

# **STAYS SAFE 28**

**SLEEP DISORDERS, DRIVER FATIGUE  
AND SAFE DRIVING**

**EDITED TRANSCRIPTS OF A SEMINAR HELD AT  
PARLIAMENT HOUSE, SYDNEY**

*MONDAY, 14 NOVEMBER 1994*

**Report No. 1/51  
ISBN 0 7310 7115 8**

**December 1995**

This report may be cited as:

STAYS SAFE 28 (1995). Sleep disorders, driver fatigue and safe driving. First report of the Joint Standing Committee on Road Safety of the 51st Parliament. Sydney, NSW: Parliament of New South Wales.

New South Wales Parliamentary Library cataloguing-in-publication data:

**New South Wales. Parliament. Joint Standing Committee on Road Safety**

Staysafe 28, Sleep disorders, driver fatigue and safe driving.-- Sydney, N.S.W. : Staysafe, 1995. -- p. ; 30 cm.

ISBN 0 7310 7115 8

1. Traffic safety--New South Wales (LCSH)
2. Sleep disorders (LCSH)
3. Fatigue (LCSH)
- [1. MOTOR-VEHICLE-SAFETY-NEW-SOUTH-WALES (Parliamentary thesaurus)]
- [2. FATIGUE (Parliamentary thesaurus)]
- I. Title
- II. Title: Sleep disorders, driver fatigue and safe driving.

# **MEMBERS OF THE STAYSAFE COMMITTEE OF THE 51st PARLIAMENT**

Mr Paul Gibson, M.P. (Chairman), Member for Londonderry

Mr Jeff Hunter, M.P., (Deputy Chairman), Member for Lake Macquarie

The Hon. Andrew Manson, M.L.C.

Mr John Mills, M.P., Member for Wallsend

Mr George Thompson, M.P., Member for Rockdale

Mr Bob Harrison, M.P., Member for Kiama

The Hon. John Jobling, M.L.C.

Mr Russell Smith, M.P., Member for Bega

Mr Bruce L. Jeffery, M.P., National Party Whip and Member for Oxley

Mr Jim Small, M.P., Member for Murray

The Hon. John Tingle, M.L.C.

# CHAIRMAN'S FOREWORD

**Paul Gibson MP, Member for Londonderry**

Chairman, STAYSAFE

Joint Standing Committee on Road Safety

Driver fatigue is increasingly being recognised as one of the major causes of road trauma. Driver fatigue is notoriously difficult to define, but is associated with reduced attention and with sleepiness or drowsiness. Expert opinion accepts that fatigue can be associated with physical exertion or mental exertion; unchanging external conditions; the use of alcohol or other depressant drugs; an individual's own physiology; elements of the surrounding environment (noise, heat, vibration); and inadequate or improper sleep. Excessive sleepiness results in an increased risk of motor vehicle crashes, either because the driver falls asleep whilst driving, or the driver is inattentive due to sleepiness. Most drivers have experienced feeling sleepy while driving; a significant proportion of drivers have actually fallen asleep at the wheel. While the commonest cause of excessive sleepiness in the community is insufficient sleep, other causes include sleep disorders such as sleep apnoea, narcolepsy and periodic movements in sleep.

Over the period 1993-94 three seminars on sleep disorders, driver fatigue and road safety were held in Australia. The first, hosted by the National Road Transport Commission, was held in Melbourne in April 1993. A second seminar was held in Brisbane in November 1993, hosted by Queensland Transport. The STAYSAFE Committee hosted the final seminar in Sydney in November 1994.

In all, over twenty papers dealing with issues associated with sleep disorders, fatigue and safe driving were presented at these three seminars. With the tabling of this report of the STAYSAFE Committee, all of the major papers presented to these seminars are now in the public domain.

The proceedings of the Brisbane seminar were published as an edited volume<sup>1</sup>. The proceedings include papers by Professor Colin Sullivan on sleep disorders, Helen Bearpark on sleep disorders in Australia, Dr Stephen Morrison on sleep disorders in Queensland, Helen Bearpark and Mark King on sleep disorders and road safety, and Ian Callinan QC on legal issues associated with sleep apnoea and road safety.

The edited proceedings of the Sydney seminar are published in this report of the STAYSAFE Committee. This report also contains, as an appendix, the edited transcripts of the main

---

Lake, R.I.E. (Ed.)(1993). Sleep disorders and road safety: Proceedings of a public seminar. Report RUB 93-1. Brisbane, Qld.: Queensland Transport. 42p.

---

presenters at the Melbourne seminar. The transcripts record the comments of Professor Colin Sullivan, Professor William Dement, Helen Bearpark, Dr Narelle Haworth, and Dr Phillip Swann.

The STAYSAFE Committee expects that the publication of the proceedings of the three seminars into sleep disorders, driver fatigue and safe driving will assist the ongoing effort involving all Australian jurisdictions to deliver a safe and efficient road transport system to all Australians.

While the STAYSAFE Committee did seek to define issues associated with sleep and driving, and also to identify and document the search for solutions to the problems of driver sleepiness and driver fatigue, there remain a number of significant issues which the Committee hopes to pursue over the next couple of years, including the medical review process associated with driver licensing and re-licensing, and road safety issues associated with the use of motor vehicles for work-related purposes.

### **Acknowledgments**

The STAYSAFE Committee would like to thank George Weber and Associates for help in organising the seminar.

The STAYSAFE Committee also acknowledges the support of: ResCare Ltd (and particularly the assistance of Dr Peter Farrell, Chairman), Sleep Disorders Centre of Australia Pty Ltd, Roads and Traffic Authority of New South Wales, and NRMA Ltd.. These organisations all contributed, by financial support or otherwise, to the successful organisation and staging of the seminar. The STAYSAFE Committee is grateful for their assistance.

Finally, the members of the STAYSAFE Committee would be remiss if they did not record the efforts of the staff of the STAYSAFE Committee Secretariat and of the Parliament for the organisation of the seminar and the recording of the seminar proceedings. The Committee particularly notes the efforts of the Director of the STAYSAFE Committee, Mr Ian Faulks, in editing the transcript of the seminar proceedings.

Finally, the STAYSAFE Committee acknowledges the contribution of the speakers and participants in the seminar on sleep disorders, driver fatigue and safe driving. It was their effort which made the day an informative and rewarding experience.

# CONTENTS

<b>Members of the STAYSAFE Committee of the 51st Parliament</b>	Page 3
<b>Chairman's foreword</b>	Page 5
<b>What's it like to have sleep apnoea?</b> John Casey Sleep Apnoea Research Association - Queensland	Page 9
<b>Sleep apnoea in perspective</b> Bob Pearson National Road Transport Commission	Page 11
<b>Medical aspects of driver sleep disorders</b> Dr Ron Grunstein Centre for Respiratory Failure and Sleep Disorders Royal Prince Alfred Hospital	Page 21
<b>Team 200: A survey into driver health</b> David Stewart Sedgwick Risk Services	Page 31
<b>Driver fatigue and the law</b> Megan Latham Criminal Law Review Division, N.S.W. Attorney General's Department	Page 37

---

<b>Fatigued drivers in Queensland</b>	Page 45
Gary Mahon Queensland Transport	
<b>Discussion: I am a truck driver with sleep apnoea</b>	Page 51
Laurie Cree with Gordon Hillyer and Heather Hillyer Sleep Apnoea Research Association - N.S.W.	
<b>Measuring productivity from improvements in sleep apnoea</b>	Page 55
Garry Egger Centre for Health Promotion and Research	
<b>Sleepsafe - a package for screening drivers</b>	Page 67
Dr Elizabeth Ellis Sleep Disorder Centre Australia	
<b>Insuring for sleep disorders</b>	Page 72
Jim Bennett Australian European Insurance Pty. Ltd.	
<b>Screening of truck drivers for sleep apnoea in N.S.W.: potential road safety benefits</b>	Page 83
Dallas Fell Roads and Traffic Authority of N.S.W.	
<b>Summary remarks</b>	Page 104
Dennis Robertson Road Transport Forum	
<b>Appendix A: Main papers presented at the National Road Transport Commission's seminar on sleep disorders and road safety, Melbourne, 29 April 1993: Dr Colin Sullivan; Dr William Dement; Helen Bearpark; Dr Narelle Haworth; Dr Phillip Swann</b>	Page 107

---

# WHAT'S IT LIKE TO HAVE SLEEP APNOEA

**J. Casey**

Sleep Apnoea Research Association - Queensland

The matters that I am covering today are the facts of sleep apnoea and the broken relationships, the failed businesses and the broken lives. I do not think the community out there really understands the problems that we are suffering.

Sleep apnoea sufferers are a highly indignant mob—well I was—and I have met a lot who are the same. They push aside the fact that they have got this problem. I had a very successful business and back in 1993 we produced about 40% of what we were producing in 1990. But me personally, I believe my problems in my business was due to the sleep apnoea and the fatigue I was suffering for the previous 10 to 15 years. And this time last year I was sitting at my desk crying every other day. I can sit and talk to anyone here about the children and personal issues and cry unashamedly. But I never ever cried about the business in my life until last year. We have to accept the fact that we have got this problem.

The second point I want to address is the idea that all marriages fail due to people. I think Dr Grunstein indicated to us at the last seminar we were at that amongst sleep apnoea men the divorce rate is up some 20%. To prove that women have got more tolerance than men, the divorce rate among sleep apnoea women is up something like 40%. So obviously women have got more tolerance for their husbands than the husbands have for their wives. This is a great cost to the community because with 3,000 clients we would get two or three calls a week through people splitting up. Since I have had sleep apnoea which I was only diagnosed Christmas eve last year and I received my CPAP machine then, I started to look at this sleep

apnoea and lack of sleep. Me personally for six months prior to getting tested and getting my machine I never washed my car, I never mowed my lawn, I was just absolutely lethargic. One of the things I had to deal with was my wife moving out six years ago with my snoring. I have a four bedroom house. The bedrooms all go down one side and we have an ensuite and a bathroom so the very back bedroom is a fair way away. My wife, she moved out five years ago, closed both doors and I still kept her awake. This is an enormous problem for the women. The real sufferers out there, a lot of the real sufferers are the wives of sleep apnoea patients. A lot of the divorces and a lot in the Family Court problems that we have I think have a lot to do with this lack of sleep.

The third point that I would like to address is businesses. In Queensland last year we had a record number of businesses go to the wall. One of the myths that I see is mismanagement. I see a lot of the people that I have dealt with over the last 12 months that are still in business are struggling with business, struggling with attitudes, the production is down and their sales are down, their activities are down. A very high percentage of the people I deal with have sleep apnoea—I am absolutely positive—but most people are not aware of it. They are embarrassed about it. They will not address the problem and I think we have got to spend a fair bit of money in the marketplace out there making the people aware that it is a problem and that there is real help out there and for those who go out there and get tested and get checked out and get fixed up they will find their whole business is turned around. Our business is up something like about 40% last year. That is only because I have been tested and



my problem is corrected.

The fourth point I want to address is the myth that the only sufferer is the person with sleep apnoea. I can tell you six weeks before I got tested my wife took my licence off me. I went to sleep at 10 o'clock in the morning after what I considered six hours sleep of the night; I hit the median strip in Camden Road in Brisbane and woke up. If that median strip had not been there I would have been across the other lane and hit some poor bugger taking your grandchild or someone else's grandchild to school. And it is a real problem we need to address and we have to attack this with vigour and put some money into this because there are a lot of costs going on; from the hospital point of view, from the medical point of view, the Courts and so on.

The fifth thing I want to cover is the myth that sleep apnoea is only a small problem. As I have said, I have got about 3,000 clients and I discuss it a lot with clients because I am very interested as to how people are going and if their businesses are down. I mainly work in the business market and I want to know why if I have a client that I will lose if his business does not pick up. It is not all sleep apnoea. But I am interested in sleep apnoea, I am focused on sleep apnoea and sleep disorders, and a lot of these people I know have real problems with sleep disorders and that is a part of why their businesses are failing. It is an enormous problem out there. You think of the signalmen out there that are running the trains, the people at the computers dealing with the planes and truck drivers. We talk about truck drivers - there are just as many sales reps. I clock up something like 50,000 km a year. I can be just as dangerous as any truck driver. I can be just as dangerous out there and there are thousands of people like me out there that are out on the road every day and we are just lethal weapons unless they get aware of it, most people do not know. Some people are really excited when you tell them and they often get tested and get their machines and so on.

The final thing I want to cover today is we here today have an opportunity to start towards saving a lot of lives. Just relating back to the things that I spoke about which is sleep apnoea on the road, sleep apnoea in business, sleep apnoea in key industrial positions. There's a lot to do and we have an opportunity to do something about it here today. We would love to see that the public is made more aware of what sleep apnoea is doing to the community.

**Mr FAULKES:** Mr Casey has raised a considerable number of questions that are of concern regarding personal safety, productivity to the community, occupational health and safety and so on. One quick question: Mr Casey, the organisation for SARA - you mentioned that there were branches at various state levels including New South Wales and Queensland; is there a national body that looks at presenting the voice of people who have been diagnosed with sleep apnoea?

**Mr CASEY:** Actually it is pertinent you asked that question; this weekend was the first weekend that all State bodies have met and we have set up a steering committee to investigate the possibility of setting up a national body and SARA is a body that is out there to make the community aware of what sleep apnoea is and the sort of help that can be available and as a back-up to the units with the hospitals and so forth; support people who have got problems with their machines and sleep apnoea and how they deal with it.

---

# SLEEP APNOEA IN PERSPECTIVE

**R. Pearson**

Director, Technical Standards, National Road Transport Commission

**ABSTRACT:** Fatigue is one of the major causes of road trauma. Research estimates fatigue causes between 5% to 40% of crashes. Fatigue is difficult to define and measure. Whatever the definition, however, fatigue or reduced alertness can be brought on by one or a combination of : physical exertion or mental exertion; unchanging conditions; alcohol or other depressant drugs; physiological make up; circadian rhythms; surrounding environment (noise, heat, vibration); and inadequate or improper sleep. Inadequate or improper sleep includes sleep disorders. Countermeasures for driving fatigue have been researched for many years, and include: on-road countermeasures (e.g., rumble strips, shoulder treatment, hum strips); and in-vehicle countermeasures (e.g., steering pattern detectors, brake/acceleration detectors, eye pattern devices). On-road countermeasures have been installed for many years. Significant research is under way in five countries (including Australia) aimed at detecting the onset of driver fatigue. Both on-road and in-vehicle countermeasures work on re-awakening the driver. But prevention is better than cure. The National Road Transport Commission (NRTC) has been very active in prevention measures. A standardised Medical Examination for Commercial Vehicle Drivers has been produced. Significant resources have been devoted to establishing an acceptable package of legislation for maximum driving of commercial drivers. While driving hours is at best a surrogate for fatigue prevention and does not take account of lifestyle, health or other individual influences, some consistency of legislation is important pending the development of fatigue management programs presently being piloted. Sleep disorders and in particular sleep apnoea have emerged in recent research as important elements in preventing driver fatigue. Heavy vehicle drivers appear to be high risk candidates for sleep apnoea and efforts to increase awareness of the disorder among truck and bus operators and drivers will certainly improve road safety. Sleep apnoea is one of the few causes of fatigue which is detectable in advance, measurable and capable of prevention.

I just want to briefly introduce the perspective of the National Road Transport Commission as to sleep apnoea. Fatigue is, of course, an important issue in road safety. There are a variety of different and numerous studies that have attempted to measure that importance and the result of fatigue related crashes range from 5% to 40%. From our perspective it does not really matter where you finish, it is where you start, and so I am prepared to make a very bold statement as many of you know that fatigue is a very important issue in road safety.

What is fatigue? There has been a couple of times it has been tried to be defined and I do not believe there has been a terribly good definition of it.

Michael Henderson in 1990 suggested it was a progressive detriment in performance which if not arrested will end in sleep and some reference was made to that earlier. AAA in America said that it involved non-professional irrational actions on behalf of a commercial driver which seemed a little strange and a variety of different sources has suggested it is either inattention or reduced alertness or even asleep which is a fairly expansive thing of fatigue. You have also seen a range of the causes of fatigue; physical or mental exertion, unchanging conditions, alcohol or other depressive drugs, physiological make-up, circadian rhythms, you have heard the jet lag problem, surrounding environment which is particularly important with truck drivers,

---

*WHAT'S IT LIKE TO HAVE SLEEP APNOEA?*

---

inadequate or improper sleep. There are a variety of other ways you can define it. Some break it up in different ways. Cullen, for example, talks about subjective status and performance measures and a few other things. I do not think it is terribly necessary to again move on with that at the moment. We need to concentrate on what we are actually doing here today.

There is a range of counter measures. One of the road countermeasures is the rumble strip shoulder treatment or hum strips; there are a variety of products available using this concept. There is also a lot of work going on into in-vehicle counter measures where there are steering pattern detectors, brake accelerator devices and there are eye pattern devices, a wide range of them. There is a significant amount of work going on around the world at the moment. There are devices which measure the patterns in vehicle control inputs, as I mentioned earlier. Devices which measure your physiological parameters where you have the mixed model devices.

There is research in five different countries. The United States for the National Highway Transportation Safety Authority; in France for the EEC by Renault; Ford is doing work in England; in Japan Nissan is doing a lot of work and in Australia MUARC, Monash University Accident Research Centre is doing some work for the Federal Office of Road Safety and the Transport Accident Commission and a range of other interested parties. But the practical and wide application of these devices I believe or I am told is at least five years away, maybe more. It is work that has been going on for some time but I do not think we should be relying on these devices necessarily to solve our problems. I strongly believe that prevention is better than cure and the National Road Transport Commission is active in preventive measures. For example, we have approval unanimously by the Minister of Council a medical examination for commercial vehicle drivers. A book, not very long ago approved. I must say it is disappointing to me that it seems New South Wales is the only State that does not seem to be prepared to distribute it for a variety of reasons at this stage and I just hope we can sort those problems out. We have driving hours legislation. Again we have a difficulty here in that we cannot get agreement after two years of belting our heads around we cannot come up with an

acceptable package and the Ministerial Council last decided to keep the status quo. Driving hours legislation is very vexed, it is very controversial but it is certainly a measure aimed at reducing fatigue. Not a very good surrogate by the way but it is the only one we have at the moment. There are fatigue management schemes. You will hear later from Gary Mahon about fatigue management schemes and we are active in those areas in the system, Queensland, with their schemes.

Other prevention measures of course include the detection and treatment of sleep disorders including sleep apnoea. Just one of the points Mr Chairman, can someone work out how to spell apnoea, we have the "o" in there and the official guidelines medical examinations have "o" in there and that was done by the Australasian Faculty of Occupational Medicine. In particular you will notice that the three areas above there are all for commercial drivers and we must not forget the non-commercial drivers. There is a range of measure to deal with those, like the "Sleeping Drivers Die" type of campaigns or the "Coffee and Wake up" ones in Victoria. But in many ways this is an area that is ripe for further work particularly in commercial drivers.

Sleep disorders have appeared only, in my view, in the last few years. When I was doing that work for the Australian Truck Safety Study back four and a half years ago now, I had volumes and volumes of work on fatigue but then I came across this little cryptic reference to sleep apnoea. I thought, here is something different. I discovered only about 2 percent of the population was estimated to have sleep apnoea so I did not really worry too much about it, though I mentioned it very briefly. Then Phillip Swann, who is sitting down the front here, came to see me about two years ago and said look, "There is this guy in America that reckons about 46 percent of truck drivers have got this thing." That really pricked my ears up so Phillip and I organised the first of the series of seminars in Sleep Disorders and Road Safety last year. I believe that was a resounding success. Following that I was fortunate enough to visit America last year and I went over to Stanford and talked to Bill and his staff and up to Washington to talk to the American Trucking Association where I discovered they have got nearly \$1 million set aside for sleep apnoea research being done for them by the Federal Highway Administration. The guy at Federal Highway

Administration is pretty keen on the subject because he himself suffers from sleep apnoea. So there is a lot of work going on to determine really what the extent of the problem was and I fully support that.

Heavy vehicle drivers clearly are high risk candidates; their body mass index is very high. They eat pretty junky foods and the work being done by Team 200, and you will hear from David Stewart about that very soon, I think is very good in this area. I do believe that efforts to improve awareness will improve road safety very, very quickly if we can get the message out. Because despite everything else, fatigue has been important, as I said earlier it is very difficult to measure where sleep disorders are measurable, they are detectable and they are capable of treatment and that is rare in the area of fatigue management. Very difficult indeed. And we must make those strong efforts to reduce driver fatigue.

There is an interesting anecdote for myself; after our Sleep Disorders and Road Safety Conference last year one of the transport company's managing directors was at that meeting; he left the meeting and went out to his Footscray warehouse where he had a driver in mind and said to the driver, "Do you feel sleepy?" He said, "Yes." He said to the driver, "Okay fly back to Queensland" and he did not put him in the truck, he put a relief driver in and that driver was found to have sleep apnoea. A cousin of my wife, I was chatting about it, and his wife complained bitterly about the fact that he snored and they had to have separate bedrooms and all that; as it turns out he has been diagnosed the last 12 months having restless legs syndrome. There is a lot of that out there. People do not know but I urge you please not to make any licence type of issues too draconian. You will drive those people required to have treatment for their own safety and benefit away. It is far better to get them out and treat them than ban them from driving.

### *QUESTIONS*

**DR DOUGLAS, MEDICAL PRACTITIONER:**

Can you tell us the mechanism of how drivers in other States, other than New South Wales, get their medical done, where the papers go and how the roads authorities organise it?

**MR PEARSON:** One of the major areas we are

trying to work on is getting some unanimity and consistency into this area. There is a new group being formed, a Registration Licensing Reference Group which I hope will be able to address those sorts of issues in conjunction with Austroads. This is partly to try and overcome some of the difficulties. I cannot actually answer it directly so if you would like to give me some details I will send it out to you.

---

**MR FAULKS:** If I might just add at that point; the STAYSAFE Committee has been approached in New South Wales to consider the possibility of an inquiry into the medical examination aspects of driver licensing even though we have not had the opportunity so far to take up that particular request.<sup>1</sup>

**GEORGE WEBER:** You mentioned BMI. Could you explain what that is.

**MR PEARSON:** Sorry, I thought I actually said body mass index. BMI is the term that - what a thing for an engineer to say in front of medical experts. BMI is roughly how fat you are compared to your height and if you are fat you have got a very high body mass index. It has been shown if you have a body mass index greater than 30 then your risk of having sleep apnoea is significantly greater than those below that but it is not exclusive. It is one of the indicators.

