Obstructive sleep apnoea: accidents waiting to happen

Sleepiness or fatigue, defined as a reduced level of alertness during wake time, is a major causal factor in accidents and incidents. Melissa Hack looks at how and why a lack of sleep can seriously affect daily living.

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Airways J **2004; 2 (1): 37–8.**

About 20-30% of fatal road traffic accidents in the UK are attributed to sleepiness.[1] There is also a higher incidence of occupational accidents in people who snore who report sleepiness.[2]

Research has shown that a recording of the electrical brain wave pattern of a person who is sleepy while driving a train shows periods of 20-30 s during which the brain waves show features consistent with a sleep pattern. However, at the time the individuals are apparently awake and operating the train.[3] The time spent by a train driver in these microsleep periods is enough to travel a considerable distance, potentially passing a red light or signal, which could provide an explanation for incidents described as 'signal passed at danger' or SPAD.

People may be sleepy for many reasons including voluntarily cutting down on sleep time for study or social commitments, intercurrent illness, childcare or shift work. However, sleep disorders can also result in excessive daytime sleepiness.

Sleep disorders

Sleep disorders are common and more than 80 disorders are recognised. These disorders can lead to:

- a reduction in the amount of sleep, e.g. in insomnia;
- reduced sleep quality, as in obstructive sleep apnoea syndrome (OSAS);
- the individual falling asleep with little warning, as in narcolepsy.

Recordings of the electrical brain wave patterns in people with some untreated sleep disorders who are performing tasks while awake can also show periods of microsleep. It is not clear whether a period of microsleep alone can result in an accident or whether other factors are also involved, but it is well established that people with untreated sleep disorders are at an increased risk of involvement in accidents.[4]

Obstructive sleep apnoea syndrome

The sleep disorder OSAS is common, affecting up to 4% of adult males and 2% of adult females in the general population.[5] OSAS is characterised by disordered breathing during sleep, which is usually associated with pauses and severe snoring, and excessive sleepiness during waking hours.

Breathing pauses or apnoeas are intermittent and recurrent leading to hypoxia, brain arousal and sleep fragmentation. These can occur between 400 and 500 times in one night, resulting in poor quality sleep and excessive daytime sleepiness.

When the patient's history and an examination are suggestive of OSAS an overnight sleep investigation is usually recommended. This may be done at home or as an inpatient. During the investigation a variety of channels may be monitored ranging from simple oxygen saturation to full polysomnography, including electroencephalographic brain wave recordings, which allow sleep staging.

A diagnosis of OSAS can be based on a suggestive history, a positive sleep study and sleepiness during waking hours.

Measuring sleepiness

The presence of wake time sleepiness can be determined from the patient history and an attempt is often made to define this further using a scale or score.

The Epworth Sleepiness Scale is widely used. Patients are asked to rate their sleepiness on a scale of zero to three, in eight different situations; a score greater than nine indicates a tendency to increased sleepiness (Figure 1). However these are subjective scales that rely on self-reporting and therefore have limitations, particularly if the individual is worried about keeping their job and other possible repercussions. It may therefore be necessary to gain objective information in cases where an occupation requires a high level of alertness, such as pilots, train drivers and so on.

The driver of this wrecked car survived the crash and was found to have obstructive sleep apnoea syndrome (OSAS). Courtesy of The Sleep Apnoea Trust (SATA).

The information required is usually collected in specialist centres using a variety of daytime tests. Most commonly used are the Multiple Sleep Latency Test, which measures the propensity of an individual to fall asleep during four periods through the day, and the Maintenance of Wakefulness Test, which measures the ability to stay awake during four periods through the day.

Other laboratory tests include the Modified Maintenance of Wakefulness Test, Psychomotor Vigilance Task and different simulators. There is debate concerning the usefulness of these laboratory tests in determining the likelihood of an individual remaining alert in real-life situations.[6]

The Epworth Sleepiness Scale

Name.....

Date.....

Your age (Yrs)..... Your sex (Male = M / Female = F).....

How likely are you to doze off or fall asleep in the situations described in the box below, in contrast to just feeling 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

Situation	Chance of dozing
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 lunch without alcohol	☐
In a car, while stopped for a few minutes in the traffic	☐

Figure 1. The Epworth Sleepiness Scale questionnaire.

Treatment options

There are a range of treatment modalities available and the choice will depend on the symptoms and severity of sleep fragmentation. The most effective therapy is called continuous positive airway pressure (CPAP), which has the advantage that use of the equipment can be monitored and compliance measured (Figure 2).

The CPAP machine provides air at a pressure *via* a facemask to gently hold open the back of the throat and abolish apnoeic episodes. Where symptoms of residual sleepiness persist despite good CPAP therapy compliance and exclusion of other contributory factors, it has been shown that the addition of an alertness-enhancing drug, such as modafinil (Provigil), is helpful in some individuals.[7] This may be considered necessary if an occupation requires maximum alertness but care must be taken to ensure CPAP use continues.

Tests to measure daytime sleepiness have shown that CPAP can significantly improve quality of life and performance, and can reduce the risk of involvement in road traffic accidents to normal.[8]

Other treatments include general advice on weight loss that may include medical therapy and bariatric surgery and healthy sleep hygiene, dental devices, and surgery if indicated for individuals with obstructive factors such as tonsillar or adenoid hypertrophy. The effect of these treatments on the incidence of accidents is not known.

Figure 2. Patient using nasal continuous positive airway pressure (CPAP) therapy.

Conclusion

Sleepiness is a known risk factor for many different types of accidents and OSAS is one example of a medical condition that can result in excessive daytime sleepiness.

Little data exist on the number of accidents that occur in the home or the workplace that may be attributable to OSAS, but it is likely that sleepy individuals will be more prone. Most of the available evidence concerns car drivers and confirms that there is a significantly increased risk of involvement in a road traffic accident of up to seven times for patients with untreated OSAS.

Approximately 80% of people with OSAS are not recognised and not treated, so are at risk of having an accident. However, OSAS can be identified, assessed and treated effectively, leading to a reduction in the risk of involvement in any accident or incident. Increasing awareness of problems related to sleepiness and sleep disorders among the public and healthcare professionals will help to prevent accidents waiting to happen. ■

Useful address

- The Sleep Apnoea Trust (SATA), 7 Bailey Close, High Wycombe, Buckinghamshire, HP13 6QA
  Tel: 01494 527772 Website: www.sleep-apnoea-trust.org
- The Scottish Association for Sleep Apnoea, 18 Albert Avenue, Grangemouth, FK3 9AT
  Tel: 01324 471879 email: smtprice@bigfoot.com
- The Welsh Sleep Apnoea Society (Welsh SAS), The Honorary Secretary, 2 Greenfield Close, Pontnewydd, Cwmbran, NP44 1BY

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