

Snooze Newz

A newsletter for people with sleep-disordered breathing (SDB) and their families

The trouble with fatigue

What is fatigue?

We all know about the physical effects of fatigue: yawning, rubbing eyes, slumping in your chair or falling asleep when you don't want to.

But what about fatigue's effect on our mental functions? Fatigued people have slower responses, they take longer to do mental work compared to when they are 'bright-eyed and bushy-tailed', and they are more likely to make mistakes. They experience what is referred to as Cognitive Disengagement—they are less engaged with any task that requires thought. As a result of this disengagement, they frequently make particular types of errors.

At the emotional level, fatigued people become grumpy and unaffectionate. Tired people are typically irritable, short-tempered, terse and uncommunicative.

It sounds obvious, but it needs to be said: fatigue, or sleepiness, can be caused by a lack of sleep or excessive wakefulness. Fatigue can also occur when a person sleeps inefficiently, maybe because of conditions such as sleep apnea, type 2 diabetes, or a neurological condition. As well, certain types of drugs can increase fatigue.

Stress can indirectly contribute to sleepiness by interrupting sleep. People who are stressed tend to sleep less well and therefore tend to be sleepier, although the direct experience of stress is to make you feel alert rather than sleepy.

People don't always recognize the symptoms of fatigue—people with sleep apnea provide a good example of this (they think they are getting enough sleep, without realizing that their sleep is being severely interrupted every night). But if you don't recognize the symptoms, how can you do something about the problem?

How much sleep do we need?

Eight hours' sleep is the average amount that most people need to stay healthy. Less than that and you can start to experience the problems of fatigue. If you sleep for less than five hours in the 24 hours before starting work or driving, or

for less than 12 hours in 48 hours, you significantly increase your risk of having a fatigue-related accident or a 'near-miss'.

There are times in our lives when the normal amount of sleep is not enough. Children undergoing the growth spurt at puberty need more sleep. Women need more sleep after they give birth, particularly during breastfeeding—it takes a lot of energy to make milk. There are also significant emotional and physical demands on a new mother, so they need to sleep more. Some interesting studies have been done in this area, indicating that new mothers are losing sleep because of the new baby, but at the same time their need for sleep increases quite significantly. It appears that their continual tiredness is a combination of a slight decrease in the amount of sleep they get, and a significant increase in the amount of sleep they need. This means that new mothers should focus on getting nine or ten hours of sleep instead of eight.

Based on an interview with Dr Drew Dawson for ResMedica Issue 8.



Women need more sleep after they give birth

IN THIS ISSUE ... The dangers of fatigue in the workplace p4

An interview with Roger London p6

Fatigue: the facts and figures p8

From the Editor



We all know what it's like to be tired, but do we do anything special when it happens to us? Do we take extra care in driving or at work? Do we decide we're really too tired to drive the car safely, and walk or catch a bus instead? This issue of Snooze Newz looks at the effects of fatigue, particularly the dangers of driving when you're tired.

We've interviewed Dr Drew Dawson, director of the largest dedicated sleep research facility in Australia. Dr Dawson has seen a lot of sleepy people and worked closely with transport organizations around the world. He is very clear in his message—driving when you're sleepy is like driving when you're drunk. We've been getting the messages about the dangers of drinking and driving for years now—we need to start adding the messages about the dangers of fatigue.

Two real life-stories, from Roger London and Steve Newman, back up Dr Dawson's findings. These two men suffered from sleep apnea, experiencing the damaging physical and emotional effects of fatigue every day. They tell us how treatment brought back their energy, their lives and their families.

One person's fatigue can have a devastating effect on a whole community. We list the details of just a few of the catastrophic accidents that have been attributed to human error, caused by fatigue. The grounding of the Exxon Valdez, the crash of Korean Airlines Flight 801, even the nuclear accident at Chernobyl and the breakup of the Columbia space shuttle have fatigue as a contributing factor.

Laws are being made that expect people, when driving or at work, to be more careful. If anything dulls their responses—from alcohol to fatigue—they will be held legally responsible.

We hope this issue of Snooze Newz adds to your understanding of fatigue. As always, we welcome your feedback. Please visit our website at www.resmed.com/newsletters/snoozenewz.

Lisa MacKenzie
Editor

The risks of fatigue

Fatigue in the workplace can have a range of effects, from poor decisions to fatal accidents. People who can't concentrate fully on the job, due to fatigue or other factors, are more likely to make mistakes or have accidents and 'near-misses'. Tired people put themselves and others at risk.

From a personal perspective, tired grumpy people have reduced libido.

Physically, sleep disruption and sleep-loss seem to impair carbohydrate metabolism and increase the weight gain associated with type 2 diabetes. This can contribute to the development of sleep apnea, which decreases the quality of sleep, further inhibiting carbohydrate metabolism—creating a vicious cycle.

The long-term effects of sleep-loss are not very well understood, but there is some indication that it has an impact on immune function, making people more likely to develop infections or illnesses and increasing their recovery time.

How does fatigue affect safety on the roads?