## OVERHEADS

# MEDICAL ASPECTS OF DRIVER SLEEP DISORDERS

**R. Grunstein**

Staff Specialist, Centre for Respiratory Failure and Sleep Disorders  
Royal Prince Alfred Hospital Sydney.

**ABSTRACT:** Excessive sleepiness results in an increased risk of motor vehicle accidents. These accidents are secondary to (a) crashes caused by the driver falling asleep whilst driving (b) inattention due to sleepiness (c) sleepiness augmenting the decline of driving performance caused by even small amounts of alcohol. Surveys have shown that between 15-25% of the population report having fallen asleep at the wheel. The commonest cause of excessive sleepiness in the community is insufficient sleep. However other causes include sleep disorders such as sleep apnoea, narcolepsy and periodic movements in sleep (PMS). Narcolepsy is a rare, genetic-linked condition of disordered sleep regulation resulting in marked sleepiness. PMS may produce daytime sleepiness and is more common in the elderly. Sleep apnoea is a continuum of disorders characterised by repetitive cessation of airflow during sleep (apnoea), caused by collapse of the upper airway at the level of the pharynx. During each apnoea, futile respiratory efforts continue and a profound fall in oxygen level develops until the apnoea is terminated by arousal and upper airway patency is re-established. In the typical patient with severe disease, after a few deep breaths, the cycle of events repeats itself as often as 200-600 times per night. As a result of recurrent arousal and breathing effort, sleep is dramatically fragmented with loss of normal sleep patterns and consequent daytime sleepiness. Central obesity is one of the most important predisposing factors for sleep apnoea. Other factors include genetic (facial structure), smoking and alcohol. A number of treatments are available for sleep apnoea, with nasal and continuous airway (CPAP) pressure the commonest used in severe apnoea. A number of retrospective studies have shown that patients with narcolepsy or sleep apnoea have an increased risk of motor vehicle accidents. Patients with untreated obstructive sleep apnoea have poorer driving performance than patients without sleep apnoea. Patients with sleep apnoea show a significant improvement in driving performance after successful treatment of their apnoea with nasal CPAP. The data on sleep apnoea and driving risk has led to certain countries limiting driving privileges for patients with sleep apnoea. These limitations particularly affect the commercial driver. Some lobby groups in the USA have proposed mandatory testing for all commercial drivers for the presence of sleep apnoea. It has been estimated that it would cost US\$5 billion to test all the 5 million commercial drivers in the USA. It is important to maintain the perspective that sleep disorders are only one component of the problem of sleepiness and motor vehicle accidents. Most (55%) of fall-asleep crashes occur in the under 25 driver. Young drivers are both the most sleep deprived and have the greatest sleep need, irrespective of the amount of sleep in the previous 24 hours. Management of this problem in young drivers is vital as it has been asserted that more productive years of life are lost due to fall asleep crashes than to cancer and heart disease. The Australasian Sleep Association is actively involved in issues related to sleepiness and driving and is currently preparing a position paper on this subject.

How do we handle the sleepy driver? How do we prevent drivers becoming sleepy on the roads?

Firstly, a semantic issue. We hear a lot about fatigue but for sleep researchers fatigue is part of a process that ends in unequivocal sleep. Some years ago Eric Segal in a very popular book called *Love Story* said "Love never means having to say you are sorry." Fatigue researchers or road safety researchers, their line is often "Fatigue means never having to say you are sleepy." As far as we are concerned fatigue is part of a process that ends in unequivocal sleep. When we are talking about fatigue related accidents we are talking about fall asleep related accidents.

Possible causes of fatigue related accidents are numerous but these include circadian factors, factors related to the time of day, night time versus daytime, mid-afternoon versus morning, and so forth. Whether the driver has had sufficient or insufficient sleep prior to the accident and what has been the quality of that sleep? Has that quality of sleep been affected by the use of drugs or by other medical conditions which may interfere with and cause frequent awakening such as a patient who has chronic pain conditions.

Finally, sleep disorders. We are dealing with a number of conditions, the most prominent of which I have listed here, and the most common of which is sleep apnoea. These include narcolepsy, sleep apnoea and periodic leg movements in sleep. All three of these can cause excessive daytime sleepiness because of interruption of the normal sleep patterns during the night.

Starting with medications first, we must recognise that in terms of fatigue and sleepiness on the roads we need to look at hypnotic medications. Many of these medications have a therapeutic effect. The down side is prolonged sleepiness during the day and a sort of a hang over or carry over effect. These are not the only medications that can cause sleepiness during the day. The list is long and you need to look at, for example, anti hypertensives which are an important group and certainly in sleep apnoea patients where there is a high rate of hypertension, some of the medications may contribute to sleepiness.

The other important area is stimulant medication. I

think it is safe to say that there is a problem with stimulant use amongst professional drivers and certainly they have their alerting effects. The down side is withdrawal from stimulants can interrupt normal sleep patterns, so the patient who is on stimulants intermittently or chronically will have poor quality sleep and often rebound sleepiness when they stop their stimulants.

The other important thing to recognise is that within humans there are two periods of increased sleep tendency - the siesta period in the mid afternoon, and also in the evening, the time when most of us go to sleep. It is interesting to look at accidents and how they relate to these time periods.

This is *Heavy Lorry Accidents in Sweden*, a paper that was presented this year at a conference of the Karolinska Institute showing the risk for single vehicle accidents and time of day. It also shows the high rate of these heavy lorry accidents, single vehicle, at night, hours between midnight and 6.00 a.m. compared to during the day - this is the r factors of increased sleep tendency which will interact and will lead to an increased risk of accidents during the times the body wants to be asleep.

The other factor is how long you have been at work and accident rate. If you look here at length of work versus accident rate, you can see the longer a worker in Sweden has been at work the more likely they are to have accidents. From the zero to eight hours the common shift period the rate is relatively steady. But the longer then someone is on the road - and this is not just truck drivers but, in fact, involves workers throughout Sweden - the rate of accidents increases, astronomically, in my opinion.

Another recent paper from the *Lancet* showed that working at night, relatively to evening and morning, is associated with a higher relative risk of serious accident - and this is not truck drivers again, but these are assembly line workers working on a self-paced task, associated with the assembly line - where there was a relative risk of 1.8 to 1 for the people working at the night shift, just the standard eight hours night shift versus evening and morning.

One problem which has been alluded to has been the recognition by authorities of this problem. This statement comes from a book which is the 776

*Stupidest Things Ever Said*. It is by John Hogan who is a News Information Supervisor at a nuclear power plant, reacting to criticism when two of his operators were found asleep. He says: "Well, it depends on your definition of "asleep". They weren't stretched out. They had their eyes closed. They were seated at their desks with their heads in a nodding position."

Unfortunately, this is the attitude that is reached sometimes when discussing this problem. People are not realistic. People think that sleep occurs only in a bed when you are safe at home. Unfortunately, it occurs in the work place.

Recently a study has been completed in Sweden in truck drivers which parallels a study done ten years ago in train drivers where these workers were attached to brain wave monitoring, (EEG monitoring) to see whether they fell asleep during work. As it was shown with the train drivers ten years ago and the truck drivers last year, these workers have frequent sleep episodes whilst at work driving either a train or a truck, and interestingly, often they do not perceive that they are asleep. So when we look at the brain wave pattern and we see the characteristic changes associated with sleep, and the worker is then asked whether they were asleep at that particular point in time, they say certainly they weren't, they don't remember. This is one problem for people both doing research and also looking at guidelines in this area.

I will be very brief and go through a couple of points about fall asleep accidents because I see a couple of people on the program who will be dealing with those issues. If you look at fall asleep accidents these are common. In Finland 15% of drivers report having fallen asleep. In the United States the figure is about 20%. Twenty per cent of United States' fatal accidents are single vehicle, not involving alcohol. Though, interestingly, when you ask the authorities they say that only 4% of crashes are due to the driver falling asleep. One of the reasons for the discrepancy here - and I think Dallas Fell may allude to - is, in fact, the under reporting of fall asleep accidents by police or road safety statistics.

What we do know in N.S.W. where, I think, the figures are certainly better than in many other countries of the world is that more fatigue related,

or sleep related accidents are fatal compared with those that are non fatigued. The majority occur during the hours when the body wants to be asleep and there is a high proportion of fatal heavy vehicle accidents which involve fatigue and, in fact, this points out that the drivers are over represented in fatigue accidents.

As Mr Hazzard alluded to, we have to recognise before we get into sleep apnoea, that we are dealing with a much wider problem in the community. Fifty five per cent of accidents occur in drivers less than the age of 25. The reasons are the lifestyle of the young causing sleep loss - the young drivers are amongst the most sleep deprived people in the community. There is an inter reaction of alcohol and sleep loss which will lead to a synergistic effect of increased sleepiness. There is an increased sleep tendency to young adults. A young adult, even if they have had sufficient sleep, is sleepier than the child, or the older adult, and this has been shown in tests where people are measured going to sleep under laboratory conditions. They go to sleep easier and faster than any other age group. I guess there is one other point which I have not mentioned to you, there is a lot more of them on the road at that hour of the night than in other age groups.

Alan Pack who has done a lot of publicity in the United States about fall asleep accidents says "More productive years of life are lost in the U.S.A. due to fall asleep accidents than productive years lost due to heart disease and cancer combined." We are talking about productive years and that is an important thing to consider when we talk about this area and in terms of legislation and what we should be doing.

I think there has been a lot of publicity and a lot more information over the last few years on sleep disorders. This has been recognised in the lay press as well as the scientific press where the numbers of papers published on sleep has increased astronomically.

I will talk about narcolepsy briefly because it is a rare condition but it is a condition which causes profound daytime sleepiness. Often in the patient with narcolepsy the daytime sleepiness can be more profound than the average sleep apnoea patient. But patients with severe sleep apnoea are often as sleepy as patients with narcolepsy. Narcolepsy is a



---

genetically linked disorder of sleep regulation. It is associated with some unusual symptoms and it is one of the few reasons that you can get legal prescriptions for amphetamines in New South Wales.

On to sleep apnoea, a few terms first. What is snoring? I think most people know what snoring is but what it is actually is vibration of the soft palate and adjacent tissues producing the sound that we know as snoring. Upper airway obstruction can be partial, and in snorers there is partial upper airway obstruction compared with complete, as it is in most patients with sleep apnoea. There is closure of the throat at the level of the pharynx and, as I will show you, repeatedly during sleep. "Apnoea" is conventionally defined as a pause in breathing for more than ten seconds, though this is an arbitrary definition, it is a bit less in children.

In obstructive sleep apnoea, the most common form of sleep apnoea, you get a failure to breathe. So when you try and measure the air flow going in through the nose and mouth, it is absent. But despite this absence there is increasing efforts to breathe. The person is trying to breathe but they cannot unblock their upper airway, and associated with this is a fall in oxygen level. What happens here is this is a person with sleep apnoea showing repeated falls in oxygen level. This is the normal oxygen level here (indicating) and this is a person with sleep apnoea showing falls in oxygen level. This may be three, four, five hundred times a night in severe cases. What happens is with each one of these episodes they are terminated by an arousal. The person wakes up and, as such, their sleep architecture, their sleep pattern is totally fragmented.

The main symptom of sleep apnoea, as I have mentioned, is snoring. Often it leads to some problems with the spouse as John Casey mentioned. The other problem, as I have said, is sleepiness. In fact, there is a range of sleepiness. Just to show you on this slide, this is a College of the Cardinals meeting in Rome. I do not know how many of them (indicating) have sleep apnoea but you can see, in fact, a great range in sleepiness from here to relatively, I suppose, a little bit more alert here. But in sleep apnoea you do have a great range of sleepiness and it is not necessarily related to how many times per hour that person stops or partially stops breathing.

The American Thoracic Society rates sleepiness in certain ways and this is relevant when it comes to driving conditions. Firstly, mild sleepiness, intermittent, infrequent sleep episodes during times of rest. Moderate sleepiness is more serious where sleep episodes occur on a regular basis during activities requiring some attention. So people occasionally fall asleep at their desk whilst working.

I show this slide only so that the Catholics do not get too upset, but this is an example of someone showing moderate sleepiness, falling asleep at a meeting where they are not actually participating actively in it. Severe sleepiness is daily, present during tasks of sustained attention and sleepiness constantly impairing behaviour. A high proportion of people with severe sleep apnoea have this degree of sleepiness. In fact, this is the sort of group that

we are concerned with today, I believe.

The risk factors for sleepiness - this is a passenger on an SAS flight from Helsinki to Gottenberg in Sweden. He has all the risk factors. He has got central obesity, the most powerful risk for sleep apnoea, as well as family history of snoring. The other risk factors that you can see here - alcohol, and there is a packet of cigarettes, I think here - are less common risk factors. In fact, some studies say they are not really independent risk factors at all when you take obesity into account.

The other important thing to recognise about sleep apnoea is the cardio vascular hazard. There are a number of studies now showing that sleep apnoea is a risk for hypertension and other forms of vascular disease. Again, when we are looking at the general health of people with sleep apnoea, again, an important consideration. Often they are on medications for these conditions which may be related to their sleepiness.

How do we measure severity of sleep apnoea because that comes into some of the discussions that we may have? The standard way is, number of episodes of disturbed breathing, apnoeas or partial obstruction episodes per hour of measured sleep. That is one way of looking at it, but as I have said, that does not necessarily correlate with the degree of sleepiness the person may have. Another way of looking at it is the amount of time a person spends below a normal concentration of blood oxygen. Again that correlates to some extent but not completely with the degree of sleepiness.

The number of arousals from sleep, this is possibly a better correlation in terms of degree of sleepiness but, again, there is individual variation in how people respond to being woken up every 30 seconds to a minute by an apnoea. Finally, which is probably a very important one, what symptoms or associated conditions does the patient have? What are the patients subjective complaints, or their friends or their relatives or their spouses complaints? That must come into the determination of severity of sleep apnoea.

How common is sleep apnoea? The National Institutes of Health have funded a large study in Wisconsin which is looking at how common sleep apnoea is. If you look at these Wisconsin public

servants you find that nearly 25% of the men, and 9% of the women have more than five apnoeas per hour of sleep, and a high proportion have even more severe forms of apnoea. Importantly, when you look at how many of those complain of subjective, severe sleepiness you have 4% in men and 2% in women. This study was done in men and women aged between 40 and 60. However, we have similar data from similar age groups in Australia and we believe that for Australia the figure is much the same and it is supported by other studies in other countries.

What about truck drivers? In truck drivers there has been one study which is well quoted where they have done not full sleep studies but a form of breathing monitoring at night and found that 43% of truck drivers have more than ten apnoeas per hour of sleep. So if you look at the rate in public servants you have a rate of 15% for that, and in truck drivers you have a rate of 43% according to this study from the United States.

Just in case truck drivers feel that they are being picked on, airlines pilots are another risk group. In a major jet lag study where they did sleep studies prior to enrolling these pilots in the study, they found that 43% of these pilots had more than ten apnoeas per hour of sleep. So, I guess, the good news in that is that 57% of them did not have sleep apnoea. The bad news is you cannot get away from this risk if you travel first or business class.

In terms of treatment of sleep apnoea, if we are looking at severe sleep apnoea the consensus around the world is that continuous positive airways pressure is the standard form of treatment - nasal CPAP is a standard form of treatment for severe sleep apnoea.

There are a range of different machines. This is the one from Australia that is manufactured by ResCare but there are other devices in use around the world, it is not just us in Australia that are treating this condition with CPAP, it is a widespread phenomena and many thousands of machines are used annually in patients with sleep apnoea who are usually sleepy. Because in my experience, and the experience of my colleague, it is usually the sleepiness that is an important driving force seeking attention in this problem.

The CPAP device delivers air under pressure to the

upper airway, linking the upper airway open. I do not have a lot of time to go into the physiology of this but basically it eradicates the breathing disturbance at night but you need to use it on a nightly basis. We do not know a lot of things. For example, if you have a sleepy person on this CPAP machine, do they have to use it every night to prevent sleepiness. To some extent there is evidence that says that they do, and that becomes very important when you are monitoring a driver with sleep apnoea who is on treatment. How much treatment is needed for them to be safe on the road? Again we can discuss this a little bit later.

The other important factor is that compliance does vary. There are a number of studies which show that anywhere between 50% to 80% of people who are prescribed CPAP machines use them on a regular basis. That means that there is a lot of people who are prescribed machines who do not use them. Therefore, that is a problem.

Fortunately, these days we have more and more accurate methods of measuring compliance. So if you have a sleepy driver who is on a CPAP machine the doctor will, certainly in the future, be able to know how many hours, how often and how successful was that machine in preventing the sleep apnoea in that particular person.

Sleep apnoea is a risk factor for motor vehicle accidents. One of the problems in this area - and I will show you with a number of studies - is that there has been fairly, I believe, limited research in terms of numbers but what data is shown certainly support sleep apnoea as a risk factor for motor vehicle accidents.

One of the original studies came from Virginia - this is the accidents per driver over five years for all drivers in Virginia. Looking at groups of various degrees, severe sleep apnoea patients had an approximately three times increased risk of accidents compared to Virginia drivers over all.

This is data from Manitoba showing accidents in control patients - these are those without sleep apnoea, a group of them - showing the accident profile over a previous period of time, showing that most are in this section with a low rate of accidents. If you look at sleep apnoea patients - and these are of a variable degree of severity - you can see the

distribution is more to the right now. You have this group here with a more higher, certainly, rate of accidents than compared to the controls.

A study done by Helen Bearpark from our group in Sydney looking at driving behaviour apnoeas versus controlled drivers show that sleep apnoea drivers certainly pull off the road due to sleepiness, report having motor vehicle accidents due to sleepiness, fall asleep while driving a lot more frequently. This is an interesting thing, falling asleep at traffic lights a lot more frequently than control patients.

Driving simulator studies have been done. One important study from Sweden by Haraldsson where they compared 15 apnoea patients with ten controls, doing 60 to 90 minute simulated highway drives. They found that sleep apnoea patients ran off the road 101 times compared to the controls who ran off the road only twice on the driving simulator. In fact, many of the sleep apnoea patients were unable to complete a 90 minute simulated highway drive and had to be taken off earlier because of repetitive falling asleep.

Other data from this group in Sweden shows major differences in aspects of performance including breaking times.

What about reversibility? There is actually very limited data. There is one study on a driving simulator showing that after CPAP there is a reduction in the obstacle hit rate but certainly more work is needed in this area to demonstrate the effective treatment. A lot of these studies were done in the days when we did not have good ways of measuring compliance to show that treatment of sleep apnoea does reduce the risk because again, that is important for legislation and guidelines.

The standard ways that people in sleep apnoea measure response to treatment are quite expensive and time consuming. We have a test which is called the Multiple Sleep Latency test which takes all day where we put people in a laboratory and see how quickly they fall asleep during fixed periods of times during the day. On this test you can show that using the continuous positive airways pressure device you do have an improvement. It takes longer for them to fall asleep after their sleep apnoea is treated but this level of six minutes is still in the sleepy range when we consider it. People argue that this test is, in fact, not very good when we talk

about the wider community concern of people falling asleep driving.

There is another test called the Multiple Wakefulness test which unfortunately takes all day to do which is the reverse. You ask people at fixed periods of time during the day to stay awake. Of course, if you fall asleep that is worse than if you manage to stay awake for the whole period. This is zero to 40 minutes here and normal people generally can stay awake for at least 30-35 minutes and this is in a quiet room where there is no stimulation.

Sleep apnoea patients have a wide range but certainly are much sleepier on this test. This is a group studied before CPAP and after CPAP you can see that although there is still a wide range the bulk of the patients, (90 per cent) are certainly significantly different. They are certainly more awake and getting a lot closer to control levels.

Again in this study people did not measure accurately how much CPAP was used. One thought is certainly that if you actually measure people who are good users of the device and regular users of the device, you will probably get a greater response. However, neither of these tests are really appropriate in terms of determining what driver is really safe on the road because they are time consuming and because they are expensive. They are tests which can only be done in selected patients.

I just come to the latter part of my talk, talking about the responsibilities of various people in this area. This is an accident on the motorway in the United Kingdom. It is not exactly the accident that I am going to talk about but it is similar to an accident where there was a driver in 1991 who fell asleep while driving his truck and ran into the back of cars that were trying to exit from the motorway. The driver did fall asleep, seven or eight people were killed in this accident and the driver was interviewed. Apparently it turned out that he was aware of his sleepiness and this was a fact that his family and some of his workmates were aware. Because of this he was placed in gaol for three years on a crime of culpable homicide or something similar to that and only when in gaol was this person diagnosed as having sleep apnoea.

We can see that at least under English law - and I

think the lawyers will talk a little about this later - if you are aware of your sleepiness and you continue to drive you are responsible and you can pay a legal penalty for that.

What about doctors? I hope this audience does not view doctors - all of us are not like the slide, I hope - but we are involved in this process as well. The medical responsibility in terms of the sleepy driver involves assessment of risk and that is often hard, as I have alluded to, and I will talk about this a little bit later also. But again the responsibilities are to inform the patient of the risk and, I guess, inform the licensing authority of the risk when necessary and again I will talk about this in a moment.

In general I do not believe it is the responsibility of the physician to inform the employer of a sleepy driver without the permission of the patient. I think that this would lead to a lot of people failing to be diagnosed and I think it breaches a number of important things on which the doctor/patient relationship is based.

However, if you give me a hypothetical situation where I have an extremely sleepy driver who I know drives a hazardous chemicals truck from, say, Sydney to Melbourne I personally would probably get actively involved in getting that person off the road. I think really you have to do what is reasonable under the circumstances.

One of the problems in this area is the "I am never sleepy", the response you get of someone who denies the fact that they are sleepy and as I showed in one of the earlier slides may not be aware of their sleepiness really, because there seems to be some discrepancy between perception and actual sleep in people performing monotonous driving tasks.

We know that sleep apnoea patients are liars. This is a very bad slide, but if you ask a patient when the wife is not present whether they habitually snore you get a rate of nine per cent. If the wife is present the rate doubles. So it is important often to involve the partner or family in getting some information about the patient.

There are other issues in physician reporting. Do patients actually follow our advice that we tell them? I do not have data from sleep apnoea but certainly if you look at other diseases such as

epilepsy and cardiac disease the answer is no. In epileptic patients when asked what they would do under conditions where they have a break-through seizure, most of them would continue to drive. In fact, they certainly would not report many of these events to their doctor if the doctor was compulsorily required to report these episodes to a licensing authority.

