>
<td>• Warm milk</td>
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<tr>
<td>• Carbohydrates</td>
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<tr>
<td>• Foods high in tryptophan e.g. bananas</td>
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</tr>
<tr>
<td>Use the bed only for sleeping or sexual activity</td>
<td>Watching television, reading, using a computer, or working in bed</td>
</tr>
<tr>
<td>If unable to fall asleep, then leave the bedroom and return only when sleepy</td>
<td></td>
</tr>
<tr>
<td>Prioritise good quality sleep</td>
<td>Going to bed too early in the evening</td>
</tr>
<tr>
<td>1. Maintain the same bedtime and rising times, regardless of the amount of sleep obtained that night</td>
<td>Pondering on life issues or conflicts and trying to solve problems that occurred during the day</td>
</tr>
<tr>
<td>2. Ensure a restful environment – comfortable bed, cool well-ventilated room, minimal light or noise</td>
<td>Having lengthy discussions prior to bedtime</td>
</tr>
</tbody>
</table>

**Sleep Restriction**

An example of a sleep restriction program is provided below (45).

1. A patient with insomnia feels they sleep only four hours per night, despite generally being in bed from 10pm – 8am
2. They should be instructed to start restricting their sleep to only 4 hours per night, as this is the length of time they think they are sleeping (e.g. go to bed at 2am and rise at 6am)
3. They must comply with this regimen until they are regularly sleeping throughout the 4 hours and feel increasingly sleepy; and wanting to go to bed earlier
4. Once this target is reached, they can increase their time in bed by 30 minutes until they are sleeping through and craving sleep at an earlier time.

**Light therapy**

Phototherapy has been shown to be beneficial in insomnia given the phase advancement in circadian rhythm in older people as previously described. Timed exposure to bright light can improve sleep efficiency and increased total sleep time, REM sleep and slow-wave sleep (46). The therapy should be administered during daytime hours and is effective in both community dwellers and those living in residential facilities (47). In patients with dementia, bright light therapy can also be effective in improving their daytime wakefulness and activity levels, and promoting a more normal sleep-wake cycle (48). The improvement is postulated to be due to the extensive degeneration in the suprachiasmatic nucleus seen in Alzheimer’s dementia which
renders the person less sensitive to individual zeitgebers.

**Pharmacological Treatments**
The medications used for treating insomnia usually falls into 3 categories – hypnotics, low dose antidepressants, and melatonin.

Hypnotics are divided into short-acting benzodiazepines (e.g. temazepam or oxazepam) and non-benzodiazepines which are GABA<sub>A</sub> receptor agonists (e.g. zolpidem, zopiclone). These should ideally be used in the short term (days to weeks) to avoid dependence and tolerance. The aim of hypnotics is to obtain rapid short-term relief and allow the patient to learn the CBT techniques that will provide the long term solution. A meta-analysis that compared hypnotics with placebo found improved sleep quality, increased total sleep time, and decreased nocturnal awakenings (49).

Adverse events were more common in those taking hypnotics, particularly given the reduced clearance associated with ageing and the greater sensitivity of the central nervous system to drug effects. It is therefore essential that any hypnotic medication be started at a low dose, and up-titrated slowly if required. If possible their use should be limited to 2 to 4 nights per week. The patient should be reviewed regularly for the occurrence of side effects e.g. daytime sedation, falls, dizziness and confusion. These drugs should be avoided in those with obstructive sleep apnoea.

A review by Wagner et al (50) found that compared to benzodiazepines, non-benzodiazepine agents had less potential for residual daytime sedation due to their shorter half-life. In addition, psychomotor performance and memory were less impaired, and rebound insomnia and withdrawal symptoms were less common. They also noted that there was less potential for abuse as development of tolerance to non-benzodiazepine agents occurred slowly.

Antidepressants at low doses can be useful especially if the patient also has depressive symptoms. However studies have mainly been in short term usage (e.g. 3 months duration). In phase III trials in older people with chronic primary insomnia, doxepin 3 to 6mg nocte, improved wake time after sleep onset, total sleep time and sleep efficiency compared to placebo (51-52). Doxepin was well tolerated and there was no evidence of physical dependence or worsening of insomnia after withdrawal of the drug.