In the year 2000 the Australian parliament held an inquiry into fatigue in the transport industry. It estimated that the cost to industry of fatigue-related accidents and incidents in Australia was somewhere between \$1–3 billion (AU) per year. This rate is similar (per capita) in the USA and Europe

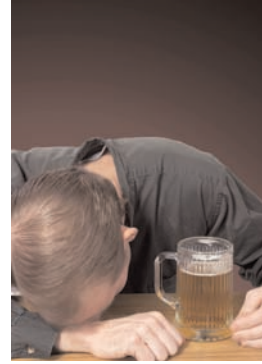
with a cost somewhere between \$50–70 billion.

The direct cost of a truck (semi-trailer) accident is somewhere between \$500,000 and \$1,000,000 (AU). The indirect costs can be three to five times higher than that, taking into account loss of income, government resources spent on investigating the crash, insurance company costs and clean-up costs—not to mention potential loss of life, injuries and medical bills.

General studies of road accidents show fatigue as a major or significant contributing factor in about 20% of cases. This means that one in every five major truck accidents in Australia is fatigue related. As there are approximately 1,600 fatalities on the road per year, that means that 320 deaths each year are fatigue related.²

The global community is starting to realize that this is too high a price to pay. Trucking companies in Canada and the USA are developing screening programs for sleep-disordered breathing (SDB). Some of the larger companies in Australia are starting to look at these programs.

In most Australian states there is now a requirement for transport operators to have a fatigue management system. Risk engineers have developed programs to determine whether these individual companies are providing their employees with adequate sleep opportunities, or



*You would never drive in this state,
so why drive when you're tired?*

if they have programs to identify conditions such as SDB. If they do, then the likelihood of a fatigue-related accident is lowered.

What level of fatigue affects your driving?

It was only 30 years ago that people thought they could have a boozy business lunch and then drive back to the office—now it is corporately and legally not acceptable. People didn't wear seatbelts, let alone put their babies in safety capsules. We didn't know how many lives these simple actions could save.

Drivers don't often get the opportunity to learn the relationship between fatigue and driving accidents—most people who fall asleep at the wheel don't live to do things differently next time. Driving when you're tired is like driving when you're drunk—you can't make good decisions or respond quickly to emergencies. If you drive after being awake for 20 hours (eg, wake at 7am, stay awake all day, drive at 3 am the next day), you will be driving like someone with a blood alcohol reading of 0.05. If you stay awake for 24 hours, your driving will be equivalent to someone with a blood alcohol reading of 0.1.

As a comparison, New South Wales has a blood alcohol limit of 0.05 for experienced drivers, so someone who has been awake for more than 20 hours is 'over the limit' for safe driving.

People are finally getting the 'Don't Drink and Drive' message—the next message will be 'Don't Drive Tired'.

Based on an interview with Dr Drew Dawson for ResMedica Issue 8.

A word from our expert

Dr Drew Dawson is Dean of Research in the Division of Education Arts and Social Sciences, Professor of Psychology at the University of South Australia and Director of the internationally recognized Centre For Sleep Research (CFSR).

The CFSR, based in Adelaide, is the largest dedicated sleep research facility in Australia. Drew has gained critical acclaim for his work and is considered a leading international authority in the areas of sleep, fatigue, biological rhythms and hours of work.



Dr Drew Dawson

Drew has worked extensively with key transport organizations in the rail, road and aviation industries around the world.

"What we have seen is that in reality the decision to drive tired or fatigued is comparable to using drugs or alcohol. This is being reflected in legislation, particularly in the corporate Occupational Health and Safety (OH&S) area, where fatigue is described as 'a state of voluntary impairment and is reasonably foreseeable.' These are two very critical legal criteria for being criminally or civilly liable for an event.

"If I tell you to drive a truck to a destination, and I know it's going to take you 18 hours, and I know you have been awake for 22 hours, then it's reasonably foreseeable that you will be tired, and that could lead to a level of impairment. As your manager, I am responsible for anything that may occur. In fact there are a number of managers and truck drivers currently serving jail sentences. The law in effect is now saying 'you should have known better'.

"We believe one of the biggest public education initiatives that governments should be undertaking is to raise awareness about the minimum acceptable level of sleep, with slogans like 'Less than 5 and you should not drive' or 'Less than 4 and drive no more'.

"In my view the campaigns that focus on falling asleep are looking at the wrong end of the problem. It's like saying if you are throwing up, stop drinking. If you are feeling tired and you are starting to nod off, it's too late. Effective intervention should occur much earlier. Knowing about the dangers of sleep-deprivation gives you the ability to make an informed choice before you start driving and put yourself, and others, at risk."

1. Beyond the Midnight Oil: Managing Fatigue in Transport. House of Representatives Standing Committee on Communications, Transport and the Arts. October 2000, Canberra, Australia.
2. <http://www.atsb.gov.au/publications/2004/pdf/rfa2004.pdf>

The dangers of fatigue in the

These days we want everything quickly, we want it delivered now, and we don't want to pay extra. But who is delivering that package? And how is the 24-hour schedule affecting their responses—are they suffering from fatigue?