There are patients who have automatic defibrillators placed in their chest for serious arrhythmia in heart disease. The advice of the College of Cardiologists in the United States is that these people should not drive, yet 70% of them continue to do so including many of them who will continue to drive whilst the device is calmly defibrillating their heart. I think the answer there is I do not think sleep apnoea patients necessarily will behave any differently but possibly.

If a patient is on treatment, how do we know if he or she is using the treatment? I have mentioned these issues already. We have better ways now determining whether they are actually using their device and we certainly need to assure ourselves of how much usage will give how much benefit. Again, there is some lack of research in this area but we are getting there.

What do other countries do regarding sleep apnoea and sleep disorders? Well, Texas is always extreme - everything is bigger and tougher in Texas. In Texas no commercial driver's licence is permitted for sleep apnoea patients irrespective of treatment which, to my way of thinking, is an extreme and, I think, dangerous precedent.

In California where things are a lot fuzzier than Texas the rules are fuzzier as well. They say sleep apnoea patients are not permitted to drive. The question is unclear as to what impact treatment has and doctors there are meeting currently to try to determine this with the Californian State Government.

In Sweden from 1 January 1995 patients with sleep apnoea or heavy snoring with daytime sleepiness cannot drive commercial vehicles until treated. There is no specific period of time in there for treatment, though I believe the intention is six months.

In Canada the National Safety Code for Motor Carriers, sleep apnoea in severe cases is incompatible with driving any class of motor vehicle and they say you need six months of treatment assessed by the medical practitioner for commercial drivers. This six month period I do not believe is active for non commercial drivers.

In the United Kingdom, this is for obstructive sleep apnoea causing excessive daytime sleepiness, the recommendation there is to cease driving when it is confirmed by a specialist's assessment the condition is adequately controlled for at least twelve months. Driving is twelve months now. Driving may be resumed, subject to annual review. These are current existing regulations.

Getting on to narcolepsy, because I said to you that people with narcolepsy often are extremely sleepy but their sleepiness is often the same as people with severe sleep apnoea. For patients with narcolepsy there is a total ban on driving in some countries and The Netherlands is one example. In the United Kingdom there is a total ban on vocational driving. In Canada - no commercial driving. In the United States it is milder - some States allow if symptom free for six months.

I am not sure where I got this data from but I believe that at least there is some guidelines regarding a sleep attack free period. I think one of the reasons for narcolepsy's perception that it is a medicated treated condition, it is rare, it is severe, that people get sleep attacks. Sleep apnoea patients can get the same sort of sleep attacks. In some ways some of these bans are inconsistent with previous rules in those same countries.

The American Thoracic Society has recently come out with recommendations regarding the high risk driver with sleep apnoea. Their definition of high risk is "sleep apnoea plus a history of a near or actual motor vehicle accident related to sleepiness." Their policy there is that these people need immediate treatment and should not drive until this treatment is obtained.

This condition should be reported to licensing authorities if the condition is untreatable, which in most cases it isn't, but there are people who are unable to tolerate CPAP machines and may refuse surgical treatments which can be used in severe sleep apnoea. If there is going to be a delay in

treatment for more than two months, if a patient will not accept treatment or if a patient is unwilling to stop driving until treatment, their recommendation is to report.

The other statements are, what to do with a driver with sleep apnoea with moderate and severe sleepiness but no reported history of a recent motor vehicle accident? They say the driving risk is increased for these people based on evidence but recommend that the person again be advised about their driving risk but make no specific recommendation about compulsory reporting of these people.

They do say that there is no clearly reliable objective test for reduced driving performance in sleep apnoea. Certainly many of the tests that we have are time consuming, some of the simpler tests are in the process or are to be validated. They emphasise, like, I guess, every speaker will say today, that we need to educate the public more about sleep disorders, why people fall asleep driving and we need to do more research. I guess that is one of the strong points that our association firmly believes in.

However, it is not just our responsibility. I think there are people in this audience who recognise that it is the responsibility of the individual driver and the employer as well as the political responsibility in terms of determining what we should do. I do not believe that we will come up with a hard fast solution today but I think if we set up mechanisms by which we can come up with at least more detailed guidelines about what to do with a sleepy driver, we will have achieved something.

Just to show you treatment of one problem can help, in Pennsylvania several years ago because of concern about fatigue related accidents, on the Pennsylvania turnpike they put in rumble streets. This is the crash rate before in red (indicating on slide) and in yellow after, at five different points of the Pennsylvania turnpike showing a substantial fall in crash rate following the introduction of these rumble strips. Certainly that is one area, obviously not just for sleep apnoea, but for the sleepy driver, one thing that can help. Obviously there is an expense involved in all this.

In conclusion, I hope I have conveyed several

points:

1. Sleepiness is a major problem on our roads. I am sure other speakers will allude to this.
2. That certain sleep disorders may produce unsafe drivers.
3. Solutions where we require risk stratification, we still lack a very strong scientific basis but whether the basis that we have is enough, may be influenced a little bit by what lawyers say and by what the authorities say.

Finally, on those people involved in sleep research I would like to thank the Staysafe Committee for supporting this forum and I hope that unlike this slide they do not develop sudden sleepiness when considering the issue of sleepy driver. Thank you.

## *QUESTIONS*

**MR ANTHONY LOWY:** Doctor, do you need snoring as an essential feature of a diagnosis of apnoea? Secondly, is the diagnosis or can the diagnosis only be made by formal sleep laboratory studies?

**DR GRUNSTEIN:** How many hours have you got? I will take the first question. I think there are several problems with the issue. One is the perception of snoring. Often the snorer is not aware of their snoring and has to be told by someone else. If there is no someone else, there is a problem for starters. Secondly, there are patients with partial obstruction or some forms of apnoea where snoring is not a predominant feature but I think epidemiologically if we are talking about large numbers of people, then I think snoring is an important factor provided you have witnesses - you need witnesses for that obviously.

Secondly, you are asking a very difficult question in terms of diagnosis of sleep apnoea. We are grappling with this issue at the moment and certainly it depends when you look at the extent of sleep apnoea in the community I do not believe if you are trying to diagnose everyone with sleep apnoea in the community that you are going to be

able to do so using conventional sleep studies. The expense or the logistics are not there. But the process, how that will happen, will depend a lot on what training is available. I do not believe that you can go out and just put on a device without any experience in that sort of technology. You have got to know your limitations and I think a lot of these devices which are coming on the market do have their limitations. I think most people recognise that. It just depends on what your sensitivity and specificity and what your indications are. At an individual one to one level we still believe that sleep studies are the standard form of investigation. But if we are talking about large scale work in terms of detection, the costs are too high.

**DR PETER CLARKE (CHIEF MEDICAL OFFICER FOR MOBIL):** I would like you to address some more, if you would, the dichotomy that you identified so clearly in one of your latter slides of the dilemma confronting the medical practitioner. I think in this situation, as in many others, we are dealing with the public health risk and the individual and as medical practitioners have the concern about who we are protecting when we are either notifying licensing authorities or notifying individuals as to what they should do in particular circumstances. It seemed to me your slide brought out quite nicely the dilemma that faces the doctor and do you have any solutions to it beyond what you presented in your slide? I thought it was interesting that you were ambivalent in your slide about the fact that you were not really sure about whether you should notify the employer or not, if you from your position in the sleep laboratory or clinical consulting room were not sure about whether the person had a public health risk, albeit as an individual, which justified notifying the employer. This is a perennial problem in occupational medicine as I am sure you will be aware and there are obviously a range of ways of addressing it. But it really is fundamental because of the need to be able to not only identify and advise the individual but advise those who have a legal responsibility for employing individuals in particular work situations that are by definition high risk.

**DR GRUNSTEIN:** As you know, we grapple with this all the time in a clinical situation. I think it depends on the risk. Why I brought up the issue of the driver who drives a truck that carries very hazardous chemicals versus the private driver, is an

issue of relative risk between the two situations. I guess the overall issue is you want to produce sleep-free or less sleepy drivers at the end - that is the result you want to achieve. If you set up a process with compulsions and reporting and you end up with a large percentage of people who avoid the whole process altogether in order to maintain their jobs then you have done a disservice. That is one of the problems I have in this area. If we get too hard and fast with rules, for example, a lot of people with sleep apnoea who might be professional drivers or other forms of drivers, may not seek attention because they are concerned about losing their licence. I think if people studied the situation in Texas, that is probably what is happening now. Certainly in epilepsy that seems to be the experience, although you necessarily cannot equate sleepiness with seizures while driving as a thing which worries patients and doctors. Certainly it seems that if you have a hypothetical situation of compulsory reporting by the doctor of breakthrough seizures in epileptics then the net result will be fewer epileptics being treated and your aim of safer roads is lost.

I guess the other thing too is I do not believe in getting up at this sort of forum and making a personal statement about what I believe is necessarily correct. I think as we are preparing guidelines from our own association, people involved in your area who have got other experiences to ours need to be involved. I hope that would be something that would arise out of such a meeting.

**MR LES PATTERSON (SLEEP APNOEA RESEARCH ASSOCIATION):** We are purely a body that raises funds to try and make awareness of sleep apnoea. I think Dr Grunstein has omitted to tell us when you are put on to the sleep apnoea machine, your disease is immediately taken care of. The next day you lose the sleepiness. It is only a matter of whether you use the machine or not. We do not put a ticket on people saying you cannot drink or if we think a person drinks too much we do not take their licence away. Why should you take a licence away when he has sleep apnoea. Because he is a normal citizen. As long as he is on the machine it is a complete cure; as long as you use the machine.

**DR GRUNSTEIN:** It is hard arguing with one of

our own patients. I think Les you have to recognise that your experience cannot necessarily be extrapolated to the wider community and that is that someone who uses CPAP gets an immediate benefit and uses it every night may well be different to the person who uses it intermittently or not at all. This is the problem in terms of monitoring treatment.

It is also important to recognise that there are studies, not from our group, but from overseas, where, if you take them off CPAP for just one night you get recurrence of sleepiness. I do not know whether that means you get rid of the driving risk and then if you do not use CPAP then the driving risk returns. But I think it is important and particularly in this audience not to make claims just based on our experience in Sydney but the way other groups have had experience and what they report. I think that is only fair. We have lots of patients like yourself who are changed people overnight but we also have the patients, whom you may not know, who are not the successes despite having quite severe sleep apnoea. And we have to recognise that and work towards ways in which we can monitor those people and get them treated better. That is all I was saying. I did not want to argue with your particular experience.



---

# TEAM 200: A SURVEY INTO DRIVER HEALTH

**D. Stewart**

Segwick Risk Services

and Driver Health Specialist, Road Transport Forum Team 200

**ABSTRACT:** The Road Transport Forum was established by the road transport industry in response to industry concerns regarding the horrific heavy vehicle accidents in the late 1980's. The industry recognised that it, and not the government, had to regulate to raise standards of trucking performance, standards, and safety. The four key areas of self regulation were (a) driver health (2) driver training (3) management systems and standards and (4) vehicle maintenance. Over 1992 and 1993 research was conducted into these four streams to identify the facts and set some interim performance standards to trial. Those organisations which had better standards in management, maintenance and training had healthier drivers. This was then linked into efficient, service and performance standards, hence making driver health a critical component to the overall success of the organisation. Launched in 1993, the driver health program has five streams (1) driver medicals (2) driver health, health promotion and training (3) driver fatigue management (4) driver partners and community (5) industry promotion and support. 240 trucking organisations and owners have been recruited to trial the standards. Drivers must undergo regular medical assessments and counselling sessions with an appointed medical practitioner. Medical guidelines as to what requires a driver to be prevented from driving were put together by the Occupational Health Physicians Association and the NRTC. Performance standards for the participating medical practitioners were put together in consultation with the profession. Driver health screening policy adopted by all organisations, requiring all drivers to undergo a medical examination at least every 3 years. Each organisation to appoint their own doctor(s) as required which would be forwarded to a national RTF list. A Health Resource Kit specific to the industry was designed and circulated to all operators. The kit, unique to the industry, provided operators with phone numbers, networks, and experts in all areas of health both nationally and locally. The kit included information on health issues; family; self help and support networks; injury prevention and treatment and emergency numbers. The kit also included training health sheets to circulate on a monthly basis which included information on side effects of amphetamines; eating healthy on the road, smoking, fatigue and many others. A fatigue management trial is being conducted in Queensland as a joint venture between the RTF and the Queensland RTA. The program includes driver health, driver training, driver management systems, driver environment consideration such as rest stops and vehicle maintenance and design features. Overall the program is not just about drivers health, it is about improving the health of the industry. The industry will be safer, less fatigued and hence less likely to use stimulants to fight fatigue. The program has gained momentum, not only is it world best practice, it is a world first initiative.

I am here today actually representing the Road Transport Forum and just to put you into the picture, what the Road Transport Forum is, it is the peak industry body of heavy vehicles of the trucking industry. The Road Transport Forum was set up after those horrific bus and truck accidents in the late 1980s. It was an initiative by the industry to actually say we actually have to lift our game, how

do we actually do that. So what they have done is looked at their industry and are looking at what positive initiatives that they can put in place that are going to improve the safety, efficiency and productivity of the industry. Part of that Road Transport Forum initiative is to set up a self-regulation program and I guess the attitude that they have had is that if we cannot regulate ourselves, what

hope has the government? So what they wanted to focus on is let's look at tackling some hard issues and the second thing is let's put some theory into practice. So the Road Transport Forum is piloting what is called the Team 200 project. And the Team 200 project is a breakdown of regulation standards that they are trialing in the areas of driver health, training, driver management and systems and also vehicle maintenance. My area is focusing on the driver health side of things.

There is our slogan - "Keeping Drivers on the Road." That is what it is all about. Before we get started, what this is all about is a culture change program. It is all very well to put in regulations and put in standards for drivers but how do you motivate the will to change? How do you actually say okay let us take a stance, let us improve the industry? And the first thing that we have taken with this project is focusing on supporting the drivers. We actually have a project vision for the Team 200 and there it is there, basically saying to accept a means of designing and delivering standards which will improve the road transport industry, professionalism, efficiency and safety. They are the three key things. We are in an economic upturn now and the way that for organisations to improve has become more efficient; that means it also encompasses the issues of safety and professionalism. The system will be self-sufficient and involve operators, government, community, drivers and their families. That is the overall project vision.

The health phase of it is to focus on providing operators with a vehicle by which to improve their levels of health and to be able to have acceptable standards in those issues. We have three phases. We are actually Stage 3 now. The first stage was to find out the facts. Everyone has an opinion on road transport on trucks don't they; they are either good, bad or indifferent. The first thing was to find out what are the facts. There is lots of research, a lot of it from overseas; whilst not to be ignored, we wanted to focus on what is here in Australia. The second thing is based on the finding out the facts, we are then putting in place some standards. What we are doing now is trialing those standards and the trialing of the standards if the standards are working and accepted by the industry then we will broaden out for the rest of the industry. It is just encouraging and also from my viewpoint terrific to

see several of the teams and participants are here today. The culture change program, the will to participate is actually starting to generate more and more.

Let us give you some feedback on to what where the facts. Initially we sampled 220 drivers. We looked at things like 20% had a BMI greater than 30. These are some of the medical standards that we had; 33% had a diastolic blood pressure above 95; 60% had a cholesterol level greater than acceptable standards; 40% had triglyceride levels greater than acceptable standards; which perhaps is not surprising to a lot of us but more surprising to some, but looking at the type of foods they eat on the road we are expecting that sort of thing; 16% were diabetic. The scary thing was 40% of those were unidentified prior to the screening process; 10% had elevated Gamma GT readings; 63% were smokers which was twice the national average and 7% had drugs detected in their urine. When we did further investigation with the drivers we had something like 60% said in the last few years at some stage they have taken some type of medication to keep them awake. So it was more spasmodic the types of medication that they were using. Those things, whilst not surprising, gave us some food for thought. We were trying to say what do we do, how do we actually get this thing moving forward.

The turning point came for me when I was interviewing a 28 year old driver who was 28 stone, smoking 28 cigarettes a day and drank 14 litres of coke a day. I am thinking now what do I do? Where to from here? He said to me, "I'm not much educated mate" but then started to take me through to how long have you been driving; 10 years; How long have you been with your particular employer; 10 years; what type of training and standards have you had put in place for you. That started to look at the concept that started to say there is a lot more to driving than having a licence. For this program to be successful we need to start looking at the competency standards that it takes to be a successful truck driver. A licence just does not fit. The thing we started to say was how do we then move forward and compare the trucking industry to other industries and the thing we are saying now is how do we get an industry to demonstrate the due diligence that is required to be a professional organisation. They are the questions we are looking at. We started to say what is the next step? We

started to look at some behavioural things. Some of the things we felt was the correlation between the amount of money spent on the road on food and drink and their health correlated highly. So those drivers that were more self-supportive on the road - packed the fridge with sandwiches from home and perhaps ate their breakfast with cereal and juice - were more healthier than those guys who purchased everything on the road. That then lead us to another thing; those drivers that were then able to have sound financial management, personal financial management were more healthy than those drivers who spent all their money on the road. The majority of drivers drank more than 2 litres of soft drink a day. Coke and lemonade does not quench your thirst - I am sorry - water does.

Skin cancers were common on the right arm; high degree of lower back problems; huge high degree ignorance as to what constituted sound driver health because the initial picture of what constitutes sound driver health means someone who runs marathons and eats lettuce leaves. We are here to say no. It is not. Someone who has sound driver health means being able to deliver in a level of professionalism in the safest manner to themselves and public at large. We were very very concerned at the behaviour and the self-management skills of young drivers. Whilst medically they were okay, their behaviour on the road - the types of things they were doing in between driving - was quite scary. So that cause of concern was not particularly the ageing drivers, it was actually with the younger drivers as well. It is interesting that the things we found that helped was things like mobile phones; really helped the communication process. I vividly remember at a truck stop this driver getting out and telling me his daughter rung him up on the mobile phone and told him she had passed all her exams. The morale that had done to that driver had been a real pick-me-up.

That started us to look at the issues of communication, behaviour and the thing that started also of what is happening out there on the road is a thing called work practices. They were the things that started to contribute most to driver fatigue was work practices. Work practices falls into the areas of personal drivers work practices, the management systems they work under, the freight forward systems that they drop off and pick up from and the jurisdictions themselves. So ultimately if we are going to start managing driver fatigue, we have got

to start improving the performance of our truck drivers on the road we need to look at the work practices of all four divisions. That lead us to putting together five streams in the driver health. We had medicals, driver fatigue management and injury prevention, training and health promotion, community and partners and industry promotion. They are the five streams we put in place standards with. We actually changed the representation of that to the way we represent it now, is that they are all interlinked. You can see at the top there we have driver medicals and counselling. We represent it that way now. I will walk through that very gradually.

First of all we are saying driver medicals and counselling; industry promotion; driver industry promotion support; driver partner and community; driver health promotion and training. There in the centre linking the whole thing together is driver fatigue management. Let's make no bones about it. If we cannot manage driver fatigue and improve driver fatigue, this whole exercise has been a waste of time. So the first thing we are saying is the ultimate thing is how do we improve the performance of drivers on the road. The drivers fatigue levels on the road is an outcome is it not? It is an outcome of the way they are working and living their lives. Our role is to help facilitate the process of merging this together. So how do we do it? So how do we actually start it? First of all what we did was put in place a process that we are trialing and saying we have adopted the NRTC Driver Guidelines as to what puts a driver on and off the road. We welcome those. What we are saying the first standard that each driver must undergo, a regular medical. It is interesting. We are saying we are trialing at least every three years but what the Team 200 participants are telling us is that they are doing it annually. The people who voted to do it annually are not the operators and are not the doctors, do you know who it is? The drivers. Because the attitude they are saying is okay we go and have our truck serviced regularly; who services us? What is more important, the truck or the driver? So the process we are putting in place is a driver medical that focuses on the word counselling. So the doctor is seen as being a resource to the driver and a confident boost to the driver to help counsel him ask to the type of standards that they have been looking for. So the process goes something like this. They have thirty minutes. They fill in a health

survey. Within the health survey is a section on fatigue. We have used the Epworth Sleepiness Disorders Survey. Where a driver actually fills in a survey which takes around about 15 minutes. It is around about 17, 18 pages long. Initially we would have told you that is too long. Drivers are interested in it. We are actually saying invest 15 minutes of your time. When they go to see the doctor, first of all the doctors are appointed by the industry. Who is the industry? The drivers and the operators. So what we are saying is that dear driver, dear operators, please appoint yourself a medical practitioner. Once they have appointed a medical practitioner or practitioners - many instances they have had three or four because they are an interstate operation - they then send that information to the RTF. The RTF then sends the doctors an information kit.

In that information kit is an outline of the program but also details of the things, the risk factors that they should be looking for plus a counselling kit. So the doctors have, at the tips of their fingers, an outline of the program; the risk factors they should be looking for; how to drive the survey and finally some truck drivers specific counselling forms that they can then use for constructive counselling. The doctors role has been there to support the industry but most importantly to start to understand the networks. And in that kit we put together things like a list of all the sleep disorder clinics in Australia encouraging them if you have a driver with these types of symptoms please refer them on. They are an invaluable source to the operators. Confidentiality is maintained. The only thing the doctors need to write to the operators for is saying I saw this driver on this date and he is accepted to drive for the next one week to three years. That is the window. So those drivers who perhaps have more health concerns may need to be followed up more regularly by the medical profession and if by way of treating that behavioural change how do we actually make them participate? Well, by saying I need to see you again in three months so your certificate to drive is relevant to drive for three months. By then we would want to review it and see how you are going from there. By and large if a person is having ongoing management of those things the doctor is in sole charge of monitoring that process. The operator, in most circumstances, really would not understand or want to go into the reasons why a driver has a shorter period and other

drivers a longer period, that is a consensus between the operator and the doctor. We put through over something like nearly a thousand drivers through the process now. We have had four instances of a person wanting to challenge the process. In each circumstance it was a driver actually protesting that his livelihood was going to go and that it was unfair and that he wanted to have a second opinion. We have no problem with having a second opinion. We have actually asked the medical profession; we have over 140 doctors right throughout Australia in this pilot at the moment, we have asked them to come up with mechanisms of doing appeals. It is interesting to hear what the reasons were for the appeals. Two of them were for cataracts; could not see; legally blind. And the other two were for cardio vascular disorders. One was actually in the process of having a coronary in the clinic, saying "No it's all rubbish, let me out." That doctor saved that driver's life. So the feedback we have had from the operators, the drivers, has been very positive because the major role of the focus of the doctor has been to counsel and has also been able to explain the due diligence of what they are doing and going through that. Feedback from the drivers is saying we would like to do it annually; we thought it was worthwhile. One thing we do need to put in place is a formal appeals mechanism.