Melatonin is a naturally occurring hormone produced by the pineal gland whose secretion is stimulated by darkness and inhibited by light, and is thought to induce sleep. Its concentrations in older people peak later at night and at a lower level compared to younger adults (53), which may contribute to insomnia. Supplementary melatonin may have some effect in improving sleep quality in older people, especially if their melatonin levels are low (54). However, a meta-analysis concluded that melatonin was of limited value in treating most primary or secondary sleep disorders (55).

**E. Circadian Rhythm Sleep Disorder**
The most effective treatment is bright light therapy, as it is the strongest cue for circadian entrainment. An artificial light box which provides broad spectrum light of 2500 to 10000 lux for 1 to 2 hours duration in the evening between 7 and 9pm should be used (32). Sleep hygiene should be employed in combination with light therapy.

**F. Older Persons in Residential Care Facilities**
Studies in sleep interventions in residential care settings have had mixed results due to sample size, study design, difficulty in implementing interventions and the high probability that the underlying causes are multi-factorial. This makes it difficult to make evidence-based recommendations. Nevertheless, it stands to reason that combination sleep therapy may be more effective than solitary treatment given the previously mentioned factors that impact on sleep in institutionalised older people. A literature review on sleep in residential care by National Ageing Research Institute Victoria Australia (56) concluded that effective therapy combinations and intensities of sleep interventions could not be determined, and that therapy would need to be individualised.
given the diversity of sleep disorders in older persons. The American Medical Directors Association has developed a clinical practice guideline which is based on level of evidence (Table 3).

**TABLE 3: MANAGEMENT OF SLEEP DISORDERS IN NURSING HOME RESIDENTS (57)**

<table>
<thead>
<tr>
<th>RECOMMENDATION</th>
<th>QUALITY OF EVIDENCE</th>
<th>STRENGTH OF EVIDENCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>A complaint of excessive sleepiness should be thoroughly evaluated using a detailed history and the appropriate use of subjective questionnaires</td>
<td>III</td>
<td>A</td>
</tr>
<tr>
<td>An accurate diagnosis should be established in older patients with hypersomnia using polysomnography and multiple sleep latency test</td>
<td>II</td>
<td>B</td>
</tr>
<tr>
<td>In patients with hypersomnia, management of any medical, neurological and psychiatric disorders should be optimised</td>
<td>III</td>
<td>A</td>
</tr>
<tr>
<td>In patients with hypersomnia, medications or substances with sedating properties should be withdrawn when possible, or the timing of the medications should be changed to minimise sedation during waking hours</td>
<td>III</td>
<td>A</td>
</tr>
<tr>
<td>Behavioural modification of sleep-wake behaviour is an effective treatment strategy that is useful for many patients with excessive sleepiness and should be advised</td>
<td>II</td>
<td>A</td>
</tr>
<tr>
<td>Scheduled naps can be beneficial to relieve sleepiness with or without the use of pharmacological agents</td>
<td>II</td>
<td>B</td>
</tr>
<tr>
<td>Pharmacological management should be considered for all patients who have a diagnosis of hypersomnia of central origin</td>
<td>III</td>
<td>A</td>
</tr>
<tr>
<td>There is little evidence that sleepiness due to medications is improved with other medications that are used to counteract sleepiness. If possible, discontinue the offending medication or change the timing or dose</td>
<td>III</td>
<td>A</td>
</tr>
<tr>
<td>Regular follow-up of patients with excessive sleepiness is necessary to monitor and ensure effective treatment</td>
<td>III</td>
<td>A</td>
</tr>
<tr>
<td>Referral to a sleep specialist should be undertaken when narcolepsy or idiopathic hypersomnia is suspected or if the cause of the sleepiness is unknown</td>
<td>III</td>
<td>A</td>
</tr>
</tbody>
</table>

**Conclusion**

Ageing is associated with many physiological changes which can have an impact on sleep architecture, and there are multiple co-morbidities which may also affect sleep quality and quantity. The clinician must be aware of the many sleep disorders and be prepared to investigate and treat appropriately. Many of sleep disorders and the conditions affecting sleep will require a multidisciplinary approach to achieve the greatest treatment effect. Whilst pharmacological measures are not always needed in the treatment of poor sleep in the older person, a combination of
pharmacological and non-pharmacological therapies is often required. The treatment regime must be tailored to each individual and must take into account not only their physical health, but also social and environmental circumstances. In all cases, the aim of treatment is to optimise the patient’s chances of recovery, increase their quality of life and ability to function.

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50. Wagner J, Wagner ML. Non-benzodiazepines for the treatment of