Our economic and social patterns are changing. Deregulation of industry causes fiercer competition, and workers are placed under greater pressure to produce more, in less time. These factors can be a major cause of fatigue. Many workers, particularly in the transport sector, are under considerable pressure to meet deadlines. They "are now required to work longer, more flexible hours at reduced staffing levels. This, in conjunction with increasing task demands and social pressures, has resulted in significant reductions in the quality and duration of sleep."¹

Research demonstrates that the effects of fatigue are similar to the effects of moderate alcohol intoxication. "In humans, fatigue delays response and reaction times, negatively impacts on logical reasoning and decision-making, and impairs hand-eye coordination in all critical safety issues in the transport industry."¹ These effects add up to greater risk of a serious accident.

According to the US National Sleep Foundation, drowsy-driving accidents cause 1,550 deaths, 71,000 injuries, and \$12.5 billion (US) in property losses and lost productivity every year. The National Highway Traffic Safety Administration reports that one million accidents annually are caused by driver inattention.

Every year thousands of sleep-deprived people are involved in road and industrial accidents, and their sleepiness is frequently seen as a contributing factor. "Recent estimates suggest that fatigue-related accidents and injuries, lost production and indirect subsidies cost the Australian community over \$1 billion (AU) annually."¹

Experts attribute many on-the-job accidents in part to poor decisions and

responses made by sleep-deprived workers. People who are sleepy have poorer memory and concentration, and this can create problems in job performance. In addition, sleep-deprived people tend to be irritable, which can profoundly affect both personal and work relationships.

To manage fatigue at work, there needs to be a combined effort from employers and employees. Employers should provide a safe environment and reasonable work schedules, while employees should ensure that they come to work rested and fit to perform their responsibilities.

The following examples of fatigue-related accidents illustrate how "fatigue-related performance failures (can result) in catastrophic outcomes."²

Maritime accidents

Exxon Valdez

Perhaps the most expensive fatigue-related maritime accident in history was the grounding of the US supertanker Exxon Valdez on Bligh Reef in Prince William Sound, near Valdez, Alaska on March 2, 1989. It spilled approximately 258,000 barrels of oil when eight cargo tanks ruptured, resulting in catastrophic damage to the environment and losses to local wildlife. Thankfully there was no loss of human life. While damage to the vessel and cargo amounted to more than \$28 million (US), the cost of the cleanup of the spilled oil during 1989 alone was almost \$2 billion.

Although there was a cascade of errors and circumstances that resulted in the grounding of the Exxon Valdez, the most significant was the failure of the third

mate to properly maneuver the vessel because of **fatigue and excessive workload**. Another contributing factor was the failure of Exxon Shipping Company to provide a fit master and **a rested and sufficient crew**.³

World Prodigy

On June 23, 1989, the oil tanker World Prodigy ran aground on Brenton Reef, off the coast of Rhode Island, spilling over 290,000 gallons of heating oil over 123 square miles of pristine coastline. The National Transport Safety Board (NTSB) determined the accident was caused by the master's **impaired judgment from acute fatigue**—the master had been awake for 36 hours.⁴

Bus crash

In Louisiana mid-morning on October 13, 2003, a bus crashed into a tractor-trailer truck stopped on the road's shoulder, killing eight passengers. The NTSB determined the cause of the accident as "the motorcoach driver's operation of the motorcoach in a reduced state of alertness due to fatigue as a result of his **chronic insomnia and poor-quality sleep**."⁵

The NTSB report on the crash states that "the need for sleep varies among individuals. Losing as little as two hours of sleep a night can negatively affect alertness and performance, resulting in: degraded judgment, decision-making and memory; slowed reaction time; lack of concentration; fixation; and irritability."

Truck collision

Just after midnight on July 27, 1994, a cargo-tank semi-trailer loaded with 9,200 gallons of propane collided with a bridge column in White Plains, New York. The tank and semi-trailer separated, and the front head of the tank fractured, releasing propane that vaporized into



workplace

gas. When it ignited, according to an eyewitness, a fireball rose 200–300 feet in the air. The tank was propelled about 300 feet and landed on a house, engulfing it in flames.

The truck driver was killed, 23 others were injured, and an area within a radius of approximately 400 feet was engulfed by fire.

The NTSB found this to be a **classic example of a fatigue accident**. The Board found the probable causes to be reduction in alertness of the driver, consistent with falling asleep, caused by his failure to properly schedule and obtain rest, and the failure of the company to exercise adequate oversight of the driver's hours of service.³

Aviation

Korean Airlines Flight 801 crashed in Guam on August 6, 1997, killing 227 people. Officially this crash was the result of several errors by the crew, most notably a lack of situational awareness resulting in "controlled flight into terrain (CFIT)". A senior and experienced pilot was in command of the flight. While he was not familiar with the terrain, and visibility at the time was reduced due to rain, the approach into Guam should not have been difficult. So why did the captain lose concentration and situational awareness? When reviewing the lead-up to the flight, it was found that he had flown from Seoul to Australia, back to Seoul, to Hong Kong, and then back to Seoul again before his fateful trip to Guam, all **with only a few hours of rest**.⁶

Nuclear facilities

Chernobyl

The chain reaction that would begin the world's worst nuclear accident began in the very early hours of the morning of April 26, 1986, 80 miles north of Kiev in the former USSR (now Ukraine). Toxic fumes spewed out from the Chernobyl nuclear plant and spread over most of Europe. Radiation levels occurring in the area now known as the 'dead zone' are so extreme that human beings will not be able to inhabit it for at least several hundred years.