One of the particular things we were asking the medical profession to do is to represent the drivers, the operators, the medical standards and the due diligence and I guess the more skilled doctors are really good at doing that because their major focus is to communicate and help and support and drive this process through. It is an area we are again asking the medical profession to spend a little bit more time putting it together. Also surveying the doctors to communicate issues and solutions that they have trialed, what have been some of the things that they have done? I will give you an example. A doctor in Tamworth that was so appalled at the level of health of the drivers that he screened that he put in place free seminars on a Saturday morning at Tamworth Base Hospital. And the feedback we are getting is on a monthly basis is they are getting terrific support of drivers and their partners are present there to participate in the process. So in that doctors kit was those things. Actually we might skip the rest of the doctors kit handouts and move on to the next one. So that was the role of the doctors and the feedback we have been getting has

been great.

The second stage is how do we promote health promotion. One of the things that moving around seminars and talking to the operators in the field is that we always used to get a person come up and say, "What do I do about this driver?" "This driver I know takes drugs" or "I know snores" or "I know does this". "How do I actually motivate them to actually do something?" That was tough, that is hard on an operator. A trucking person to actually say to an employee I think you should do something about your health. I think you need to do something about your snoring or your sleepiness. What we have done is put in place, say first of all the major role of the operators is to facilitate a process. What we have put together is the first ever driver health resource kit, that is going to every team 200 operator. The final kits were circulated to me on Friday. What this is going to have is a Who's Who of Health and Health Resources ever in the country. An operator who actually sees a driver who has a problem, there is a network where they can then recommend or direct the driver to go for help. For instance we have got Relationships Australia have put together a program specifically for truck drivers. There is a brochure on that with an 008 number. That was one of the concerns we had is drivers bringing their problems from home on to the road. We have, through Warburton Base Hospital, set up a driver drug advisory process. Why there? Because the guy in charge was actually a truck driver who was a drug addict for 22 years driving on the road who actually understands the needs and he has put together a brochure that is included in the kit. There are things from the Physiotherapy Association on backs. We have the medical profession, with their 140 - you name it, it is in there. We are going to update that fairly regularly. So a driver in need - an operator should be learning to recognise that. We are spending a lot of time training operators to recognise early warning signs and then help facilitate the process. And each of the 140 medical practitioners participating in it will understand that process as well.

So health promotion is going to be ongoing. In that driver resource kit there is going to be a monthly training aid. All they have to do is circulate it. All they have to do is photocopy and circulate it. Once a month, end of the month, it does not matter. Circulate it. Because what is going to happen is

drip feed. That information is constantly coming through. We are asking operators to be creative. How do you actually sell it? Don't send it to the drivers, send it home. How to keep on facilitating the process. Each month we have a different topic with a lot of emphasis on early warning signs, fatigue, drugs and so on. Before I move on to the fatigue management program I also talked about industry promotion. What is industry doing to promote itself? Part of the industry focus is very much on saying what about the truck stops? What are we actually doing in the truck stops? How do you actually force healthier eating? One of the things that BP truck stops is about to launch is a healthy diet. What happens is a truck driver sits down, orders whatever he orders, and there sitting down there will be a placemat and on that placemat will be foods coded in three different colours; the healthier foods in green; less healthier foods in orange or yellow and the unhealthy foods in black. So they start getting to read. That is just the circuit breaker. The next step involved in that circuit breaker is a process that is saying perhaps we can come up with a truck pack which will then provide them with alternative food choices. That is occurring. We are running regional seminars under the driver industry and community process where we actually target partners. We are actually motivating each regional community within the industry to actually run a seminar to look at how do we improve and how can we support the industry. We have trialed one in Mr Gambier which worked very successfully in terms of motivating social workers, counsellors, support networks for spouses and families.

Fatigue management; part of the benchmark is saying by September next year each Team 200 operator will have a fatigue management program in place. The focus of the fatigue management program firstly must be measurable. Part of the ways that we are doing the fatigue management program, we are actually piloting through Queensland Transport the fatigue management programs, looking at the ways of measuring it and auditing that and you will hear Gary talk more about that. Part of the methods of doing that is doing it through an audit - by looking at the things that we know cause fatigue. We are asking operators to say how are you actually managing that? What is the due diligence going by? The reason we are focusing on that is that log books and the other fatigue

limiting things in place at the moment do not work. If they did we would not be here. We are saying let us put in place and trial and research what goes in place into a fatigue management program. And the thing we learned looking at first and foremost at is work practices. Who loads and who unloads. One of the things that is interesting is are freight forwarders guilty of causing more fatigue by their method of a truck driver having to load and unload and the driver not having time to sleep. One of the things that we were looking at is the type of stops that the jurisdictions do on drivers is to see whether there is a better way of speeding up so we do not have these delays in transport. Some of the things we are starting to look at is how do you schedule and roster. Why do we have a prescriptive program here in the Eastern States and in the Western we do not. Which way works best. Just by prescribing and limiting driver hours to 12 or 14 hours, it just does not work. What we have to focus on is driver behaviour, the systems by which they operate. Why give that driver a job to drive up there when you know he is fatigued. Why do you do that. You would not send a truck up there if the brakes were faulty so why send the driver. Why don't you employ that driver with those competency standards - he had a licence but he Could not cope with fatigue. They are the things we are starting to benchmark now and that is what is happening in place in our fatigue management programs now. It is up to the industry to demonstrate the due diligence. I am here to say that 12 months ago I was saying how do we actually do this. Because the first thing that was coming up to me is what is all this crap. Now the tide has changed. They have put their toe in the water, something happened - it worked. The drivers actually accepted it. The drivers attitude is about time, about time you recognised me. What is happening is momentum is building up now to say okay we reckon in two or three years time the truck drivers in this industry, those that participate in the RTF are going to be healthier and safer and less fatigued, not only part of any driver in this country but any other driver in this world because this is a world first.

We are actually bench-marking new stuff here. There is no-one else to copy off at the moment. Our focus is saying yes we recognise we have a problem, we also recognise the extent of the problem. Now what are we going to do about it. This process is saying let us trial the process, let us find out what has worked but let us also find out what does not work too, pigeon hole that as well and build up on the positives. Thank you.

## DRIVER FATIGUE AND THE LAW

**M. Latham**

Director, Criminal Law Review Division  
New South Wales Department of the Attorney General

**ABSTRACT:** If a driver falls asleep at the wheel and is subsequently involved in an impact with another vehicle or an object or a person, and death or serious injury is occasioned to a person, a prosecution under Section 52A of the Crimes Act 1900 may be brought. The implications of the High Court decision in R -v- Jiminez (1992) 106 ALR 162 for future prosecutions under this section are discussed. The civil liability of a person who suffers from a sleep disorder is also referred to in the context of the Jiminez decision.

Before I start I just thought I would pick up a remark made by the previous speaker, while it is still fresh in your mind, and that was that he asked the rhetorical question "Why should an employer send a fatigued driver on a trip? Such an employer would not send a truck with faulty brakes so why should you send a fatigued driver?" In fact, that issue with respect to faulty brakes was one that arose directly in a culpable driving matter of Giorgianni [Giorgianni -v- R (1985) 2 MVR 97] where the Crown tried to sheet home criminal liability for an accident arising primarily out of the faulty breaks of the vehicle of which it was alleged, the owner of the vehicle was aware. Of course, he was not driving the vehicle at the time.

The rhetorical question which should now be asked, and subject to what I have to say shortly, is would similar criminal liability be sheeted home, or attempted to be sheeted home, to an employer who did send a driver, knowing that the driver was fatigued, and the driver thereafter had an accident

which resulted in the death of, or grievous bodily harm to another person?

In the time I have available I want to outline firstly very briefly the nature of a charge that is brought under section 52A of the Crimes Act 1900 (NSW) which is that section which deals with culpable driving. I would rather leave some time for questions. I am acutely aware of how dry and boring the law can be to non-lawyers and sometimes I think it is preferable if you ask questions and then I have an opportunity to gauge whether what I have said has been understood, because if it has not been understood then the fault has been mine, not yours.

To the extent that I am going to read from some passages of a High Court Judgment in the case of Jiminez [Jiminez -v- R (1992) 106 ALR 162], I apologise if it gets a bit turgid and technical, but the judgment is a fairly clear judgment and I think it is important to be familiar with exactly what the judgment says.

In New South Wales, like every other jurisdiction in Australia, the Crown may bring a charge of culpable driving against an accused person who, while driving a vehicle, has been involved in an impact with another vehicle, or with a person, or has overturned and left the highway, and thereby occasioned death or grievous bodily harm to another person. In New South Wales, however, our ingredients, and therefore our methods of proof of the offence, are different to every other Australian jurisdiction.

One of the ingredients of the offence in New South Wales is that death or grievous bodily harm has been occasioned to a person - and usually that is not disputed - that is, that death or grievous bodily harm has been occasioned through the impact with a motor vehicle, an object or the motor vehicle leaving or overturning on the highway. A further ingredient is that at the time of impact, the motor vehicle was driven by the accused, either under the influence of alcohol or under the influence of a drug or in a manner dangerous or speed dangerous to the public.

For the purposes of this discussion today we are principally concerned with manner dangerous to the public because that is, in fact, the heading under which driver fatigue would fall and does fall in the High Court decision of Jiminez.

But what I want to point out to you initially is that the relevant criteria for the New South Wales offence is that death or grievous bodily harm is occasioned. That is, that it simply results from the impact. It is no requirement of the offence in New South Wales that the Crown has to prove that the accused in driving the vehicle intended to cause the death or the grievous bodily harm that resulted. The relevant intention is the intention to drive, not the intention to cause the relevant injury. There is no requirement to prove a causal connection between the manner of driving and the fact that death or grievous bodily harm resulted.

In every other State in Australia that I am aware of there is a necessity to prove that causal connection. So at first blush it seems like a fairly easy or, at least, less onerous charge to prove. But the question of the intention, being the intention to drive, is one that is fairly crucial for our purposes because the

criminal law maintains, and this is for all criminal offences, that for a person to be guilty of an offence their action has to be voluntary. That is, the relevant intention has to be a voluntary act - the mind has to go with the act.

For our purposes dealing with accidents which arise out of fatigued driving where drivers actually fall asleep at the wheel, the High Court in Jiminez has said, and indeed it really did not need saying because it has been said often enough before, that actions of a person whilst that person is asleep are, in fact, not voluntary within the criminal law. So from the point at which you fall asleep at the wheel and the car leaves the road or crosses to the wrong side of the road and impacts with another vehicle or an object, a person can not be held criminally responsible for what happens while they are asleep.

The first thing that you need to be aware of in terms of how the criminal law sheets home responsibility to someone who falls asleep at the wheel, is that the relevant period of conduct for the purposes of determining whether or not they are driving in a manner dangerous to the public, is the period immediately prior to falling asleep. That is the relevant period in terms of assessing whether or not that person is guilty of an offence of culpable driving. (That is, culpable driving in the sense of driving in a manner dangerous to the public, where there is no evidence of excessive speed, so there is no evidence of driving at a speed dangerous to the public and, there are no other contributing factors like alcohol or drugs. For present purposes I am just talking about the pure fatigue situation without any of those other exacerbating characteristics.)

As I said, the relevant feature for our purposes is driving in a manner dangerous to the public. I just want to outline how that requirement translates to the facts in Jiminez, but before I do that I want to read very briefly from the judgment a summary of the facts in Jiminez because I think there has been some misunderstanding. In some way there has been a temptation to think that Jiminez is somehow, as I said, a departure from the law. In fact, it is not, it is a restatement of the law and it actually has not changed the law as it was generally understood in New South Wales in any respect.

The facts in Jiminez were as follows: At about 11.00 p.m. on 13 June 1988 - it is in the middle of



winter—and that has some bearing on what follows—the appellant, Mr Jiminez, set out to travel south in his BMW sedan from the Gold Coast in Queensland to Sydney in New South Wales. He was accompanied by three female companions, one of whom was a Janelle May Stephanoni.

Before setting out the applicant, Mr Jiminez, slept for four hours from about 5.00 o'clock in the afternoon. They had left on the journey at 11.00 p.m. Miss Stephanoni drove the car for the first 400 km during which time Mr Jiminez slept in the vehicle. Assuming that they travelled for about four hours, he slept an additional four hours in the vehicle.

At about 3.30 a.m. on 14 June, Mr Jiminez took over the driving of the car. At about 6.00 a.m., so some two and a half hours after he has commenced driving, at Ingai Creek on the Pacific Highway approximately 30 km north of Kempsey the car failed to take a moderate right hand curve in the highway. It travelled on to the eastern gravel shoulder, continued on and collided with a tree, and then with two more trees and Miss Stephanoni who was the passenger sitting in the front seat of the car and was not wearing a seat belt was killed. The other two passengers were in the rear seat and they were slightly injured as was Mr Jiminez.

Mr Jiminez was taken to a nearby hospital for treatment but then allowed to leave. He was then taken to the home of a Salvation Army Minister who had attended the scene of the accident and Mr Jiminez slept for a further three to four hours.

When Mr Jiminez was first questioned by the police he was asked "How did the collision occur?" His answer was "I really don't know, before the accident there was a lot of fog in the road, I lost control of the car, everybody was asleep ..... the three girls, and then it happened. It was just for a second. I lost control when I fell asleep. I'm not sure what happened."

In a further question he is asked "You said in part 'I lost control when I fell asleep' were you feeling tired prior to the collision?" His answer was "I don't know what happened, I was driving, I was thinking about stopping in the next town, the heater was on."

Now interestingly enough at his trial he made an unsworn statement in which he said that at the time of the accident he intended stopping at the next main town for breakfast and it had nothing to do with being tired. In his unsworn statement he said "Suddenly my car was off the road, I think I must have closed my eyes for a second. When I opened my eyes the car was off the road and I lost control." So between the time that he was questioned by the police and the time that he gave his statement at the trial, the slant had changed somewhat from initially being one related to fatigue to one being not related to fatigue but simply closing his eyes for a second and it had nothing to do with any feeling of the onset of sleep at all.

Having stated the facts I just want to return to this feature of dangerousness. What the Court has said about driving in a manner dangerous to the public generally is

"... that the manner of driving encompasses all matters connected with the management and control of a vehicle. For the driving to be dangerous for the purposes of section 52A there must be some feature which is identified not as a want of care but which subjects the public to some risk over and above that ordinarily associated with the driving of a motor vehicle including driving by persons who may, on occasions, drive with less than due care and attention."

This is the relevant part for our purposes which is interesting:

"Nor need the conduct manifest itself in the physical behaviour of the vehicle if the driver is in a condition while driving which makes the mere fact of his driving a real danger to the public, including the occupants of the motor vehicle, then his driving in that condition constitutes driving in a manner dangerous to the public.

It should be emphasised and must always be brought to the attention of the jury that the condition of a driver must amount to something other than a lack of due care before it can support a finding of driving in a manner dangerous to the public. Driving

in that condition must constitute a real danger to the public."

And then further:

"It follows that for a driver to be guilty of driving in a manner dangerous to the public because of his tired or drowsy condition, that condition must be such that, as a matter of objective fact, his driving in that condition is a danger to the public."

Then later:

"No doubt it may be proper, in many cases, to draw an inference that a driver who falls asleep must have had warning that he might do so if he continued to drive or that otherwise he knew or ought to have known that he was running a real risk of falling asleep at the wheel."

I stress the references in all of those statements to the term "in that condition" because I think that is crucial for the purpose of sleep apnoea. I apologise for not being here earlier, but I am under the impression that someone who is suffering from sleep apnoea is very well aware of the fact that they are drowsy. In other words, they go through the day feeling drowsy and being tired and exhausted.

What I extract from the High Court judgment in respect of that is that if you are suffering from sleep apnoea or, indeed, if you have been diagnosed with sleep apnoea, every time you get behind the wheel of a car you have to be aware of the fact that you are in a condition which makes it likely, at least on this construction, that you are driving in a manner dangerous to the public by the very fact that you are in that condition and that you are in the control of the vehicle and you are responsible for every aspect of the management and control of the vehicle.

But what I also need to point out, for the purposes of drawing these conclusions from Jiminez, is that all the way through the judgment in Jiminez there is an assumption that we are dealing with a normal person who has normal sleep patterns. There is nothing in the judgment in Jiminez which refers to anything like persons with sleep disorders. There is an assumption, when looking at this question, that you are looking at people who are supposed to have

had a proper night's sleep the night before, who do not suffer from any sleep disorder and who are therefore going to be in a position to know perfectly well whether they are likely to fall asleep at the wheel or not.

And that is borne out by the reference to various matters which will be relevant in reaching such a conclusion, that is whether or not the driver is in that condition, the period of the driving, the lighting conditions including whether it was night or day, the heating or ventilation of the vehicle and, of course, it will be necessary to consider how tired the driver was. I read from the judgment:

"If there was a warning as to the onset of sleep that may be some evidence of the degree of his tiredness and the period of driving before the accident, and the amount of sleep that he had earlier, will also bear on the degree of his tiredness. But so far as driving in a manner dangerous is concerned the issue is not whether there was or was not a warning of the onset of sleep, but whether the driver was so tired that in the circumstances his driving was a danger to the public."

It is important, I think, to qualify what you see in the judgment in Jiminez by the fact that there was no issue in that trial that the person was anything other than a person with normal sleep patterns.

I am not aware of any case arising thus far in New South Wales where a driver who has been charged with culpable driving arising out of falling asleep at the wheel and an impact that results therefrom, has come to court saying "Well, look, I was suffering from sleep apnoea." Because I dare say that that may give rise to certain other considerations, not the least of which will be, I anticipate, the need to call some expert evidence about the sort of symptoms that a person who is suffering from sleep apnoea would be expected to have, and whether or not that would be something that would give them some foresight, some warning of the onset of sleep, that is the fact that they were driving around in a drowsy condition, or that they had these periods of time when they fell asleep in the middle of conversations or meals, or whatever.

It may well be that for those of you who specialise

in this area there is a lucrative expert evidence fee waiting out there for you when somebody discovers a client with that sort of problem.

There is one further matter that I would wish to touch on just briefly and that is that the other fact to which the High Court referred in Jiminez was the defence of honest and reasonable mistake of fact. Essentially that was what Mr Jiminez argued. Mr Jiminez argued "Look, I had absolutely no idea that I would fall asleep." Indeed, by the end of the trial he was shifting from having fallen asleep to having just closed his eyes for a second.

I might interpolate there to say that the Court of Criminal Appeal has recently confirmed that momentary inattention, that is just turning your eyes away, or shutting your eyes momentarily, is still conduct that can be brought within manner dangerous for the purposes of section 52A of the Crimes Act 1900.

Getting back to Jiminez, the High Court referred to the fact that if you raise a defence of honest and reasonable mistake of fact, that is, that you had absolutely no warning of the onset of sleep and you could not be expected to have any warning of the onset of sleep, then you are acquitted outright in respect of a charge. Because it is a defence that is raised in a criminal trial then it is for the prosecution to negative that defence beyond reasonable doubt. It is not for the accused to prove the defence on the balance of probabilities. So the Crown would have to negative beyond reasonable doubt that the accused had this honest and reasonable mistake of fact in relation to his condition at the time.

Just lastly, I want to reiterate what I have said at the outset which is that I do not think that Jiminez has created any new law at all. Indeed, if you read the judgment it is perfectly common sense. Indeed why it was that the High Court overturned the conviction from the N.S.W. Court of Criminal Appeal which had originally affirmed the conviction from the District Court was because, in fact, there had been a misdirection to the jury.

In the Jiminez trial what the judge and defence counsel failed to appreciate was that the relevant time for the purposes of focussing the jury's attention on what was the manner dangerous to the

public—what period of driving was it that was in a manner dangerous to the public was not the period of time after he had nodded off, left the road and crashed into the tree, it was the period of time immediately prior to falling asleep.

The relevant question was, in that period of time, if he had been drowsy, if he had have foregone sleep, if there were circumstance which would have indicated to him that he was in need of sleep and could no longer manage the vehicle in a way that would maintain his duty of care to users of the road, then he was potentially criminally liable for what happened thereafter. So it was a complete mistake on the part of the trial judge in not focussing the jury's attention on that period which led to the overturning of the conviction. In that respect, I repeat, that I do not think that Jiminez has created any new law at all.

In fact, anyone coming to court, even prior to Jiminez, who had fallen asleep under those conditions, if the directions had been in accordance with what the High Court has set out, and there had been a conviction, would have no legitimate complaint at all. Cases of this type, I anticipate, will keep coming before the courts and provided the directions are given in those terms, then there will, I anticipate, continue to be convictions under the section for persons who have fallen asleep at the wheel whether that be because they suffer from sleep apnoea or whether it be because they simply have not had enough sleep the previous night.

If there are any questions I would be happy to answer them now. If there is anything that you have not understood or, indeed, anything that I have not covered that you wish to ask me, please feel free.

## QUESTIONS

**MR PETER CLARKE (MOBIL):** Thank you for an interesting and clear presentation. It is difficult to come to grips with all the elements of it but this question of the period before the incident is obviously elastic. Can you give an indication as to what the appropriate time period might be?

The second question, if I may, beyond the question

of the time period, within this room, 120 people in it, getting to the question of condition - in this room there is somewhere between 5% and 10% problem drinkers; there are probably between zero and five of us who are diabetics; there is somewhere between two and 43 of us who have sleep apnoea, depending on which of the statistics we have heard before.

If I understand you correctly all of us are at risk of failing the precondition trial in some way and therefore the time period becomes very important for us in terms of our own obligations. Could you extend beyond that to the question of third party obligations for employers which I know was probably addressed in the previous paper but I would like your comment on that, please?

**MS LATHAM:** The first part of your question is, indeed, particularly relevant to the whole discussion. When I say the period immediately prior to falling asleep, it is not a period immediately prior to falling asleep that extends hours before you fall asleep. In fact, what the judgment says is that the relevant period is that immediately preceding falling asleep and there has to be a sufficient nexus between that and the impact.