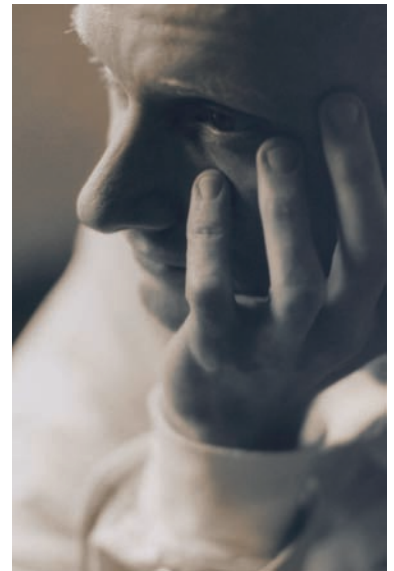
Investigations into the meltdown revealed that a combination of human error (including **impaired judgment**), poor design and lack of a safety culture contributed to the disaster.⁷

Three Mile Island

The near-miss reactor meltdown of the Three Mile Island nuclear power plant in Pennsylvania, USA, on March 28, 1979, was caused by a combination of human errors, design deficiencies and component failures. This prompted sweeping regulatory changes, in particular: identifying human performance as a critical part of plant safety; revamping operator training and staffing requirements; and the **establishment of a "fitness-for-duty" program** for plant workers.⁸

Space shuttle

The report by the CAIB (Columbia Accident Investigation Board) into the breakup of the Columbia space shuttle on re-entry stated that "time pressure, particularly that caused by launch scrubs and turnarounds, increased the potential for sleep-loss and judgment errors and that working excessive hours, while admirable, raises serious questions when it jeopardizes job performance, particularly when critical management decisions are at stake."⁹



1. Beyond the Midnight Oil: Managing Fatigue in Transport. House of Representatives Standing Committee on Communications, Transport and the Arts. Canberra, Australia, 2000.
2. Kryger MH, Roth T, Dement W. Principles and Practices of Sleep Medicine. 4th ed. Saunders & Elsevier, 2005.
3. Remarks before the Washington Traffic Safety Commission Symposium on Driver Fatigue, National Transportation Safety Board, <http://www.ntsb.gov/Speeches/former/hall/jh961121.htm>.
4. Grounding of the Greek Tankship, World Prodigy Off the Coast of Rhode Island, June 23, 1989. National Transportation Safety Board. Marine Accident Report, NTSB/MAR-91/01. Washington, DC: NTSB, 1–47. 1991.
5. Safety Board Determines Fatigue As Cause Of A Louisiana Motorcoach Accident, National Transportation Safety Board, <http://www.ntsb.gov/Pressrel/2005/050419.htm>.
6. Don Phillips/Washington Post. Crew reportedly didn't know crash imminent: Plane's wheels were in place for Guam Landing, The Dallas Morning News, 8 Aug 1997.
7. Chernobyl Nuclear Disaster, www.chernobyl.co.uk (subsections 'Health & Physiological Consequences' and 'Social, Economic & Political consequences of Chernobyl') viewed Dec 2005.
8. Moss TH, Sills DL (editors). The Three Mile Island nuclear accident. New York Academy of Sciences; 1984.
9. Report Volume 1, Columbia Accident Investigation Board, http://caib.nasa.gov/news/report/pdf/vol1/full/caib_report_volume1.pdf

An interview with Roger London

Roger London has suffered severe fatigue twice in his life—the first time he ended up in surgery; the second time it was solved with a ResMed flow generator.

What were the symptoms that made you go to the doctor the first time?

I was working in the finance industry and I had a lot of stress. I used to be pretty much wiped out by the weekend. Just pushing the lawnmower up a slight incline in the garden was tiring.

Then things started to change. My fingers started growing, and I started to put on weight. I used to lose my train of thought half-way through sentences—it was as if the thought would start but not finish. I remember being in pretty serious meetings at board level, and I would just lose the plot. I would lose track of what I was doing and what was being said. My mental sharpness was fading fast.

My energy levels, enthusiasm and outlook were all low. In fact I seemed somewhat depressed. My productivity was low. There is a considerable lack of confidence, lack of self-belief and tremendous self-doubt when your brain does not function how it used to. I was used to being a fairly extrovert energetic individual. I put these changes down to workload pressures and stress at the time.

What did you do?

We knew something was wrong and visited numerous doctors—mainstream and alternative. We finally began to suspect that it was sleep deprivation and my doctor referred me to a sleep laboratory. I had a sleep study and was told that I had sleep apnea. I was put onto a fixed CPAP flow generator that gave me great relief for some time. However, after about two years, I became tired again and progressively slowed down again.

You mentioned that your fingers were growing—do you mean swelling?

Well no, they were becoming stiffer and they felt strange. My wedding band no longer fitted. My face also became thicker.

What happened next?

In 1992 my GP finally suggested a blood test and checked my hormone levels. Results indicated the worst. I was diagnosed with a brain tumor. I had had the tumor for ten years, which was pretty insidious. As a consequence of the tumor I developed a condition called acromegaly, which was what had caused some of my features to grow and my

“Within the first week I was beginning to really move and feel much better”

body to change. Luckily I had the tumor successfully removed without any residual neurological trauma.

It was just unbelievable how I changed within three to four months of the tumor being removed—I shed weight, my face thinned and my energy levels returned to normal. Life became interesting again and I no longer used CPAP.

But you suffered severe fatigue again?

Over the last three to four years my wife and I endured a number of very stressful events. I seemed to get through this, but I began to slow down again. During 2002 my wife started saying “you’re not as sharp as you used to be” and of course I would reply “no, no I’m fine, I just need a little rest.” I am an academic lecturer, I was doing three degrees at once plus a

long-term research project. Naturally this takes a great deal of reading, study and a lot of mental endurance and I was beginning to tire quickly.

I soon came to the realization that I was struggling. We ended up taking a vacation in Switzerland, but I was still very tense. I continued to wake every night to urinate, and I really had very broken sleep. When we came home from the trip my wife said strongly that she believed there was something very wrong, while I was thinking that I just needed to get fit. Then my blood pressure began rising and I suffered an attack of palpitations—my heart was rippling like a keyboard. I thought I was not going to live through it! To add to the problem, my wife also noticed that I

stopped breathing during my sleep. Eventually we decided I should check to see if the sleep apnea had returned.

So you had another sleep study?

This time I was able to do the study at home. This was much easier, less invasive and more convenient than staying overnight in a sleep lab. I was not 100% convinced that I had sleep apnea, but when they showed me the printouts I could not believe what I saw—my breathing pattern was all over the place. I was told I had Cheyne-Stokes respiration (CSR). I think that seeing the examples of my breathing helped me to understand what was going on during my sleep. I then realized that this was more serious than I had originally thought. I was advised to trial the AutoSet CS™2.

How was the trial?

The first night's sleep was WOW, it was glorious! It was amazing waking up feeling energized for the first time in a long time. Within the first week I was beginning to really move and feel much better. I have been using the device for almost two months now and the most profound changes have come over the past few weeks. My pulse is becoming regular and my blood pressure has come down considerably. My motivation, energy and enthusiasm have improved. I am back on track with my research and work in general. My whole outlook is more positive. Six months ago I would have found having all my family and kids at home difficult to cope with—now I love it, it's great.

Did you have any problems in using the device?

Like many things, it does take time to adapt. I think the main thing I have had to sort out is where to position the coupling (hose) and mask. The mask can move out of position and if it does it results in leaks, which in turn can cause the device to sound an alarm. The alarm can then disturb my wife. When the mask is fitting well the device is very quiet and both my wife and I find it easy to sleep. While the mask leaks are not excessive, I am currently experimenting with both a full face mask and a new nasal mask.

Really I can't think of any problems. I look forward to going to sleep every night—sometimes I can't wait to get to sleep and get recharged. Now I don't wake up during the night, and I have a restful relaxed sleep.

It's been a very positive experience in my life.



A patient's perspective

Steve Newman is CEO (Business Services) of the Pegasus Group, a group of companies operating out of regional NSW in Singleton, Australia. He was diagnosed with a range of problems, including asthma, and suffered from severe fatigue.

I was always tired; I had no energy. I struggled to wake up in the morning. I would get to lunchtime, but after that I was more likely to be asleep on the desk. I had memory loss and I was finding myself becoming vague. I'd begun to feel depressed and anxious. And of course, there was the snoring. My wife hadn't quite moved into another room, but the kids had certainly complained. At times I'd actually jump out of bed, feeling like I was choking.

One day I took my daughter to an immunologist. After talking with my daughter he started questioning me. He told me he suspected I was suffering from sleep apnea. I was indeed diagnosed with sleep apnea. I had a trial on an AutoSet Spirit™ device with a HumidAire 2i™ and a Mirage Activa™ Nasal Mask. I noticed a difference in alertness within one week. Within one month my anxiety levels had decreased, and within three months the blood clots that I had been tackling for more than a year had disappeared. Within six months I was off all asthma medication. At this point I no longer take any allergy medication for the rashes I suffered. I'm far more alert at work now—even my colleagues have noticed a difference. And we now have peaceful nights at home.

Most of my working life has been centered around the mining industry and my experiences started me thinking about how many other people may be operating heavy machinery or making safety decisions while suffering from sleep apnea.

What danger are they posing to their workmates? What danger are they posing to themselves? I'm keen to look at doing something to address the impact of Obstructive Sleep Apnea (OSA) on safety in the mining industry. I want everyone to have the benefit of this wonderful technology.