In other words, you have to be able to associate the manner dangerous, that is the period of driving immediately before falling asleep, with the impact so that you can not simply say "Well, look, 20 km down the road he nodded off at the wheel but then regained control and left the road 20 km further on". That is not a sufficient nexus. It is the period of time immediately prior to falling asleep in terms of assessing whether or not the person in that period of time immediately before falling asleep is capable of knowing that they are in danger of falling asleep and losing control of the vehicle.

In terms of the comment that everybody seems to be at risk in relation to this well, you are absolutely right. That is why I say I do not think Jiminez creates any new law at all. It applies to anybody who for any multitude of reasons whether they have had a heavy night out on the town the night before or they abuse tranquillisers or they have some other health problem which predisposes them to driving in less than an alert state, yes, that is what creates the potential for liability.

It is not a problem that is specific to sleep disorder. So this discussion, particularly in terms of what the High Court says, is not something that you can confine to sleep apnoea because, as I said, the whole High Court judgment is premised on the fact that Mr Jiminez was just an ordinary person who had taken ordinary precautions and had something like seven hours sleep in the preceding twelve and he had no reason to think he was going to fall asleep at the wheel.

That is the context in which they then talk about all these other factors: the fact that the windows were wound up, the heater was on, everyone else in the car was asleep, those sorts of things.

In terms of employer liability, I suppose that comes back to the comment I made at the outset and that is a fascinating issue although it is easy to see why criminal liability would be sheeted home much more readily to the owner of a truck who knew that the brakes were defective, whereas vicarious criminal liability for someone else's medical condition, even though you know what that medical condition is, would stretch that just a little bit further. Although I do not think it is outside the realms of possibilities given a sufficiently serious set of facts that that could happen: that the employer could be charged. I think that it is possible that someone, given a certain set of facts, could well be charged and found guilty in respect of a culpable driving offence.

I stress a certain set of facts because all of these cases turn on their facts. One would have to presuppose a certain combination of circumstances and facts which would warrant that sort of liability. For example, not just the fact that you knew that the person suffered from sleep apnoea but perhaps a fact situation whereby you knew the person suffered from sleep apnoea, you had repeatedly sent the person out on lengthy drives, and there had been occasions when the person had had motor vehicle accidents in the past directly arising out of their fatigue albeit nobody was killed or injured. Then suddenly one day one of those accidents results in a death and there is that history about which knowledge can be proved against the employer, I think criminal liability might well flow.

**MR JOHN ADAMS (ROTHMANS):** If a driver had exceeded his legal requirements and had such

an accident, what would your comments be then as to his culpability?

**MS LATHAM:** When you say "legal requirements" in what respect?

**MR JOHN ADAMS (ROTHMANS):** He exceeded his period of driving time under, say, New South Wales legislation?

**MS LATHAM:** Well that would be just one factor that the court would take into account or that the jury would be asked to take into account in determining whether or not in that period prior to falling asleep he ought to have known that he was in danger of falling asleep. That would be referable to some expectation of the onset of sleep, but it would just be one factor amongst the many.

**MR LAURIE CREE (SLEEP APNOEA RESEARCH ASSOCIATION):** Our Association, for obvious reasons, is very much involved in awareness programs in relation to sleep apnoea. The normal pattern is that once people are diagnosed and treated that they are very, very similar in their behaviour to those who are not sufferers. As I understand your comments you are implying that somebody who has been diagnosed and treated may still be charged and convicted on the basis of having sleep apnoea which, of course, creates a dilemma in terms of encouraging people to come forward and be treated?

**MS LATHAM:** Partly that is right, but what I am meaning to convey is that I understand your point, and I understood before I started speaking that if someone is treated then they very much return to what would be considered sleep patterns and normal behaviour for someone who did not have sleep apnoea. But that simply puts them back in the same position as everybody else who, like Mr Jiminez, is still liable for criminal prosecution if he ignores certain warning signs that the jury can infer from the circumstances he should have had. It just puts that person back in the position that everybody else is in.

With respect to whether or not the issue of their sleep apnoea and treatment would be brought into a criminal trial, that is why I say that I think we are not too far off the day when we will be hearing expert evidence in criminal trials about sleep apnoea. I can well imagine an accused person who

has been diagnosed and is being treated, who comes to court and says "Look, the sleep apnoea had nothing to do with it, I was being treated, I was responding well, there was no reason for me to think I was going to fall asleep at the wheel". I would anticipate in those circumstances that the Crown would probably be arguing something like "Either you were not pursuing the treatment to the extent that you should have and, therefore, you were aware of the fact that you were drowsy because you had not been taking the treatment as often as you should have" or something like "The treatment may well have been inadequate for your condition."

Wherever that sort of issue is raised you would expect expert evidence probably from both the Crown and from the defence. I would think that the accused would probably call an expert witness to give evidence of the fact that this was the correct treatment and that, provided he undertook that treatment, the sleep apnoea was managed properly. The Crown's expert may well wish to argue something else.

I am just saying that all of those things may well be up for grabs in terms of how a jury would assess someone who is known to suffer from sleep apnoea and is being treated. It would be a relevant circumstance if the accused wanted to make it relevant or if the Crown wanted to make it relevant, but it would depend again on the individual circumstances of the case.

**MR ALAN HEBERLE (GREENFREIGHT):** How does this relate to Victoria?

**MS LATHAM:** As I said, all of the principles that you can extract from the High Court judgment in Jiminez are common law principles to the extent that the issue of voluntariness, that is, whether or not someone can be criminally liable for something done while they are asleep, is a common law principle so it is applicable across the board. I would dare say that a Victorian case along the same lines as Jiminez would be treated in exactly the same way in Victoria, subject to the fact, of course, that their proof of the offence is slightly different.

In Victoria they have to actually prove that the manner of driving directly caused the type of injury which resulted whereas we do not have that requirement, but leaving that to one side, the issue

about voluntariness and what you can be held liable for is something which would apply in every jurisdiction.

**Mr FAULKES (STAYSAFE):** Do you envisage a situation where legislators might consider the possibility of making being asleep itself one of the elements for dangerous driving so that that common law principle that you have discussed would be displaced by legislation?

**MS LATHAM:** I cannot really imagine that for this reason - and I think this is where the confusion has arisen - it is not a defence, it is a complete absence of *mens rea*. It is a complete absence of one of the essential ingredients of committing any criminal offence, that is, that the mind has to go with the act. If you are not awake you cannot be held criminally responsible. It falls into exactly the same category as, for example, criminal acts which occur while the person is in an epileptic fit or while they are under some sort of automatism response. It is not just sleep. It is a principle that extends across a range of circumstances where the law has held that if your mind is not going with your act you simply cannot be held criminally liable. Any attempt to legislate in respect of that would involve a fundamental departure from the principles of the criminal law.

**PETER O'CONNOR (NEW SOUTH WALES ROAD TRANSPORT ASSOCIATION):** In trying to deal with the problems of truck movements we are well aware that the transport chain which is more than just the trucking company, it is the consumer of the service and also the roads authority providing the road service itself, can all play a contributory part into possible circumstances of an incident in a case like you outlined. What I am interested in and I dare say in New South Wales Police who are also having difficulties with highway reports will be having difficulty too; who retains the discretion as to who will be charged with any particular criminal offence, especially the vicarious ones. For example, if there was a hypothetical abattoir in Brisbane demanding transit times for lambs or beef which were clearly one hour less than what you could normally reasonably set out to achieve and that business was being won or lost on that basis - or any other sort of similar circumstance where there is a transport chain problem. Who retains, within the New South Wales

prosecuting framework the discretion, as it were, to go after these facts?

**MS LATHAM:** Ultimately it is the Director of Public Prosecutions. Most culpable driving charges in New South Wales are initially laid by the police and they would lay a culpable driving charge in almost every instance where a death is occasioned unless it is patently obvious to them that there is simply no fault on the driver at all. They would initially lay a culpable driving charge simpliciter against the driver. I am not aware of the police being in a position to examine liability to the point where they would lay a charge against the employer. I think you would find that that is still a very extraordinary situation. Even in the Giorgianni matter it failed.

---

It ultimately had some problems in respect of sheeting home liability to the owner of the vehicle. But I think you would find it would not be until the matter came before the staff at the Office of the Director of Public Prosecutions who would examine the police brief and perhaps identify some avenue of liability that the police had not pursued that you would see a charge like that being laid for the first time.

# FATIGUED DRIVERS IN QUEENSLAND

**G. Mahon**

Manager, Vehicle Safety and Operations, Queensland Transport

**ABSTRACT:** The Fatigue Management Program pilot project, a Queensland Transport road safety initiative, conducted jointly with the Road Transport Forum Team 200 Project, is described. The project involves developing a program to enhance the management of heavy vehicle driver fatigue under a system of accreditation. The paper examines the objectives and management of the project and in particular, the developing of fatigue management standards to address such issues as scheduling, rostering, time at work and driver characteristics. In addition, how the fatigue management program is to address the management of sleep disorders, including sleep apnoea, is discussed.

I certainly thank the STAYSAFE Committee for the opportunity to speak here today about the Fatigue Management Program which we commenced in Queensland. I would like to outline that it is a part of our fatigue strategy that addresses the overall fatigue related accident problem. This includes counter measures in relation to private vehicles. For instance such things as the driver reviver project and marketing campaigns such as rest stop dead stop. I was not aware this morning our vocabulary did not fit into everybody else's. What we call audible edge lining was called rumble strips to everything else this morning and I was not aware our vocabulary was outside that. What I would like to say though is that whilst a lot of people today have spoken about a lot of components of fatigue and the results of fatigue research, what I am going to talk about today generally is the legislative approach to try and manage this fatigue problem in commercial operations. This project has enjoyed the unqualified support of the Road Transport Forum for which we are grateful and also our colleague jurisdictions in the four States that currently administer driving hour regimes and subsequently moved on since then to now be a part of the national approach in terms of what the National Road Transport Commission is trying to achieve.

The Fatigue Management Program incorporates the management of sleep disorders. I will talk about

that a little bit later. As some background, I will just outline the activities that have been occurring in Queensland on sleep disorders. Robert Lake, one of our researchers within the department conducted a seminar in 1993 and that generated quite a significant amount of interest in sleep disorders in Queensland and in other States for that matter. Of particular note I think to many commercial operators were the legal issues raised by Mr Ian Callinan QC which I think raised many eyebrows within the more responsible elements of the industry.<sup>2</sup> Since that time to try and increase the exposure of the sleep disorder problem, we have incorporated a number of paragraphs in our Driver Reviver Magazine. Any driving hour brochures that we now publish include topics on sleep disorder issues to try and increase the understanding by people who engage particularly in commercial practice on this particular issue. Because at the end of the day, what the Fatigue Management Program is all about is ensuring that the people that operate

---

See: Callinan, I. (1994). Legal issues: Sleep apnoea and road safety. In: R.I.E. Lake (Ed.). *Falling asleep at the wheel: Proceedings of a seminar on sleep disorders and road safety*. Report RUB 93-1. Pp.24-36. Brisbane, Qld.: Queensland Transport.



these types of outfits on our roads and intersect with the road-using community on a daily basis are in a fit state of health and condition to operate those vehicles in a safe manner. Departmentally we accept that there is a causal link between sleep disorders and accidents. But the sixty four dollar question for us is what is the scale of the problem. We do not really know. There is some research around that suggests certain figures but at this stage we do not really know. As a regulatory body what is our responsibility? What is the appropriate level of interdiction, if any. These questions need to be answered by our Parliament and put into practice by the administrators. Should we introduce mandatory screening? Do we need to introduce mandatory doctors certificates or such like? It would be particularly unfortunate if our legislation reflected that over 35 male truck drivers are a pariah. That is not the sort of approach that we need to be taking. But we certainly accept that we have a moral and ethical responsibility to treat the problem. Key action subsequent to Roberts activities was to introduce a project to develop a screening and management system for the detection of sleep disorders and that particular project is now being subsumed or incorporated into our fatigue management pilot as part of the overall process.

As some background as to where we are coming from with the Fatigue Management Program, I am also pleased to say that this particular concept has attracted international interest. I recently returned from the US where I gave a presentation to a regulatory conference over there and they are quite interested in this concept because they have a similar problem to ourselves and on a similar scale. Where I think generally we all agree (I could not endorse Bob Pearson's remarks more) as a collective group that log books are a primitive proxy measure to manage the problem. In the absence of anything else, it is the best we have but we certainly have to look to other opportunities to better manage this problem. Our general conceptual approach to the legislation is that what we are trying to do is shift the focus from the command and control approach to one of gaining industry support to accept its own level of accountability and an appropriate level of accountability. In the past essentially our activities related generally to about 80 percent being focused on command and control type of approaches with approximately 20 percent, let us say, delving in the concept of self-regulation alternative compliance

accreditation. Whatever it is that you might like to call it. Good research from around the world will tell you roughly 80 percent of the population will pretty much try to do the right thing so long as they see plenty being done about the 20 percent who don't. What we are saying is we want it more formally recognised that 80 percent who are prepared to try and meet their responsibilities and be accountable for their actions and the consequences thereof.

In developing the Fatigue Management Model we introduced a new set of legislation to our statutes on 1 March this year and it generally reflects this approach. On the left hand side of the slide there you will see that is the traditional prescriptive model. That incorporates limits on hours, rest, continuous periods of driving, when you shall and shall not complete a book, sign the page, have your grandmother in attendance and all those other prescriptive things that we are very capable of developing over a long period of time. As I said before, that prescriptive model must remain on the statutes until such time as we are confident that we have a better alternative to that prescriptive model. We also introduced such initiatives as parties to offences. So we made it very clear within that statute that we are most interested in those other parties who have an influence over the commission of these offences or have an influence over the consequences of actions in relation to abuses of fatigue. The centre diagram shows that within that prescriptive model, we have some exemptions and variations. They only relate to the prescriptive model. So if you have a good enough case you may be able to get some alleviation from some of those requirements if you have justifiable cause. There is a formal application process you have to go through for that. On the right hand side is the fundamental shift we have made.

The Fatigue Management Program Statute says something to the effect that if you have a program within your organisation that can guarantee the health, fitness and safety of your drivers driving heavy vehicles you may apply for a permit from the Department and not be required to comply with the prescriptive model. In other words we are stepping you completely outside of the legislative statutes and shifting you to a performance based outcome. Rather than being a process orientated outcome where all you have to do is ensure that drivers do

not go beyond a certain number of hours, you are now going to be measured against a true performance outcome and the limitation or the minimising of fatigue related accidents. Because essentially that is what we are all about. That is why we are dallying with this type of legislation. That is why so much research is put into this particular issue, because we are all about reduction of fatigue related accidents. The problem with the loss of focus with the prescriptive model is that you start to tend to go towards the direction of demonstrating how good you are at forcing people to comply with the system you invented and losing the plot in terms of the reduction of fatigue related accidents.

Where does that particular Fatigue Management Program fit? In the classic production management model you have inputs, processes, outputs and outcomes. What we are saying is that the outcome in this particular part of our problem is the fatigue related accidents. And the outputs is a certain amount of fatigue within the system. Through the good research being conducted around this country and internationally we know a fair bit about what the inputs are to the generation of fatigue within the system. What we have not had in place is a process to manage those inputs. To satisfy the purists, we cannot be conclusive about this particular model. So what we are saying is on a statistical probability, if we can manage the inputs so that we can reduce them, it is reasonable to conclude that we can reduce the amount of fatigue in the system and thereby reasonable to conclude that we can reduce the amount of fatigue related accidents. On a statistical probability equation, we are on something here that should be a winner but we cannot say that with absolute conclusiveness but that is not a good reason not to try. Another description for the fatigue management model is that it is essentially about an occupational health and safety risk management program. And it is about meeting your responsibilities.

Fundamentally what we are saying is we want to change the culture. It is moving away from a process orientation to a performance outcome orientation. What we want to do is ensure that we are putting drivers into vehicles that are less fatigued, that are fitter and healthier to accommodate the task that confronts them. We would also hope that we can reduce the amount of

fatigue related accidents in the system. At this stage we cannot say that with the utmost confidence but as I said before it is reasonable to conclude that by better managing those inputs that that will be the result. As a further consequence of that, there will be less interdiction in the transport economics. That is not necessarily a problem for us, however, what we are saying is that if the owners can better manage their accountability, better manage their performance, there is no reason for us to interdict within those economics, if they can manage their program and their own environment. There is no need for us to dictate mathematical driving hour models.

The pilot itself commenced on 1 June of this year. It was initially commenced with five pilot operators that were volunteers from the Team 200 Road Transport Forum project. At the moment they are Queensland-based operators, although they all operate on an interstate basis for the greater majority of their trade. Those participants have been most generous of their time and there has been a lot of research and through workshops and seminars conducted with them over the last approximately five months so that we can arrive at a situation where we are almost ready to roll. I will talk about the action outline in a moment. Also within the structure we have a steering committee which is comprised essentially of four jurisdictions and the National Road Transport Commission. We have a project team that is comprised of project representatives from each of the State jurisdictions and the National Road Transport Commission, the Police jurisdictions and quite a number of State Government bodies within our own State.

In terms of the action outline; the objectives of the project can be seen on this slide which also indicates the latest action plan. Unfortunately this action plan timetable gets changed from time to time. I would like to say that during this whole project we have made it very clear to the industry and all the participants that we are not going to rush to the next step. We want to be very comfortable we have got this step under control before we go to the next step. Because we think it is too good an initiative to forsake it for the sake of timing this deadline and we are more than prepared to extend that deadline if it is absolutely necessary. Stage 1 is to develop team management principles and standards by 1 November. We essentially have met

that particular deadline. Implement communications and marketing plan by 1 December 1994 and then develop FMP accreditation agreement standards conditions and processes by 1 December. We then commence the pilot evaluation on 15 January 1995 and at this stage we have no reason to believe we will not meet that particular deadline. And then commence pilot operations by 1 March. From there we will have approximately nine months of testing, during which time we will evaluate the accreditation standards and conditions and the conduct of the pilots so that we are commencing to put a report together by 31 January 1996. We then expect to be able to make this Fatigue Management Program generally available to all industry members by 1 March 1996. By that stage we would also hope that there will be general national agreement that that particular program would then translate to all of the respective States involved.

Some of the key issues the project is having to address is a real culture change. What many industry people do not understand - this is not meant as a negative remark, it is just an observation - the Fatigue Management Program is not about ratifying current industry practice. The industry will need to change its practices to meet the accountability measures within this Fatigue Management Program and there is significant good work being done by the RTF and other organisations in assisting us to make that cultural change. But that change is going to have to be made. This program is not about ratifying your current industry or business practices. But we are not going about it by pushing and shoving as we go. It is incremental change. The term I like to use is incremental but relentless pursuit. A little bit at a time but always there giving you that nudge. So that you never forget you are getting a nudge. You put that into an analogy for instance if you are standing in a queue and someone gives you a great big shove, you are likely to have something to say and resist. Someone walks into a queue and just gives you a little bump, more often than not you will accept it. That is essentially what incremental but relentless pursuit is all about

We have also got the issue of pilots being able to conduct their operations interstate. I was very pleased to hear in my absence last week that the transport agency chief executives gave a very strong commitment last Tuesday that they will ensure that the pilot operators will be able to operate throughout

their States whilst they are within this pilot program. We will be doing everything we can to communicate what is going on in each of those State jurisdictions, particularly the Police; and other States where there is also transport enforcement representation so that they know what is going on and if they happen to intercept a pilot operator they understand what parameters those people are working within. That is a very important element. The other one is that developing the appropriate variations at the margin. What we do know is that the same principles will apply to basically all natures of operation within the transport industry. What we need to refine a little bit better is what the variations at the margin will be for the different commodity and specialist type transport operations. For instance if you are operating a B-double operation from Sydney to Cairns return on bulk freight, you have got a slightly different set of problems to someone who is running livestock operations with triple road trains that never come any further east than Dubbo. There are a lot of principles there that are common but there will be variations at the margin. There will be some things that will be an issue for one group and will not be an issue for another. That is something we need to get a better handle on.

Membership of the project management teams also includes the research community, behavioural scientists, ergonomic specialists, occupational health and safety specialists, medical advisers. We are in constant touch with people such as Worksafe Australia, Monash University Research Centre, and the Federal Office of Road Safety. We are trying to include every possible person known that has something to contribute in terms of managing the fatigue problems. Because we believe they all have something to contribute and we want to gain as much ownership as possible. What we are saying is we developed a conceptual approach here, what we do not know enough about is the detail and it needs fleshing out. An analogy I could use is a bit like the Emperors Clothes. Everybody has seen them but you sit down and try and describe them. It is a fairly difficult process, it is an interactive process and it will take time. Also needs to gain confidence of people involved in this particular research that what we are trying to do is a meaningful outcome. We are not throwing the baby out with the bath water. One observation I would like to make in support of the approach we have taken here is

certainly to my knowledge this is the first legislative approach that uses the results of research as performance parameters rather than just determining some unilateral mean average for everybody to comply with. So the package can vary at the margin. The legislation does not dictate the elements, what it dictates is the performance outcomes and as more research comes to hand that can be included in the program. One of the unfortunate outcomes of the process of law is that interpretations subverts intent. That is why it is critical in the introduction of legislation in the future that you have the policy objective incorporated into the head of power at the beginning of the piece of legislation to aid and assist the judiciary when they are interpreting the statutes within that legislation and being able to link the literal interpretation to the policy objective. Otherwise what happens over a period of time is that interpretation is subverted off with the literal English meaning and often loses the intent.

In terms of pilot outputs - I will quickly run through these. Pilot programs will produce the following outputs; fatigue management, principles and standards; project communications and marketing plan; screening of management system for sleep disorders; pilot program evaluation report - goes without saying - report on the benefits of operating under an FMP. People have to make wise business decisions here. They are not going to leap into something unless we conclusively demonstrate what the value added is in going into the process. FMP accreditation standards and conditions; accreditation agreement document; and the Fatigue Management Program accreditation policy and implementation plan. The evaluation will be conducted by a third party process. We are currently drawing up the evaluation standard in co-operation particularly with Worksafe and FORS who have been quite supportive and we will be putting that third party process out to tender. That has not yet been determined as we have not submitted the tender yet. Because one of the most important features of this program is that we are going to have to gain community support. They need to be confident what we are doing is not abrogating our responsibility.