Fatigue: the facts and figures

- Sleepy people are 8.2 times more likely to cause a traffic accident than people who are well-rested.⁶
- British figures indicate that 27% of drivers who lost consciousness behind the wheel had fallen asleep, as opposed to fainting, having a seizure, or having a heart attack—and they accounted for 83% of fatalities.¹¹
- Sleepiness represents a significant risk to driving safety and may pose as great a risk as alcohol.²
- Researchers from the University of Helsinki found that over 20% of long-haul drivers reported having dozed off at least twice while driving during the previous three months, and 17% of these drivers reported near-misses due to dozing off.⁷
- The average duration of sleep of 20 US truck drivers in a five-day period was 4.78 hours. 56% of drivers exhibited six non-continuous minutes of EEG recorded sleep (microsleeps) during their driving sessions.¹⁰
- Professional drivers involved in fatal accidents had an average sleep duration of less than six hours in the 24 hours before the accident.⁵
- In the USA, during the year 2000, more than 800,000 drivers were involved in sleep apnea-related motor vehicle crashes, and those events cost \$15.9 billion (US) and 1400 lives.³
- Treating all drivers exhibiting OSA with Continuous Positive Airway Pressure (CPAP) would cost \$3.18 billion (US)—saving \$11.1 billion in collision costs and 980 lives annually.⁴
- In a random sample of 3,268 Australian commercial vehicle drivers, 59.6% had SDB and 15.8% had OSA, while 24% had excessive sleepiness.⁸
- Truck drivers with SDB have twice the accident rate per mile than drivers without.⁹
- The average cost of a crash involving a single vehicle has been calculated to be \$51,000 (US).¹
- The cost of a crash involving fatalities is estimated to be \$2.7 million (US).¹
- Australian fatigue-related road accidents alone could be costing the community up to \$3 billion (AU) per year, with heavy-vehicle fatigue-related accidents costing around \$300 million annually.¹²

Websites of interest

In 1990, the American Academy of Sleep Medicine (AASM) established the National Sleep Foundation (NSF). This is an independent, non-profit organization whose mission includes improving public health and safety by enhancing understanding of sleep and sleep disorders.

www.sleepfoundation.org

The NSF believes that sleep deprivation is so great a problem that it has established a National Drowsy Driver Education Program (NDDEP) to help guide and inform people about the dangers of driving while sleep-deprived.

www.drowsydriver.org

The US National Highway Traffic Safety Administration also has a website that aims to “save lives, prevent injuries, reduce vehicle-related crashes”.

www.nhtsa.gov

The New South Wales (NSW) Roads and Traffic Authority (RTA) website has a section outlining the causes and dangers of fatigue, and includes maps of the places within NSW where drivers can stop for a rest and a snack during holiday periods.

www.rta.nsw.gov.au/roadsafety/fatigue/index.html

The Australian National Transport Commission (ANTC) has recently proposed a policy for managing fatigue in drivers of heavy vehicles, and has published a fact sheet on Sleep Disorders and Driving.

www.ntc.gov.au/filemedia/Publications/DYHFSSleepDisordersDrivMar2005.pdf

1. US Department of Transportation. The Costs of Highway Crashes. Washington DC: Federal Highway Administration, 1991.
2. Dawson D, Reid K. Fatigue, alcohol and performance impairment. *Nature* 1997; 388:235.
3. Sassani A, Findley LJ, Kryger M, Goldlust E, George C, Davidson TM. Reducing motor-vehicle collisions, costs and fatalities by treating obstructive sleep apnea syndrome. *Sleep* 2004; 27:453-8.
4. Phillip P. Sleepiness of Occupational Drivers. *Industrial Health* 2005; 43:30-33.
5. National Transportation Safety Board (NTSB). Factors that affect fatigue in heavy truck accidents: Safety study 1995. Washington DC, 1995.
6. Connor J, Whitlock G, Norton R, Jackson R. The role of driver sleepiness in car crashes: a systematic review of epidemiological studies. *Accident Analysis and Prevention* 2000; 33:31-41.
7. Hakkanen H, Summala H. Sleepiness at work among commercial truck drivers. *Sleep* 2000; 23:49-57.
8. Howard ME, Desai AV, Grunstein RR, Hukins C, Armstrong JG, Joffe D, Swann P, Campbell DA, Pierce RJ. Sleepiness, sleep-disordered breathing, and accident risk factors in commercial vehicle drivers. *Am J Resp Crit Care Med* 2004; 170:508-12.
9. Stoohs RA, Bingham LA, Itoi A, Guillemainault C, Dement WC. Sleep and sleep-disordered breathing in commercial long-haul truck drivers. *Chest* 1995; 107:1275-82.
10. Mitter MM, Miller JC, Lipsitz JJ, Walsh JK, Wylie CD. The sleep of long-haul truck drivers. *New England Journal of Medicine* 1997; 337:755-61.
11. Parsons M. Fits and other causes of loss of consciousness while driving. *CJM* 1986; 58:295-303.
12. Australian Bureau of Transport and Regional Economics www.btre.gov.au (last updated 8 Dec 2005).

Microsleep

Microsleep (noun)—A brief period (usually only a few seconds) in which the brain enters a sleep state regardless of the activity the person is performing at the time.¹

Microsleeps can last from a few seconds to several minutes. During this time the brain of the sleep-deprived person actually enters into a sleep state, even though it may look like they are still sitting up and paying attention. During a microsleep a person may develop a blank stare or glazed look, head snapping and prolonged eye closure.