What does a plan look like? Our working model is shown on this slide and you can see we have identified five major categories; scheduling and

rostering; driver characteristics; workplace conditions; time at work; employer driver relationships. This is not something we just plucked out of the air because we were sitting in a back room somewhere having a chat with a few people around a table. We have taken both the top down and the bottom up approach and there have been a substantial number of people included in the brainstorming activities to come up with these results. And they included all of the people that I mentioned before. Management requirements again include the application accreditation processes; the fatigue management requirements; accreditation requirements. The fatigue management systems - they are to include measuring, monitoring, documenting fatigue factors. What are the reporting procedures - preventative and remedial policies, procedures and measures. One anecdotal thing I can comment here is one of the lessons learned for instance is having a policy in place for the driver if he believes he is fatigued. What does he do? Most of them believe they must drive on because if they stop they will be sacked. Whereas the better companies have a policy in place to say if you believe you are at risk, you stop, you ring this number and these remedial actions are put in place. Many drivers say if I am fatigued I have absolutely no idea what I am supposed to do. So I presume or assume I simply have to push on. That policy being in place alone will probably assist to a great extent.

Then you have the accreditation requirements. Management of compliance and non-compliance. Within the company organisation what are you going to do when someone within your organisation steps outside their authority or does not meet their responsibilities in terms of managing fatigue. We are not going to come in and do it for you. Because under the FMP process, what we are going to specify is the performance outcomes. All the "hows" are up to you. We are not going to tell you how to manage your company. You best know how to do that. Education and training; we have been quite surprised through the seminar and workshop processes what little understanding there is amongst many of the real issues in this fatigue problem. I think there was probably an unfortunate assumption by us that most people out there know what the issues are. I would suggest there are many who do not. External audits; on road audits; tenure and deterrents; I won't go into all the details of this because I will overstep my time. I am just giving

---

you a snapshot today of what this program includes.

Just plucking one of those out; driver characteristics. You notice on the left hand side of the slide fatigue contributing factors; second dot point driver characteristics; as an example this is what this might look like when the Fatigue Management Program comes into play. The health of the driver is a known contributing factor to fatigue and its effective management is critical if the driver is to operate a vehicle safely on the road. An effective health management system must screen such factors as medical history; sleep disorders; diet; alcohol and drug abuse; and lifestyle to identify if drivers are at risk, especially in regard to preventing and combating the onset and effects of fatigue. The operator must have a documented policy and procedure that demonstrates a health screening and management system to combat the onset of fatigue and include those factors. What we are saying here is we want to treat the source not the symptom. We really are kidding ourselves if we think we are ever going to put enough enforcement presence on the road to detect the drug problem in the field. The analogy I use is a bit like a cat in a mouse plague. Once you have one under each foot and one in your gob what do you do now? They are rushing past you and there is absolutely nothing you can do. That is really what the dilemma that is faced by the enforcement authorities; we simply do not have enough of a presence to put on the road. So we have to start getting smarter about what we are doing and start treating causes and not symptoms. We do not want to dictate the "hows". We are not going to be prescriptive about that. Implement and operate the RTF driver health management program. We do not see any reason why the RTF health management program cannot be used as a reasonably good guide. But we will not mandate if the RTF might like me to say that I suppose, but what we are saying is that we are not in the business of prescription. We certainly will give advice. These are the places you should go; this is where you will get the best advice but we are not going to mandate it.

The sleep disorders screening and management support program is in place. The critical word in there is support. We certainly have detected in the field that there is a great level of concern amongst drivers that if they are detected with a sleep disorder they are definitely going to be out of a job. It has

been quite encouraging to see some of the fleets being so pro-active in doing the screening process and demonstrating how supportive they are when these particular disorders are detected. And education and information material regarding fatigue contributing factors is made available to drivers to make sure they are educated about these issues. As you can see on that slide, the health standards we recognise must have an effective health management system. It is hoped that the sleep disorders screening and management system we developed would be adopted by industry to meet the standard. We rely on our research fraternity to give us the performance parameters for that particular program and it might encourage operators to apply the driver medical standards developed by the NRTC.

Just in closing I would just like to say that as you can see we are working our way through a fairly comprehensive program that we believe is a viable alternative and an enhanced and improved alternative to managing the fatigue problem in the industry. I would agree with Bob Pearson earlier on too, we know fatigue is a great issue. I do not think it matters a lot whether it is 32%, 38% or 41%. We know it is a substantial issue and that we need to treat it with effective counter measures. What we are now doing through this program is shifting the accountability to the owner so it is in the owner's interest to meet their responsibility and we will then allow them to step outside the mathematical model and operate within their own business environment and be competitive. There is no reason why they should not be allowed that flexibility if they are prepared to step up a level and be measured against a performance outcome rather than a process.

---

# DISCUSSION: I AM A TRUCK DRIVER WITH SLEEP APNOEA

**L. Cree**

President, Sleep Apnoea Research Association

with **G. Hillyer and H. Hillyer**

**MR FAULKES (STAYSAFE):** I would like to resume now for this afternoon's session. This morning tended to be a session which pointed in a number of different directions and raised quite a number of issues. This afternoon's session is hopefully designed towards starting to promote some idea of the solutions which may be apparent.

We have an interview which is going to be conducted by Laurie Cree with a couple where there is sleep apnoea in that particular relationship. Laurie Cree is going to be interviewing Gordon and Heather Hillyer. Gordon is a truck driver with sleep apnoea. Laurie's particular objective overall is to promote an awareness of the issues associated with sleep apnoea in the community. His objective today is to promote an awareness of some of the marital and family issues that arise with sleep apnoea patients.

**LAURIE CREE**, President, Sleep Apnoea Research Association Incorporated.

**GORDON HILLYER**, Truck driver with sleep apnoea and **HEATHER HILLYER**.

**MR CREE:** Gordon, first of all consider the situation in which you found yourself before you were treated. Perhaps we might start by considering a typical day from the day that you got up?

**MR HILLYER:** For the last twenty years, I

suppose, I would rise at 5.30, ring my employer and see if I had a job for the day. If I never had nothing I would read the morning paper and at 6.30 I would be asleep again. Then I might move to the couch, go out during the day with the wife for a couple of hours, do a bit of shopping, have a sleep at lunchtime. I would have a sleep in the afternoon - never done much around the house. In the evening I would watch the evening news, sleep until maybe 10.00, watch the late news and then sleep until 5.30 the next morning. Without any trouble I could sleep 18 hours a day and I was always tired, always heavy.

I would go my local doctor I had been going to for 20 years and I would say "Listen here, I'm tired." "You're too fat." Well, I had to get a second opinion on that! That was the case. He never diagnosed it. I have always been tired and fat. But now I have had a go at this machine I have been on now for 18 months and it is magnificent. I am up on the balls of my feet - I haven't lost any weight but I feel good. It is just a funny thing. It is just a day, like, that's all I can say.

**MR CREE:** Let's go back - you were saying that if you did not have any work you did particular things, now what if you did have work? What about the situation when you were actually driving?

**MR HILLYER:** I would go to work and I work in the Sutherland Shire all the time. But prior to that if I worked in the City, like I have got a couple of trucks, and if I work in the City I could be driving

along Grand Parade at Brighton and just go to sleep. Only that the island was there, or I would change lanes and a horn would blow, and I would be back into it again.

My brother always refers to this, on one occasion he was at the window seat and another fellow working with us was in the middle. I am driving, I had gone through a few gears and I got into, say, the middle of the gear box and "Lizard", the bloke in the middle, gave my brother a nudge and said "He's asleep". He said "Don't nudge me, nudge him, he's driving". My brother tells everyone about that. I said "I'm alright" you know, when I come too, but that was that. I am not a long distance driver - I only work say 7.00 a.m. to 4.00 p.m. of a daytime, I drive a large truck.

Sleep apnoea - I just thought it was being fat and tired but I haven't had it since I have been on this machine. I am a firm believer. If anyone wanted to know about it they would come to my place and I would give them a test run, that's how confident I am. To the truck drivers or anyone I say to people - I even say it to my G.P. who I have had a row with, over it. He said to me about fixing something, I said "Yea, I'm getting this fixed first" because I was at the clinic, I said "When we cure the sleeping problem, I'll let you have another go but 'til then.." He said "Oh."

I said to him "Anyone who comes into your surgery, you want them to talk about it, come around to my place, I'll give them a dry run on it." Because I think the machine has made my life grouse ever since.

**MR CREE:** Very good. If you found yourself in this situation where you were sleepy, did you make any comment at all to your employers? Did you make any reference about this?

**MR HILLYER:** No, I used to get my work done because I was employed on the basis I was a subcontractor and if I didn't do the work, the money wasn't there, so I always seemed to get through the work. It was a lot of manual work.

**MRS HILLYER:** It was a struggle.

**MR HILLYER:** It was a struggle - I seemed to get through. Now I don't do as much manual work, I just drive a truck basically, but it was all hand load

then but I have got a machine and I use that as well now, not for sickness reason but for the ease of making your life more pleasant to work.

**MR CREE:** Indeed. Heather, just to turn to you for a moment, would you like to describe what it was like to live with somebody who fell asleep at the wheel while driving?

**MRS HILLYER:** Oh, it was dreadful, it was really bad. I mean, I had got to the stage where I would drive everywhere. I wouldn't let him even get behind the wheel if we were in the car, you know. I was frightened, I was, I didn't like him driving. I just didn't know when he was going to fall asleep and I would be forever looking at him to see whether he was awake or not, so it is frightening living with somebody with that complaint, most definitely.

**MR CREE:** Any other comments, other than his driving, in terms of living with someone with sleep apnoea?

**MRS HILLYER:** Oh yes, I mean even the kids had noticed it. Like they would go in to see dad and dad would be sitting there watching telly and they would come back and say "dad's asleep." If they want to ask him something - I mean, to the whole family, overall, it has just made one big difference. He is more aware of the fact too, aren't you?

**MR HILLYER:** Yes.

**MRS HILLYER:** It has just made everybody happier.

**MR HILLYER:** Communicating.

**MRS HILLYER:** Well, that's right, the communication and everything, it is just 100% to what it was before.

**MR CREE:** What happened then Gordon, that led you to go and seek treatment?

**MR HILLYER:** Well, I had been seeking treatment for 20 years. Heather and I would walk to the doctor and he just kept on saying "You're too fat." I would go out and she would say "I think there is more wrong with you." One time he sent me to have some sort of test, a heart test or a stress



test, whatever, and the bloke said "Jump on this machine". He said "Your recovery rate is fabulous." He said "You've run out of puff now" but then said "You haven't got any major heart problems" he said "I would go and see this bloke at Prince Alfred or Camperdown Sleep Clinic. I went and seen him and it was four or five months before I could even get into anywhere.

But when they found out that I had it as bad as I had it, I was working on the following Monday and I got a 'phone call in the truck and the bloke says "Could you come to the clinic again?" I said "Listen, I've four months to get there." He said "No, we have got a vacancy on Thursday evening." I said "Heather, you ring up and find out what this bloke wants, will you."

**MRS HILLYER:** It was fatal, really it was fatal.

**MR HILLYER:** He said "And don't come out of there without a machine." She says "Oh, its going to cost us so much." I said "Don't worry." I walked in there and the bloke said to me, it was a male nurse, a doctor or a technician or somebody putting this machinery on me, he said "Mate, you're wasting your time if you're not positive." He said "You've got to get in and get this machine on and use it" and I haven't had it off since.

Like, if I go out, just a little sneak go, if I'm going out on Saturday night, if I worked on Saturday and I am going to have a little lay down before I go, I would put it on. Its like giving yourself a charge. I could play all night then when I've got it. If I am going out to play up I will certainly put it on to give myself a charge.

**MR CREE:** Now, you said that it had made a big difference as far as your driving is concerned, would you like to comment further on that?

**MR HILLYER:** I have always thought that I was a good driver but someone disagrees. I have been a truck driver for years and I think I am going alright now. Like I am with it, I am not half asleep at the lights. You could pull up at the lights and just sort of get a bit of a doze up, you might see a car move away beside you, then you are right again. I reckon I am 100 per cent.

Sleep-wise, I used to sleep 18 hours, now I can sleep five and I am up at 3.00 a.m. and 4.00 a.m. in

the morning playing with the computer or something. It is like putting a battery charger on, I think. If I go to bed at 11.00 p.m., by 3.00 a.m. or 4.00 a.m. I'm looking to get out of bed, not looking for more bed. I had always been like it but now I am just outside doing things. I don't do much work but I get a bit of enjoyment.

**MR CREE:** Heather, would you like to comment on how soon you noticed an improvement after Gordon got on to the machine?

**MRS HILLYER:** I noticed it the next morning. The night that he actually went to Hornsby Sleep Clinic, the second time, and he had the machine on I noticed it the next morning when I picked him up. Because normally if we got in the car he would be asleep within 15 minutes and he actually stayed awake from Hornsby to Como which was what, a good one hour and a half. Yes, I noticed a big difference that following morning so it was really instant, wasn't it?

**MR CREE:** As soon as that?

**MR HILLYER:** As soon as I had the machine on.

**MRS HILLYER:** It was the following morning, yes.

**MR CREE:** Gordon, let's face it, you could be regarded as a lethal weapon before you were treated?

**MR HILLYER:** I wouldn't have said it then but I will now. I was in my own world and I thought I was alright. I could still get eight hours work done in eight hours but they might have been a sluggish eight hours. Now, I still do my eight hours but not as much. I suppose you would describe it as a lethal weapon but I had got away with it for all those years. Some of these chaps mustn't be getting away with it who are causing accidents. I can see it. Anyone who even half thinks they have got it ought to go and get it tested, that's the only thing I can see.

I've got my own consultation room in the hotel. People come up and ask me questions about it. They keep asking too, they say "So and so, he's got that sleeping complaint, can you tell him about it?" And I don't charge either.

**MR CREE:** Heather, what advice do you have for wives of truck drivers or any commercial drivers who might have sleep apnoea?

**MRS HILLYER:** Well, I would recommend the treatment to anybody. I really would, I think it is the best thing. You know, I used to get so upset with our local G.P. because they weren't aware of it. I would recommend it to anybody, well and truly, 100% all the way.

**MR CREE:** Do you have any concluding remarks then, Gordon?

**MR HILLYER:** Well, I'm over the moon. Like, I don't know about this Committee of people talking and all that but the machine, and how much good its done for me - well, Professor Sullivan, he's my hero. I give him a build up wherever I go, you know what I mean? That's all I can say. If anyone has sort of got it, get it looked at quick because its nothing to put the mask on of an evening and take it off and you feel terrific. Like, you would wake up in the morning like you want to do something instead of being tired from the start of the day, that's how I would work it out.

**MR CREE:** Ladies and gentlemen, in conclusion, the organisation that I represent, as I mentioned earlier, is very concerned with the whole concept of awareness and perhaps this interview might indicate why we are so dedicated to that particular cause of making people aware of sleep apnoea and its consequences.

People may not know, and I can comment as a physiologist, that it has links with such things as diabetes, gastric reflux, nocturnal asthma and the immune system. They are some of the things that are known about. Its links with other things may not be known because there is still much research to be done in the area but the message that Heather and Gordon have is certainly very, very clear in terms of sleep apnoea and the potential of the machine to make such a difference to people's lives. Thank you.

---

# MEASURING PRODUCTIVITY FROM IMPROVEMENTS IN SLEEP APNOEA

**G. Egger**

Clinical Lecturer, Faculty of Medicine, University of Newcastle and  
Director, Centre for Health Promotion and Research, Sydney

**ABSTRACT:** The evidence on whether sleep apnoea per se, is a health risk, is controversial. However, there is little doubt that the consequences of sleep apnoea are a risk to health and well-being as well as to overall productivity and quality of life. One of the primary outcomes of apnoea is daytime hypersomnia, which increases the risk of injury at the workplace. For those involved in the transport industry of course, this can be fatal. Additionally, the hypersomnic, or daytime sleepiness effects, reduce the sufferer's ability to carry out physical movement which in turn reduces aerobic, or "work" capacity. Studies which have been carried out dealing with the major causes, as well as symptoms of sleep apnoea and other lifestyle problems, have shown improvements in sickness absences, workplace moral and ultimately productivity. These suggest an economic value in dealing with the problems at the primary and secondary prevention levels in the workplace rather than counting on care at the tertiary level.

I do not claim to be an expert on sleep disorders, I have written texts on health promotion and I come to this talk from that aspect but I am not an expert on sleep disorders or sleep apnoea. But because of my interest in body fatness and fitness it is a natural progression to that.

This is probably the worst session of the day, especially to talk to a sleep apnoea clinic or a sleep disorder clinic, two minutes after lunch, the perennial slumber. I would ask you if you would not mind standing up for a minute, get the blood circulating, have a good stretch above your head. That will give me more prospect of keeping you aware over the next half an hour or however.

I will also say I will depart a little bit from formality in that if you wish to ask questions at any stage along the way, please do so.

This is a difficult topic to talk about - productivity gains from improvements in sleep apnoea - because not a lot has been written about it. In fact, in the whole area of health promotion in industry from 1980 to 1991 there were 24 papers in the scientific literature, most of which showed positive benefits

from a range of health promotion programs instituted at the workplace but some of these studies were pretty poorly conducted. Because of the difficulties you have in working at the workplace, of course, it is difficult to get a large controlled sample; it is difficult to have a double blind study as is normally required in a typical scientific study; and it is difficult to get costs in relation to benefits which is what everybody is interested to know.

Since 1991 to 1993 there has now been another 24 studies published and these are much better and are giving us a much closer picture on the benefits of general programs in the workplace but of those not one of them that I can see has specifically addressed the issue of sleep apnoea and productivity increases and/or productivity changes and that. So I am going to have to confine myself to looking a little bit at the theory behind it, what sort of productivity levels may be increased going through the evidence on those, and then also may be finally talking a little about the program that I am involved in at the end, the Gutbuster program, in relation to productivity changes and some of the benefits theoretically, if not practically.

If I could have the first overhead? When we look at the cycle that leads to sleep apnoea it is a very closed circle in a way. We start somewhere on that circle and wind up with sleep apnoea but the next stage, as we have heard this morning and it is interesting to me to hear the papers this morning that there was no question about the fact that sleep apnoea and fatigue are very closely related, and yet with the people that I talk to in the general community there is a big distinction between fatigue and sleep apnoea. I am sure, as our previous panel here demonstrated, a lot of people who have the problem are not aware that the fatigue that they suffer during the day is due to the sleep apnoea at night. In fact, many of them think because they are heavy snorers that they are good sleepers. It is typical for snorers to think that they are very good sleepers.

Fatigue is an obvious bi-product and first one in the cycle. The second one, of course, is the excessive daytime sleepiness and that then has the natural progression to lead to a decrease in productivity. I will come back to that in just a minute but I want to go on from there to the next stage in the circle that I have got there, the decrease in activity that is possible. Again it was very clear from the previous speaker the effects that not being able to sleep at night had had on him during the daytime. The fatigue that means that you are not able to be physically active.

When we talk about the aerobic capacity we are really talking about physical work capacity. We are not talking about, as many people think, the ability to stand up in an aerobics class with a pretty young girl in front jumping up and down to music. That has got nothing to do with aerobic fitness. It may be one way of achieving it but another way of achieving it is just through physical activity in the normal day to day situation. I will come back to that at some later point because we have got to get away from this notion of physical fitness and lack of fatness being associated with vigorous type activity. We have a slogan in Gutbusters that you don't have to bust a gut to lose a gut. In fact, if you do you are not busting a gut because you are working anaerobically and you are not burning fat.

That is the first stage in the process that is the decrease in physical activity. As I say I will come back and look at just what that does in a minute.

That then leads to this decrease in aerobic capacity which is work capacity. Work capacity these days is measured in metabolic units. We talk about a person having a physical capacity of three or four metabolic units which means that they are able to output three to four times the amount of energy that they are at rest, basically. Somebody who is very fit has aerobic capacity of may be ten or twelve metabolic units which means that you can do twelve times as much under exertion as you can at rest. That is again important for the total capacity there.

This then can often lead to as we see with men in particular, a form of overeating or, in fact, not overeating but comfort eating or improper eating. I call comfort eating, eating of fatty foods in practise because it is not really over eating that leads to the next stage which is fatness, it is improper eating. We know that it is very easy to eat a diet high in high fat foods which are nine calories per gram, but it is very difficult to overeat from high carbohydrate and high fibre food which are only four and a half calories per gram. On the other hand you do not get the comfort from high carbohydrate foods that you do from fat.

We have learnt right from childhood that fatty foods are a source of comfort because when we get into trouble or when we have an injury or something we are always given a sweet which is generally a fatty sweet to comfort us and that is the way that we solve that comfort.

There is a vicious circle that goes on within here too and that is stress. Nobody this morning, I think, has actually mentioned the stress effects on apnoea. Stress both effects body fatness and is affected by fatness. If you are stressed we know that some people who are stressed - not everybody but some people, particularly people who are restrained eaters - tend to overeat when they stressed. Other people tend to under-eat when they are stressed. Of course, once you carry that extra fatness - and I am talking particularly here about abdominal fatness - it then becomes a source of stress which ultimately can exacerbate the apnoea there and around we go in the vicious circle again.

If I could have the next overhead to look at the effects on that physical work capacity. A very simple explanation is this, if you have got a lot aerobic work capacity - it is like having a small

petrol tank basically - but within that small petrol tank you have got a certain amount of petrol that is required for your daily living. The extra there, the energy reserve that you have is not very much because most of what you are using is taken up for your daily living. Again that was quite noticeable with the previous speaker.

If you develop that aerobic capacity through some form of activity, some form of exercise, and that exercise can only happen if you are not tired enough to do it during the day, then you develop a bigger tank, you have still got the daily requirement in there, but you have got a much bigger energy reserve in there. This is the reason why athletes can go out and train all day and party all night. It is not just their youth, it is the extra capacity that they are carrying. That is most important because it leads back and feeds back to that apnoea cycle that we were talking about before.

I was really interested to hear of some of Gordon Hillyer's symptoms. It struck me as fascinating that he said that he was not unfit or he did not seem to be unfit when he was having the sleep apnoea problems which is quite in cycle because fitness and fatness are not necessarily related. He also said that on the CPAP machines he did not actually lose weight but it has helped him feel much better during the day. He is much more active and he would be able to develop this aerobic capacity as a result of his increased activity. He feels now as if he is able to do things during the day that he was not able to do before. He said his productivity level actually increased and his sleep decreased, that the amount of sleep required was decreased.

If we look at that productivity level and how it may be increased it might give us a bit of insight into what we might be able to measure.

When we measure productivity, particularly in relation to health programs, there is a very limited number of ways of doing it. One is the direct measures that we use and they are things like sickness absenteeism, injury rates that we heard a lot about this morning, productivity which is quite difficult to measure and then, of course, for those of you who are in the transport industry the big factor is the bottom line and the dollars at the bottom line.

I can not tell you how many dollars you are going to

save as a result of a sleep apnoea reduction program. What I can tell you is that of the 48 studies that have been published in health in the workplace initiatives all of them have shown cost benefits to a degree of about one and ten. You are saving between about \$2 for every dollar that you spend up to \$10 for every dollar you spend as a result of instituting some sort of program in the workplace.

The indirect measures here are, of course, workplace morale and motivation which you can only measure through things like questionnaires although it is something that you could generally pick up in the ether as well. Health and fitness, of course, and I will come back to talk a little bit about that. Then, of course, your apnoea risk factors, things like sleep, body fatness and I come back to this abdominal fatness because we know now that it is not whether you are fat that is important but it is where you are fat.

We know that men store fat around the abdomen, that the fat cells around the abdomen are rather smaller than the fat cells that women store around their hips and buttocks and they are much more lipolytic which actually means that they give up their fat into the blood stream much more readily and, therefore, become more dangerous because, like mud in a hose, they can then clog up that hose and put pressure back on the heart and cause problems there.

We know that abdominal fatness is also associated with snoring and with sleep apnoea, possibly due to the increase of fatness on the tongue itself. We are now also beginning to think that not only abdominal fatness but what is known as visceral fat, that is, the fat around the organs of the trunk, particularly the kidneys, liver and the stomach itself, and so on.

It is probably even more important in terms of health risks than fatness on the stomach although fatness on the stomach is a good predictor of visceral fat. I do not know whether the work has actually been done yet but I would hypothesise that visceral fat is probably also highly related to sleep apnoea and may be another risk factor that we just have not looked at yet. But it could be associated with that proportion of the population that has sleep apnoea that are not over-fat. I keep saying over-fatness rather than overweight and I stress that

because we are really not talking about weight in this area.

A couple of speakers this morning referred to the measure of BMI - body mass index - which is a measure of weight over height. If you put Mal Meninga on a scale, a stadiometer, he would have a body mass index of about 35 or 40 which would put him into the very obese category. As you know, Mal Meninga is not very obese. In fact, he has a body fat level down around five or six per cent. So weight is not a good measure of fatness in men and not even a good measure in women but it is a better measure in women than it is in men. So we are talking about fat distribution rather than overall fatness.

We can also look at stress levels, at lifestyle factors and, of course the biological factors that are involved in sleep apnoea that are not associated with these other lifestyle factors.

When we look at the research that has been done, and as I say there is not a lot of it and it is difficult to pinpoint and we look at the evidence for improvements in productivity through improvements in sleep apnoea or sleep apnoea risk factors. That is basically what we have got down to is looking at the sleep apnoea risk factors until such time as we get results such as the Queensland study that was mentioned this morning. Another one that I am about to be involved in with a trucking company in South Australia at the moment looking at changes in some of these levels as a result of changes in abdominal fatness through the introduction of the Gutbuster program to truck drivers.

If we look at things like absenteeism we know that there is a major decrease in absenteeism as a result of decrease in body fatness. I will come back to that in a minute and point to a study that has just been carried out in America.

We know as we heard this morning - there is no need for me to go into this in detail - that we get changes in injury rates as a result of improvements in sleep apnoea. Let us put it the other way around, we theoretically, we hypothesise that we would get improvements in injury rates. We do not have that good evidence at this stage that that occurs.

Productivity is a much more difficult one to measure and it depends on just what you are doing,

whether you are making widgets or whether you are driving trucks from Sydney to Brisbane. I am not sure just how we would measure that in the transport industry. Certainly there are ways of doing it and there are ways that we could build into it. Then, of course, the bottom line, the actual dollar value. There is some evidence of that from the studies that I have reported.

The indirect measures are morale and motivation and finally changes in health and fitness and we have got good evidence for that. So the two ticks there (indicating on slide) suggests that there is good evidence for changes in these. The one tick - that we have got some evidence. The no tick - the evidence is not all that convincing at this stage.

Of course, those of you who are in industry who are looking at these two things here, as I say I can not tell you exactly how much you are going to save by introducing this type of program in terms of your bottom line. All I can say is that it is going to have impacts on these other things.

This is a study that was carried out, recently reported at the American Sports Medicine Society Conference on absenteeism as a result of body fatness which is one of the major risk factors for sleep apnoea. If we look at obese men and women where that is defined as more than 25% body fat in men and more than 30% body fat in women, we find that the sickness absences over a six month period are about between 40% and 100% extra to that of lean people here. And about 50% greater than non obese who are in the category of 15% to 25% body fat in men or 20% to 30% body fat in women. This is roughly regarded as the average for men and women, percentage body fats here. If we take lean men, less than 15%, and lean women, then that is the bench mark for this here (indicating on slide).

Overall, the conclusion is that obese adults are absent from work due to reported illness between 40% and 100% more than their lean counterparts. Over-fat adults are absent 20 to 50 times more. Again the indications are that if we were to reduce body fatness in those groups then we would have an impact on productivity.

What can we do then to improve those risk factors? What are some techniques for improving productivity by reducing sleep apnoea? There are

the symptom based approaches and we have heard some of these this morning, the breathing devices in particular. We have not heard much about surgery or drugs but there are other techniques coping with the symptoms and the CAP machine is obviously working extremely well in doing that.

We have got the cause based approaches too and nobody has done this very effectively as yet except in some of these lifestyle management programs where they are more general in industry. But in terms of body fat reduction, I will put an asterisk on there because that is the area of interest that I have and which I will talk about a little bit in a minute.

Stress management programs, fitness programs are all cause based. They are dealing with the problem. It would seem to be that the obvious thing to do is to combine these with these. Whilst you are using a CAP machine it seems appropriate to also try and do something about if it is body fatness to do something about that body fatness whilst you have got the energy to do it as a result of using the machine based techniques.

The program that I am involved with is dealing with this proportion of the population that is regarded as overweight or obese. I said that body mass index is not a good measure. We all go on this figure of 49% men and 34% women in Australia who are overweight or obese. That is increasing by about 1% per year and has done since 1980.

Any health promotion initiatives as has occurred in America to try and set a reduction of that obesity level over the next 10 years, the American Health and Welfare Association actually set a target for the year 2000 to reduce the level of obesity by something like 10 per cent. They have now discarded that totally because they realise that they are going to be flat out stopping it going up rather than dropping it.

If we take the body mass index we have got about one half of men and a third of women and that in itself is an interesting revelation because the general perception is that there are more women than men over-fat, probably because of that impetus that women's magazines have put on the problem for women.

When we take waist to hip ratio on the other hand

men stay pretty much the same. There is about 42% there. This incidentally in lower socioeconomic groups goes up to about 75 per cent. In Newcastle, the Hunter Valley region, the proportion of men who have a high waist to hip ratio in the "at risk" level which would predispose them to things like sleep apnoea, is about 75 per cent. Women drop down on the other hand. Women are protected, particularly in the early years, by their lower body fat and by their hormones so that the fat that they store is not dangerous. It is there to get them through the nine months of pregnancy.

After they hit menopause, of course, nature does not care much about them any more and they start to become more like men and they put on upper body fat just like a man. Again that is an area that I do not think has been widely researched as yet but, certainly looking at post menopausal women in terms of the development of sleep apnoea post menopausal would be an interesting little study to do.

That is the extent of the audience, if you like, that is available there to do something about, particularly when we are talking about body fatness as a risk factor.

I pointed out before that it is not if you are fat but where you are fat that is important. We talk about the fatness shapes in terms of fruit shapes. It is the apple shaped man who is most at risk. Surprisingly he does not have to be very big to be at risk and to be at risk also of sleep disorders as a result of that increase in abdominal fat. It is the guy with the skinny little legs and the skinny little arms and the pot belly over his stomach that you see down at the TAB on Saturday afternoons who is the one at most risk.

This type here (indicating on slide), the gynecoid shape is more characteristic of women, that is the pear shape. You get some men who are like that, you get some women who are like this. Predominantly though it is men who are like this and women who are like this. Then, of course, you get the ovoid shape which is shaped like the box that the apple and pear came in. That is more characteristic of the genetically obese. If you have got someone like this you generally know that the problem is going to be harder to work with. These people, these environmentally induced fatness

people are much easier to work with to get that extra fat off.

This will show you the risk factors. This is from an article that I did for a medical journal last year or the year before, I think it was, looking at the degree of risk for a whole range of different factors according to body shape. If it goes from this shape here which is the high body mass index, high waist to hip ratio - waist to hip ratio is the measurement of waist over hips. Then that person there is the one who is most at risk. That is the big person with the big belly.

The second most at risk is the small person with the big belly and this is the one that you are not really familiar with. This is a characteristic that you quite often see in the transport industry. Then we have got the big pear shaped person, the small pear shaped person and then, of course, the small overall person.

Just to finish up, if I could just have the next slide. The program that I have been involved in developing over the last two or three years, the gutbuster program is aimed substantially at men. The other thing that Ian said slightly incorrectly when he introduced me was that this was a gutbuster weight loss program, it is not. In fact, we do not let men weigh themselves, we only measure them. It is a gutbuster waist loss program. They measure themselves around the stomach, they are given a paper tape to measure with. They are not allowed to get on scales or they are advised not to - they always will but they are advised not to.

We can get a 1% loss of that gut per week in the average man. Because the fat cells in a man are smaller and more lipolytic they actually give up that fat much more readily. This fat that a man carries around on his belly is really a spare packet of sandwiches to help him get through the bad times. Whereas the fat that a woman carries around on her hips and buttocks is there to help her get through the nine months of pregnancy if times get tough.

The spare packet of sandwiches is used up very quickly and for a man to get rid of that it is quite easy once he knows how. The problem in Australia is that most men are ignorant of how to do that. They need the knowledge - they do not need cajoling, they need the knowledge. Once they have

got the motivation and they get the knowledge they can do that quite effectively.

The program that I have been involved in has had some 7,000 men through it just this year. We get an average of a 7% cent drop in their gut in the first five weeks of the program. We have now evaluated two groups over two years: one group over two years and one group over one year. We have found that about 80% of them keep off some reduction over that one year period.

As a result of interest in the trucking industry we have now developed it into a portable program that can be listened to in trucks. It is actually done by correspondence and it is done with tapes that the guys listen to in the trucks. That is being evaluated with a trucking company in South Australia at the moment and I will know, hopefully within 12 months' time if they come back to talk again, a little bit more about that.



Just to sum up, I guess, we know intuitively that changes in the risk factors associated with sleep apnoea are going to increase work productivity but it is difficult for us to put a figure on that. We know also that when we broaden the scope and we look at lifestyle related health changes which would include changes in some of the risk factors for sleep apnoea, we can start to put a figure on it of between \$2 to \$10 for every dollar spent in return. There are benefits in the long term economically as well as the altruistic benefits that you would gain and the other decreases in risk factors that may be associated with sleep apnoea.

### *QUESTION*

**HELEN BEARPARK (UNIVERSITY OF SYDNEY):** I am interested in the epidemiology of sleep apnoea and its relationship to weight. We have been particularly looking at BMI but I realise you do not do that. I notice in some of these figures you have suggested that the prevalence of overweight and obesity in the Australian male population is something like 47%. Have you any idea what it is in a truck drivers population in Australia?

**MR EGGER:** No, we actually re-analysed the Heart Foundation figures last year at Newcastle—and we have just published those this year—looking at waist to hip ratio in the overall Australian population. The closest we can get is socioeconomic levels, as I say. If we take Newcastle as a area of low socioeconomic groupings, it is about 75% in males in the Newcastle region. If you associated the truck drivers with that category of people you could probably say it is about three out of four would have abdominal obesity.

# SLEEPSAFE - A PACKAGE FOR SCREENING DRIVERS

**E. Ellis**

Consultant to Sleep Disorder Centre Australia Pty Limited

**ABSTRACT:** Road safety is clearly an issue of national significance in a country such as Australia. For safe roads, there is a clear need to identify individuals with problems of vigilance due to sleepiness. Two previous national seminars on road safety have demonstrated this conclusively. Public awareness of the problem is so great that ignorance of the problem is no longer a valid defence. There is no longer a need to recognise the problem - the need is for practical ways of managing the problem. The following proposal for company screening is based on the belief that human resources in a company are very precious and that protection of public and personnel is a high priority. The second major assumption is that there is a link between sleepiness and safety, diminished productivity and impaired performance. This assumption is supported by clear evidence of increased number of accidents generally and, of particular significance, accidents on the road during critical sleep phases of the day. This proposal is based on the identification of risk to work safety by specific symptoms of excessive daytime sleepiness and specific signs and symptoms of various causes of excessive daytime sleepiness including Obstructive Sleep Apnoea (OSA). The following proposal describes a partnership arrangement between the employer, employee and the Sleep Disorder Centre. The aim of this proposal is to offer a staged screening process by which companies can enhance employee awareness of the problems of excessive sleepiness and OSA, and have employees directed to appropriate treatment for any abnormal conditions identified. The ultimate goal is to improve productivity and maximise safety by identifying and managing specific aspect of job performance and road safety. **STAGE 1:** Company awareness through company newsletters/brochures to every employee. Focuses on the association between sleepiness and accidents, causes of sleepiness, challenges to the company and individuals, the need for screening and the process to be gone through. **STAGE 2:** Designed to screen widely across a company, both existing employees and for a company to be able to assess new employees, to establish a sleep/health profile among the employees. The purpose of this stage is to identify employees who have a high incidence of sleepiness, a high risk of OSA and to establish patterns of work safety. The main methods used in this stage would be a confidential questionnaire regarding health, work and sleep patterns. **STAGE 3:** The purpose of this stage is to diagnose the cause of the sleepiness and to explore possible solutions. Individual employees will be informed of their risk and the recommended course of action. **STAGE 4:** 6-12 months after initial survey the company group should be resurveyed to evaluate the effectiveness of intervention.

Road safety is clearly an issue of national significance in a country such as Australia. There is a very strong public expectation which hangs as a doubled edged sword over both the health care and the commercial transport industries. There is clearly an expectation of a high standard of road safety and also an expectation of a high standard of performance from companies in this industry, when companies have to operate against great odds, both geographically and commercially.

These two issues need not be conflicting. If the health and welfare of individual employees are protected, it is very likely there will be both a high standard of road safety and a high standard of work performance. For road safety, there is a need to identify individuals who have problems of vigilance due to sleepiness. Two previous national seminars on road safety have demonstrated this conclusively and evidence today, I believe, goes a long way towards supporting that

statement. I believe the science is there; the moral obligation is there; the legal responsibility is there and now it is time for the action to be there. The consequences of ignoring the problem are not just confined to the interests of the company. In a study in Great Britain it was found that if the driver fell asleep and actually had an accident they died in approximately 87% of the cases. The deaths of the individuals and the implications that that has on the family, of course, are enormous. But apart from deaths, there is the ongoing costs of disability that can be associated with drivers who have accidents and injuries as a result of those. In addition, for every driver who goes to the grave, 4.2 innocent victims go as well and this has implications and costs for the whole community. Clearly there are losses to the company quite apart from the loss of skilled and trusted employees but equipment, bad publicity and on it goes. The potential cost of litigation must act as a motivation even to the toughest of company directors. Accidents due to sleepiness are preventable events and someone is responsible. Public awareness of the problem, particularly through the efforts of the groups like SARA (Sleep Apnoea Research Association), is now so great that the defense of ignorance of the problem is no longer valid. I believe that there is no longer a need to try and recognise the problem and certainly not with this audience here today. But there is now need of practical ways of managing the problem.

A practical step to enhance standards that people take voluntarily is going to be a lot better for the industry than having to have legislative controls put on the industry. The SleepSafe proposal for company screening is based on the following premises. First is, that companies believe that the human resources of their company are very precious and that protection of the public and personnel is a very high priority and not just because it is a legal requirement. The second major premise is that there is a link between sleepiness and diminished productivity and worker safety for which I believe there has been considerable evidence provided today. This is also supported by the evidence of increased numbers of accidents generally and of particular significance, accidents on the road. In addition, it has been well established that single vehicle truck accidents fatal to the driver occurred during the critical sleep phases of the day. The final assumption on which this proposal is based is that sleepiness can be detected by the reporting of symptoms. Specific symptoms can be used for screening and identifying those employees who should

go on to more detailed investigations. There is now a significant volume of evidence that supports this use. The best predictors are loud snoring, sometimes the patient is observed choking, they fall asleep while they are driving and it has been well established the more severe the symptoms the more sensitive the screen is.

It should be kept in perspective that there is more than one cause of excessive daytime sleepiness which Dr Grunstein reviewed this morning. Insufficient sleep can affect all of us. Obstructive sleep apnoea accounts for about 43% of excessive daytime sleepiness. There is of course narcolepsy, the periodic leg movements in sleep which was mentioned this morning; various medications; medical illness and sleep schedule disturbances; all of which will be taken into consideration in this survey. There is also more than one cause of medical accidents; fits, epilepsy, heart attacks, fainting and episodes of transient ischaemia in the brain. Although these caused fewer serious accidents than the other causes. I would just like to point out that obstructive sleep apnoea is mentioned in the previous slide and has been spoken about throughout today, is not only a risk to employee safety due to its effect on daytime performance but obstructive sleep apnoea is also a risk to the individual's health. There is a very high association between obstructive sleep apnoea and cardio-vascular disease, both hypertension, coronary artery disease and carotid artery disease which of course can lead on to heart attacks and transient ischaemia attacks. These then increase the risk of other medical causes of accidents. The consequences of sleepiness for road safety are so great that according to the legal opinion provided during the previous seminar of Ian Callinan QC that an employer has the right to insist upon, and an employee is not entitled to decline, participation in appropriate screening. Of course the Workplace Health and Safety Act provides that employers must ensure the health and safety of employees. They must maintain systems of work to achieve that end. So the following proposal is based on the assumption that the company's responsibility is to identify the problem and to make it known to the individual employees.

In this case, the case of obstructive sleep apnoea, we see the individual employees responsibility to take the action to remedy their own health problem once that problem has been identified for them. This SleepSafe proposal describes a partnership arrangement, an agreement between the employer, the employee and the sleep disorder centres providing screening process.

And each partner having clear responsibilities in the arrangement and the payment or costing of that proposal then is based on those responsibilities. The company pays for what it is responsible for and the individual pays for what he or she is responsible for. Who is screened within a company depends on the individual companies and their decision as to whom this is important. It may be seen that sleepiness or lack of vigilance in their board members is as critical to the safe and successful operation of the company as it is for the drivers. It maybe for example that maintenance operators are important people to have screened. So the extent of the screening throughout the company is of course up to the company.

This proposal, like many of the initiatives that have been suggested today, is innovative and as such we expect to continue to develop the proposal with insight gained from its implementation. However, we believe that each aspect of the proposal has a very sound basis and considerable internal validity. The aim of the proposal is to provide a staged screening process by which companies can enhance the awareness of the problem throughout their company, screen all their employees and then have their employees directed to appropriate treatment in order to improve productivity and to enhance safety. The first stage is the stage of developing company awareness and this would be through either brochures to every employee or through company newsletters or it could include in-service presentations if required. This awareness program would concentrate on the association between sleepiness and accidents, various causes of sleepiness, its challenges to the company and the individual employees in terms of their protection of their own health and safety and the safety of the general public, the need for screening and the processes that are to come in this program. This would be seen to be the 'softening up' part of the program to get people ready for the stages to come. Stage 2 would involve widespread screening across the company but which could be available to both existing employees and also the company to assess new employees and pre-employment screening. This would enable the company to establish a sleep health profile amongst employees. The purpose of this stage is to identify employees who have a high incidence of sleepiness and a high risk of obstructive sleep apnoea. The main method used in this stage would be a questionnaire with very specific questions on health, work and sleep patterns. We have chosen to limit this to a fairly compact two pages with language chosen that is very

specific to the lay person and able to be comprehended easily and readily by all workers and not too loaded with medical jargon and this has already been tested by us for comprehension. It also includes a partner report to try and enhance the accuracy of the reporting of symptoms. The questionnaire would be packaged by us for distribution to the employees. However, if the company chose, the distribution of that could remain the responsibility of the company in order to protect the privacy of individual employees until such times as they volunteer their responses back.

The questionnaire will be looking at both factors to do with the functional impact of sleepiness; it will include self and partner reported breathing disturbances and look at factors that influence driver impairment and the extent to which driving is impaired. It will also include demographic information such as age and sex, body mass index, neck circumference and the incidence of hypertension, apart from other medical diseases as well. But by using a questionnaire initially, employees in widespread locations and with varied shifts and rosters can be readily accessed. It may be possible and desirable for a company to link this kind of screen to existing health screens and other fatigue management programs that the company may be currently employing. The company should require all employees to complete the questionnaire and they can facilitate the return of the responses to the Sleep Disorder Centre group. Clearly there are two major issues that need to be considered when looking at questionnaires and the first is the ability of the employee to complete the questionnaires and their readiness to complete them accurately and truthfully which may appear to threaten their job security.

With regard to the first issue of their ability - and we are talking about problems where English may not be their first language or where literacy may not be very high - the questionnaire could be completed with the assistance of their own family doctor or a company doctor or occupational health officers. Alternatively the company may choose to have the information gathered by structured interview. That is, we could go in and discuss with the employees and gather the information more directly. The second more important issue is the issue of the readiness of employees to truthfully complete and report symptoms of excessive sleepiness and our strategy for this is to make sure that it is clear that the responses will remain confidential and that the questionnaire is identified by code and not by name and only the Sleep

Disorder Centres researchers such as myself will have that code. We are hoping that confidentiality will increase the accuracy of the responses and the return rates. The individual results with appropriate recommendations will only be made known to the employee or to the doctor or their doctor if they so choose. On receipt of the individual's results the responsibility will then be with the individual employees to discuss these recommendations with their local physician for them to ascertain their fitness to work and to seek out the appropriate investigations and treatment. The decision regarding fitness to work and return to work will remain with the individual's physicians. At this point in time, at the end of this stage, the company will receive a report on the return rates and the analysis of the company risk with regards to the sleep profile.