Microsleep episodes are completely involuntary. They can occur when a person is trying to stay awake to perform a monotonous task like driving a car or watching a computer screen.²

Microsleeps are more likely to occur at certain times of the day, such as the early hours of the morning, pre-dawn and mid-afternoon. During a microsleep the person fails to respond to external stimuli—they may not see a red light, or notice that the road has taken a curve. During a study of microsleep, conducted by Dr William Dement, participants were asked to press a button when a strobe light was flashed directly in their eyes every few seconds. When they were experiencing a microsleep, the participants did not notice the light and were not even aware they had been asleep.³

“If we ignore sleep and get behind the wheel of a car, a catastrophe can happen. It only takes a few seconds—just long enough for a tired body to steal much-needed ‘microsleep’—to run off the road or into an oncoming car.”⁴

1. Wordspy. Viewed at <http://www.wordspsy.com/words/microsleep.asp> December 2005.
2. Moore-Ede, M. Alertness and Fatigue: Microsleeps. Viewed at <http://www.rta.nsw.gov.au/roadsafety/fatigue/factsaboutsleefatigue.html> March 2006.
3. Dement, WC. Some must watch while some must sleep. San Francisco: WH Freeman, 1974.
4. Carter, J, Carter JD. Everyone must cope with sleep problems. Scripps Howard News Service, April 18, 1999.

Student fatigue

- Up to 40% of high school and college students are sleep-deprived. Laboratory studies have shown that their performance is impaired by sleep-loss.¹
- Many high school and college students are involved in crashes caused by driving while drowsy.²
- In 1913 children aged between 8–12 years slept an average of 10.5 hours per night.³ In 1964 this average dropped to 9.2 hours.⁴
- In 1994 children aged between 13–14 years slept an average of 7.7 hours per night during the week and 9.5 hours on the weekend.¹



1. Wolfson AR, Carskadon MA. Sleep schedules and daytime functioning in adolescents. *Child Dev* 1998;69:875–887.
2. Pack AI, Pack AM, Rodgman E et al. Characteristics of crashes attributed to the driver having fallen asleep. *Accid Anal Prev* 1995; 27:769–775.
3. Terman LM, Hocking A. The sleep of school children: Its distribution according to age and its relation to physical and mental efficiency. *J Educ Psychol* 1913; 4:138–147.
4. O'Connor AL. Questionnaire Responses about Sleep. Master's thesis. University of Florida: Gainesville Florida, 1964.

Sleepy drivers—an accident waiting to happen

Fatigue leads to diminished performance in many ways.

- As fatigue increases, performance and reliability decrease.
- Physical reaction times increase and thought processes become slower.
- There is a tendency to make mental errors and flawed judgments.
- False responding, or responding when a stimulus isn't present, also increases.
- Memory errors are more likely.
- Vigilance decreases.
- Motivation is reduced.

Read the warning signs. Ask yourself the following questions while you are driving:

- Are you having trouble keeping your eyes open?
- Are you blinking frequently?
- Are you rubbing your eyes often?
- Are you drifting from lane to lane or hitting the rumble strip (shoulder)?
- Are you yawning excessively?
- Are you missing turns or ignoring traffic signals (eg, failing to drive when the traffic lights turn green)?
- Are you finding it difficult to remember driving during the latter part of your journey?
- Are you literally nodding off? Are you unable to keep your head up?
- Do you startle yourself as you nod off?

If you detect any of the above warning signs while driving:

- pull over and stop driving—have a break
- take a rest or nap in your car
- get out and stretch or walk around
- stop at a service station and have a snack or refresh yourself
- get someone else to do the driving.

Don't ignore the warning signs—pull over, “revive and survive!”

***Chronic
fatigue/sleep
deprivation
can make you
less able to:***

make judgments
concentrate
make decisions
cope with stress

***It can
increase:***

emotional problems
(including depression
and anxiety)
irritability/mood swings
susceptibility to colds,
flu and infections
risk of accidents
risk of obesity, heart
disease, diabetes and death
memory loss
problems associated
with aging

MASKERADE



Help for children with sleep apnea

An increasing number of children are being given medication for hyperactivity—but could some of them be suffering from sleep apnea?

Pediatricians are reporting a surprisingly high number of children with loud snoring or other types of SDB who display classic fatigue symptoms—they are sleepy during the day or have problem behaviors such as hyperactivity, inattentiveness or aggressiveness.

It's pleasing to report that there is now a system for treating children with sleep apnea. The children are treated with a ResMed flow generator, the VPAP™ III ST-A, and a special mask, the Mirage Kidsta™, designed specifically for comfort on their small faces. Easy to use for parents and children, it has 'set and forget' headgear and very few parts to reassemble after cleaning. The dual-wall cushion reduces pressure on the face, and the fit of the mask can be adjusted to provide the best possible seal and comfort. Children can still read or play

while wearing the unobtrusive mask, so they can put it on and fall asleep at their natural time.

ResMed is the first company to provide such a system, approved by the US FDA for use in the hospital or home, for use with children aged seven years or older or weighing more than 40 lbs (18 kg).

For more information about ResMed's system for children, please visit our website at www.resmed.com or call your local ResMed office.



The Mirage Kidsta is specifically designed for children

Maggie's Law

Maggie MacDonnell was only 20 when she was killed instantly in 1997 in a head-on collision in New Jersey, USA. A truck driver who had been driving 'high' on stimulants for over 30 hours to meet his delivery deadlines fell asleep at the wheel, crossed three lanes of traffic and smashed head-on into Maggie's car. Despite his obvious guilt, the truck driver was only fined \$200 (US) and escaped jail because his defense successfully argued that there was no law against falling asleep at the wheel.

Maggie's mother, Carole MacDonnell, fought tooth and nail to change the law and in June 2003, New Jersey became the first state in the USA to pass a law specifically criminalizing drowsy driving. Under the new legislation, drivers are liable if they are convicted of causing an accident while sleep-deprived.

Maggie MacDonnell lives on in the law that her mother fought for—it's called Maggie's Law.



Sleep Smart

Part 7: Understanding sleep disorders

One of the most troubling sleep disorders is sleep apnea. It interrupts your sleep—and your partner’s sleep—and can lead to sleep deprivation and the dangers of fatigue, as well as leading to a range of chronic life-threatening diseases, such as hypertension and stroke.

Snoring may be the first sign that you are developing sleep apnea, so don’t treat it lightly.

Sleep apnea

The most common type of sleep apnea is called Obstructive Sleep Apnea (OSA). It occurs when your upper airway closes, but you continue trying to breathe. Your partner might notice that you stop breathing during sleep, then take in a big gulp of air.

The upper airway can close during sleep for two main reasons: lack of

muscle tone and gravity. During sleep, especially in REM sleep, our bodies relax, and muscle tissues like the tongue and soft palate lose their slight rigidity. Because we tend to sleep lying down, gravity pulls these tissues toward the back of the throat and closes the upper airway.

The collapsed muscle tissues actually work to suffocate the sleeper. The sleeper wakes up enough to regain control of the upper airway, breathe again, and then fall back to sleep. This happens from dozens to hundreds of times per night for people with OSA, but they usually don’t remember waking up.

Each time the upper airway closes, the body is deprived of oxygen and forced to retain carbon dioxide that it would normally exhale. As a result, the body’s blood gases get out of balance, and the body is subjected to a ‘toxic’

environment. When the body sets off ‘alarms’ that it needs more oxygen, the brain wakes the sleeper, breathing resumes, and the individual falls back to sleep until the next obstruction occurs.

These brief wake-ups also diminish the quality of sleep. The person then experiences sleep deprivation, with symptoms like excessive daytime sleepiness, poor concentration, poor memory, and even depression.

Snoring

Snoring—the symptom most commonly associated with OSA—occurs when the upper airway becomes partially blocked. As air moves through the limited space, it causes the soft tissues of the throat, uvula, and soft palate to vibrate. These vibrations create the sound we recognize as snoring.



The right kind of support can make all the difference to CPAP treatment. Whether you are new to treatment for have been a user for many years, there are times when you need expert advice and encouragement.

ResMed’s sleepVantage* program is designed to help you get the most from your treatment at all times. Contact your local ResMed office to find out more about FREE MEMBERSHIP to sleepVantage and its exciting benefits.

* currently sleepVantage is only available in Australia and the UK.

ResMed’s World-wide Offices:

United States	Germany	Spain
Australia	Hong Kong	Sweden
Austria	Japan	Switzerland
Brazil	Malaysia	The Netherlands
Finland	New Zealand	United Kingdom
France	Singapore	

An important note to you, the reader

Snooze Newz is intended to serve as a forum for topics of interest to SDB sufferers and their families. Contributions by the editor and authors may contain information or opinions that have not been verified for accuracy or completeness by their authors or the editor. You should make your own independent inquiries before relying on **Snooze Newz** contributions and accordingly neither the ResMed Group of companies nor the editor offer to, nor will accept liability for, the consequences of any reliance you may place on **Snooze Newz** contributions. Opinions by authors in **Snooze Newz** contributions are not intended to be the opinions of, nor are they endorsed by, the ResMed Group of companies or the editor.

While the editor has striven to make correct attributions of authorship and to acknowledge ownership of copyright any omission or error is unintentional and the editor invites the notice of any suspected omission or error.

AutoSet CS, AutoSet Spirit, HumidAire, Mirage Activa, Mirage Kidsta and VPAP are trademarks of ResMed Ltd. Activa, AutoSet CS, AutoSet, HumidAire, Mirage, Kidsta and VPAP are registered in U.S. Patent and Trademark office. ©2006 ResMed Ltd. 1011104/1 06 06

Snooze Newz publication is the subject of copyright owned by ResMed Ltd 2006, all rights reserved. Requests for permission to reproduce contributions from **Snooze Newz** should be addressed in writing. **Snooze Newz** is a trademark and servicemark of ResMed Ltd. snoozenewz@resmed.com.au