Stage 3 is a stage which I referred to as the differential diagnosis stage. The purpose of this stage is to diagnose the cause of sleepiness and explore possible solutions. Estimates of risk to classifying people into the two different risk groups will be made on both the symptoms of excessive daytime sleepiness, the impact on daytime performance and certain demographic characteristics as well as the specific signs and symptoms that would indicate Obstructive Sleep Apnoea. Males and females are scored slightly differently because of the different ways it presents in the two sexes. The 'at risk' group will be provided with their estimate of risk; information regarding assessment and treatment; information regarding availability of overnight sleep studies and they should be instructed to discuss this with their GP or the company doctors. Assessment of sleep disorders would involve a consultation with a sleep physician who they are referred to by their local doctor, and an overnight sleep study which would involve the measurement of sleep and the measurement of breathing. Depending on the location of the trucking base, the overnight studies could be done in a metropolitan sleep centre, or alternatively, Sleep Disorder Centres can arrange for a remote monitoring site to be established near the company for the convenience of the employees. That is, they could send out for a period of time, the equipment and all the expertise that would be required to have sleep studies done in a regional centre or close by to the trucking company. This group would be offered treatment as appropriate and I know we have talked about a number of treatment strategies including weight loss, modification of drinking pattern and continuous positive air-

way pressure. Just to note at this point that the CPAP machines are portable and are able to be tucked into a truck and able to be used for long distance trucking hauls for people who travel for extended periods of time. Just going back to the second group, the minimal risk group would simply be provided advice on healthy sleep patterns and road safety. Although Stage 3 will predominantly be the responsibility of the employees to seek out assessment and to seek out a treatment for Obstructive Sleep Apnoea or whatever other sleep disorder that may be identified, the company could provide them with appropriate sick leave provisions for the sleep studies and treatment implementation. The final stage of this process would be an evaluative stage where the company would be re-surveyed approximately 6-12 months after the initial survey to assess the effectiveness of the intervention and the company would then be provided with a follow-up report at the end of that period on the healthy profile of their company.

In preparing this proposal I had a considerable amount of assistance and I would just like to acknowledge the assistance that was provided for me and thank you again for the opportunity to present this proposal, which I see as an exciting new innovation: to offer a systematic screen for the commercial transport industry in Australia. Australia has led the way in many ways in the assessment and treatment of Obstructive Sleep Apnoea and hopefully this will provide us with another way of keeping us one step ahead of the rest of the world. I would like to thank you again and wish you all a safe sleep

## QUESTIONS

**MS DALLAS FELL (ROADS AND TRAFFIC AUTHORITY OF NSW):** I was wondering if you could tell us what sort of validation has been done on the screening in terms of once you get through to a proper sleep study, how it compares and also what measures of effectiveness are being used in the evaluation.

**DR ELLIS:** The SleepSafe proposal with the set of questions we have selected has not itself been tested but each of the items has been selected, based on a very thorough analysis of other validation processes that have occurred and present themselves in the literature. So there is not a single item that a person would not be scored on that has not already been demonstrated to have a high correlation with

obstructive sleep apnoea and/or validated for its internal validity as far as detecting symptoms of excessive daytime sleepiness. But of course I suppose why I put the proviso in is that we are looking forward to the implementation of this and there may even be minor modifications done after the initial implementation of this. That, I think, was only one part of your question.

**MS FELL:** The second part was about what you would be evaluating.

**DR ELLIS:** We would be using a similar tool as we had gone in with in the first instance but adding some questions about the rate of people taking up the opportunity to have sleep studies; whether or not they had taken up the treatment and their compliance with that treatment and the effectiveness of it as they perceived it.

**MS VICKY YANGOYAN (MOBIL):** How much does your overnight study cost, and how much does your overall program cost?

**DR ELLIS:** The costs are shared variously. The company would be paying for the awareness part and the screening part of the program. That is what we believe is their responsibility: making the employees aware of the problem and offering a screen, and then the costs of the overnight study are borne by the individual for which there is a Medicare rebate and then the health funds also rebate part of that as well too and the maximum out of pocket expense for any individual on the current market is approximately \$100 for the individual for the overnight sleep studies. That does not mean if we set up a remote site there may be added costs in terms of a remote site set up in Broken Hill or somewhere like that; the final details of the costing would have to be worked out depending on what extras are added in.

**MR JOHN CASEY:** What do you see as the problem? The testing is fine. How do you see dealing with the problem where you do these remote studies and you go out in the country and you have someone who is on \$20,000 a year, he has got two children and it costs him \$100 for the test but the machine costs him \$1,700 and he cannot afford to buy the machine?

**DR ELLIS:** There is a system of payment through Payment of Aids to Disabled Persons where the government is currently supporting the purchase and hiring of sleep apnoea equipment for those persons

who cannot afford to purchase it outright.

**MR CASEY:** Is that just New South Wales or Federal?

**DR ELLIS:** I understood the Payment of Aids to Disabled Persons to be a commonwealth initiative but I do know for a fact that it applies here in New South Wales.

**MS ROXAYNE WEST (F.J. WALKER FOODS):** I was interested in the approximate cost to the company from its awareness of the screening and also you talked about weight loss, the other gentleman talked about fat loss. There is a bit of a difference here. Where do we go - do we start with busting the gut or ---?

**DR ELLIS:** I think that Garry Egger's programs have had a significant amount of success and weight loss programs generally do not have a very good record of success so we would probably be trying to direct the individual to a program that does have some significant success rates or more so than the average. With regards to the cost to the company, we have done an early estimate of costs and we, based on a company size of approximately 100 employees, we calculated to come out at approximately \$50.00 per head.

**MR PETER CLARKE:** On the question of costs, the Commonwealth Health Insurance Act specifically precludes the payment of benefits for things that are work-related. Have you addressed this question with the commonwealth because you made the statement patients would be rebatable but I think that is a contentious and interesting question but if you have had it clarified I think it would be very useful for us all to know.

**DR ELLIS:** We are operating on an assumption that this condition is not work induced, that it is not like tenosynovitis or something that is directly caused by their work conditions. There certainly is a high association between this particular industry but as you have evidenced today there is a very high incidence in pilots as well too and other industries. If we believe that it was the industry, if working in this industry had caused the problem, we would be expecting the company to pay the entire costs but we are not going on that assumption. We are going on the assumption that it is a general medical health problem that people happen to have in this industry and therefore it is quite

---

reasonable to expect that to be paid.

**MR LES PATTERSON:** I am a public accountant and very conscious of costs. I would suggest to any employer here that if they have an employee with sleep apnoea, they buy the machine and don't think twice about it. It is cost effective to buy the machine yourself for an employee. I have done it for my employees and I found I have earned my money back many times over.

**DR ELLIS:** I would not quibble with that. We are just not setting it up as that being the basis.

**MR PATTERSON:** You may not be setting it up on that basis, that is my practical experience; that is the way to go.

**DR EGGER:** We find that with the program with the men, we always do better if they pay something and it is not all paid by the company because it increases their motivation to do well on it.

---

# INSURING FOR SLEEP DISORDERS

**J. Bennett**

Manager (Workers' Compensation), Australian European Insurance Pty Limited

**ABSTRACT:** This paper deals with problems associated with insurance matters involving driver sleep disorders and the way they may be overcome. It is my experience that the "Insurance Industry" generally is totally ignorant of the term sleep apnoea and indeed the possible relationship if any between sleep apnoea and fatigue, whether it be related to transport drivers or any other vocation. Most states and territories have Occupational Health and Safety Acts in place and in general terms both employer and employee are charged with the responsibilities for the health and safety of themselves, other employees and other persons with whom they come into contact in their work environment. If an accident were to occur in the workplace and following investigation it was found the employer and/or employee were negligent, both of these parties could receive financial fines. Ian Callinan QC covered this scenario in his paper to the Sleep Disorder Seminar in Queensland on 4 November 1993 and left no doubt that both employer and employee could be liable to fines for not maintaining safe work practices. That being, the employer should put into place a screening process for drivers, which obviously would cover medical examination prior to employment and possibly also at a later date. The employee also has a duty of care to inform the employer if that person had any infirmity which affected that person's ability to perform the job or task in safety to him or herself and others in that environment. All states and territories have a "NO FAULT" system, therefore if an employee is injured, whether it be due to the effects of sleep apnoea or any other circumstance the employer is going to be the loser. Many claims that are being made on employers are a recurrence of an old injury that has not been detected by the new employer. In most cases the employer has not requested the applicant to complete an employment application or if they have the form only asks questions relating to name, address, age, licence details and driving record. It is absolutely a must that every applicant complete a detailed application form and complete a medical examination. The employer should then check the validity of answers with previous employers particularly in relation to workers compensation matters. There are two main factors that come under the heading of Employers' Assets and Liability which are (a) Owners Vehicle/Rig Cover; and (b) Third Party Liability. As with most major fleet insurers they request a driver questionnaire be completed and submitted to the insurer prior to the acceptance of the driver under the policy. The insurer has the right to decline any driver they feel will be a risk to the policy. Most of the questionnaires leave a lot to be desired when assessing a person's ability to safely control a vehicle. Some insurers don't touch on the subject. The Duty of Disclosure under the Insurance Contracts Act 1984 states that you must disclose to the insurer every matter that you know, or could reasonably be expected to know, that is relevant to their decision whether or not to accept the risk of insurance. If you fail to comply, the insurer could deny liability in respect of a claim or indeed terminate the contract entirely. As time goes on and public awareness increases, the more inclined courts will be to say that an employer of drivers, either knows or should know about sleep apnoea, which certainly could give reason for an insurer to test the water in the Courts if they want to avoid payment of a claim.

A couple of weeks ago I spoke to George Weber and said this is a pretty difficult sort of a subject to talk on, on the insurance side of things, and I found it a bit abstract. George said "Well, Ian Callinan found the same situation." Having read Ian Callinan's address in November I can understand it,

and certainly I would recommend that you read his address, it is an excellent report.<sup>3</sup>One thing that I

---

See: Callinan, I. (1993). Legal issues: Sleep apnoea and road safety. In: R.I.E. Lake (Ed.).



would like to start with is that it is my experience the insurance industry generally is totally ignorant of the term 'sleep apnoea', and indeed the possible relationship, if any, between sleep apnoea in fatigue whether it be related to transport drivers or any other vocation.

A few people I have spoken to here today have voiced some comment relating to it mainly being related to transport drivers today. I feel that it really covers the whole of industry and office procedures. It is a major problem in my opinion and it is one that really needs to be addressed by all areas of industry.

I also have noticed with some dismay that there are no insurance people here other than myself. Maybe they might have been a little bit frightened to come, I do not know, but I think it is very indicative in some ways with the comment I made just earlier that they are totally ignorant of the subject and I hope it does not get me into too much strife with my colleagues but I do think it is very poor of their non attendance. There is another major conference on in Sydney at the moment which does cover some of the areas of risk management but that is no excuse for them not being here.

Another point that I would like to raise is that in the prior speakers I have not noticed, probably with the exception of Elizabeth, that anybody has mentioned the word "insurance." Even in the consultative area these people have been talking about involving this person, that person and this organisation and that organisation but not once have I heard the word "insurance" mentioned whether they be involved in consultative areas or otherwise.

I do not know whether you have asked anybody whether they know what sleep apnoea is about. I often ask people if they know what the words "sleep apnoea" means and pretty well everybody sits there absolutely dumbfounded and they are waiting for you to tell them what it is. That is a big problem that needs to be addressed also.

---

*Falling asleep at the wheel: Proceedings of a seminar on sleep disorders and road safety . Report RUB 93-1. pp.24-36. Brisbane, Qld.: Queensland Transport.*

From my point of view I tend to think that the problem could be just as practically related to machine operators in factories when you are looking at potential accidents and, as I said before, in offices in relation to work efficiency.

The results of any accidents whether they be on the roads or in factories or in offices are just catastrophic to all parties, particularly, I guess, employers because they are the ones that cop it in the pocket more so than probably most other people. I would suspect many of us have encountered situations where drowsiness has almost resulted in an accident either in the office or in another place.

I had a classic example of what I consider to be a reverse of sleep apnoea the other week. Some of the experts here today may dispute this but I think the point is relevant. I was extremely tired, I had been attending a few conferences and seminars and had not slept for a while. I never take sleeping tablets - I try to avoid them like the plague even pain killers. My wife said "Take these two tablets and you will get a good night's sleep." Dr Wright had made some comment on the radio about them and she thought "Oh, well, these must be pretty good."

I seemed to get a pretty good night's sleep and woke up at normal time, about 5.00 o'clock in the morning, got to the office about 9.00 o'clock and to say I felt rotten was an under-statement. I walked into the factory to send a fax to somebody about 9.00 o'clock and almost fell straight into the bench and for the rest of the day I was really off the air. That seemed to me to be a complete reverse of having a sleep apnoea but you get the same result which could be an absolute disaster. That was something that was brought home to me very closely.

### *Occupational Health and Safety*

The first subject that I really want to cover, aside from that little preamble, is occupational health and safety. Most States and territories now have an Occupational Health and Safety Act in place, and in general terms both employer and employee are charged with responsibilities for the health and safety of themselves, other persons, workers and workers with whom they come into contact in their work environment.

It would, therefore, follow that if an accident were to occur in a given workplace and following investigation it would found the employer and/or employee were negligent, both of these parties could receive substantial fines.

Ian Callinan Q.C. covered this scenario very well in his paper to the Sleep Disorder Seminar in Queensland on 4 November 1993 and left no doubt that both employer and employee could be liable to fines for not maintaining safe work practices. That being, the employer should put into place a screening process for drivers which obviously would cover medical examination prior to employment and possibly also at a later date if the employer felt it necessary for safety. The employee also has a duty of care to inform the employer if that person had any infirmity which affected that person's ability to perform the work or task in safety to himself or herself and others in that environment.

Many of you may be aware that the various authorities responsible for administering this Act are on the move and some substantial fines are being imposed on employers and employees who are not providing safe work places. I must say, there are also many circumstances where the authorities have waived fines where it was not felt the circumstances warranted such action.

Many of you may also be aware of the case in the Victorian Supreme Court recently where a company was convicted of a manslaughter under the Crimes Act following the death of an employee when the truck driven by the employee overturned on a steep gradient.

In this case the truck had faulty brakes and despite the fact that the company was in liquidation, the Court imposed a fine of \$120,000 to reflect "normal sentencing principles" and to have a general deterring effect to other companies who did not regard safety as a high priority.

The supervisor who, I think, was also a director of the company - so I am told, I am not 100% sure on that - involved had a manslaughter charge withdrawn but was fined \$10,000 for breach of the Occupational Health and Safety Act. Now that could apply to any employees or officers of the company if they are deemed under virtually any of the State or Territory Occupational Health and

Safety Acts.

All employers and employees should be aware of this Act and make every effort to conform, otherwise one can expect to be hit very hard in the pocket.

### *Workers' Compensation*

All States and Territories have a "No Fault" system, therefore if an employee is injured, whether it be due to effects of sleep apnoea or any other circumstance the employer is going to be the loser.

This, of course, does not infer in any way that the employee will not be a loser. In N.S.W., for instance, the cost of claims on an employer premium can be quite dramatic, particularly if you have a payroll in excess of, say, \$1,000,000. One workers' compensation claim that say cost \$50,000 on a wage roll of \$1,000,000 you could be looking at double the premium you pay on workers' compensation, particularly if you are in the trucking industry where the rate per cent on the wages is fairly high.

Many claims that are being made on employers are a recurrence of an old injury that has not been detected by the new employer. I must say I come across this situation more times than I can count when reviewing client's claims.

In most cases the employer has not requested the applicant to complete an employment application or, if they have, the form only asks the questions relating to name, address, age, licence details and driving record. My experience is that most employers are very trusting and very rarely check the authenticity of the answers given. I could give you a couple of classic cases of that. It may sound a little bit like I am talking in generalities and that is correct when we are talking about an accident or sleep apnoea but I am sure most of you people can relate sleep apnoea to put it into another situation.

We had sometime ago a fairly substantial transport company in the south west which dismissed an employee, luckily he had not had an accident, but he then made a claim for a back injury. Our client had not bothered to really check out the previous history of this worker. It was found that the worker had made a back injury claim for some \$60,000. It may have been that he may have had a sleep apnoea

problem and had an accident as a result of that which the previous employer may have known about, but the new employer never bothered to ring the previous employer to find out whether what this guy had written down was correct or not. As it turned out the employee had put down that he had no previous claims or anything else, so it is a major problem.

Even if the application form has questions relating to previous injuries, claims made or any infirmity that could impair the safe use of a vehicle the answers are rarely checked. Hopefully, at this point you may recall my comments on occupational health and safety because they dovetail in together. If an employee has an accident and the employer was aware that they had that sleep apnoea problem, then all hell is going to break loose as far as the assets and those sorts of things are concerned.

It is an absolute must that every applicant complete a detailed application form and complete a medical examination. The application details should be provided for at least five years. The employer should then check the validity of all the answers with all previous employers, particularly relating to workers' compensation claims and related matters and also, if possible, the medical history - that can be a bit difficult, I understand.

If there is any doubt as to the fitness of the applicant assess your potential liabilities before you employ. I would not think the privacy laws would be such a major problem.

There can be difficulties, I guess, too when you are trying to assess a situation of whether a driver should have a licence or not. I had a particular glaring example of this with my own family where my mother does not drive very well, in our opinion, and she was having some major problems running into gutters and all sorts of things and making up excuses for the reasons why that was happening.

I spoke to the Roads and Traffic Authority and they said "Look, there is nothing we can do about it, talk to the police." I spoke to the police and said "What can you guys do about it?" They said "Well, we can't do anything unless you want to make an official complaint" which we did not think was the right way to go. All we wanted them to do was to just really track her and find out, you know, if she

made an error, well pull her over and scare the daylights out of her. Now we find she has been given a driver's licence for another three years, or the application has gone out for another three years. In my opinion she should have medical and this is all what comes about with what we have been talking about today.

It is absolutely vital that some sort of legislation be put in place to establish whether there is a problem with somebody if the industries are not going to regulate themselves. They are starting to do that but I think it has got to be a two way sword.

It is interesting to note only two months ago the New South Wales Industrial Relations Commission made an important ruling on the responsibility of prospective employees to provide details of past workers' compensation claims to employers in the selection process.

A worker was dismissed for providing misleading information on prior claims after having made a claim for a back injury with a new employer. Commissioner Patterson, refusing reinstatement, said the employer was entitled to the information. How else may the employer properly observe his full obligations in providing a safe place and a safe system of work? It was subsequently found that the worker had been successful with claims on three different employers between 1986 and 1991 for \$17,500, \$7,000 and an undisclosed amount all of which were for back and arm related injuries.

Again I come back to the point - this could be related to a sleep apnoea situation on the road. Just because I am talking about a particular thing - I do not have any great information on accidents that are caused by sleep apnoea. You hear about fatigue accidents and people running off the road, you have got to put these sort of contexts into that area.

I have no doubt this scenario will become the rule across all employment and one more reason why employers must effect proper employment procedures.

### *Employers' Assets and Liability*

There are two main factors that come under this heading, (a) owner's vehicle or rig cover and (b) third party liability.

As with most of the major fleet insurers they request a driver questionnaire be completed and submitted to the insurer prior to the acceptance of the driver under the policy and each subsequent year the policy is renewed.

The insurers have the right to decline issue or to even quote for the fleet and most certainly any driver they feel will be a risk to the policy. This could even occur mid term of the policy. So if you have a driver who has had an accident it is quite possible the insurance company could say "We are not going to insure that driver any more." Again you have got a problem to get him off the driving fleet.

My personal opinion is that most of the questionnaires I have seen leave a lot to be desired when assessing a person's ability to safely control a motor vehicle, particularly in the general area of physical or medical defects (if I can use those terms.) Impairment or affliction which could or may impair efficient and safe use of a vehicle. Indeed some insurers do not even touch on the subject. I could show you driver applications that are just mind boggling with their lack of questions, it just beats me, and yet they take on some major fleets.

I mean, it is okay for us trying to get a client's motor fleet placed or something like that where they do not provide the information but I will come to that point a little bit later as well.

Indeed, some insurers do not even touch on the subject. You may think that gets you off the hook. No such luck, insurers are not that stupid even though they are not here today. There is a little clause in the policy called "Duty of Disclosure" and this is in all insurance policies, it is not just relative, although it does not come under the workers' compensation policy, but it certainly comes into the fleet policies, motor vehicle policies, householder's, you name it. The duty of disclosure is in every insurance policy.

The duty of disclosure under the Insurance Contracts Act 1984 states that you must disclose to the insurer every matter that you know, or could reasonably be expected to know, that is relevant to their decision whether to accept the risk of insurance and, if so, on what terms. If you fail to

comply the insurer could deny liability in respect of a claim or indeed terminate the contract entirely.

It has been said that as time goes on and public awareness increases, the more inclined courts will be to say that an employer of drivers either knows or should know about sleep apnoea which certainly could give reason for an insurer to test the water in the courts if they want to avoid payment of a claim.

Insurers up to this time have generally provided cover to the insured if the driver of the vehicle caused damage to that vehicle and third party property, such as other vehicles, buildings, even a train, if the insured was not aware of the driver having an impairment that under normal circumstances allow the vehicle to proceed safely and therefore the insurer had not been made aware of the problem or had not approved it.

What I am saying there is basically if the employer was not aware of a circumstance with a driver having some impairment, whatever it may be, then the insurance company would generally pay the claim for the damage to the vehicle and any third party damage that is done also. It does not mean to say they would not try and contest it, in today's market the insurers will just about contest any claim - it does not matter what it is, they will try and get out of it. That is generally accepted ruling that if the employer is not aware, then they would not be liable but I come back to that other comment that where they should be aware or reasonably should be aware, that leaves the area of doubt and it is becoming a major problem.

To give you two examples:

1. A client had a rig written off in North Queensland and in doing so the driver also demolished a house - luckily there were no occupants in that house at the time. The driver was killed but found to be a great deal over the prescribed limit of alcohol. The company had a written policy that drivers were not to drink whilst driving. I think it was something similar to what the airline policy is. The company was found not to have voided its policy so the insurers covered the company and the insurer paid out the claim for the rig and the third party. The workers' compensation insurer also paid out on the worker that was killed to the dependents although in this particular case

there is some area of doubt as to who are dependents and who are not and how much will get paid accordingly.

That brings us to the point that that is an employer or an operator who has a driver and was not aware of that drinking problem. If they had have been advised that there was a problem with that driver via a 'phone call from somewhere up in North Queensland to say "Hey, we have just seen one of your driver's .." they picked the number off the side of the truck ".. and he is in the pub here, he is pretty stoned out of his mind, what are you going to do about it because he is just about to get in his truck and drive?" If that employer did not do something about it at that point there is every likelihood if the insurance investigation came up with any goods on that and was able to establish it, they would deny liability for the damage to that rig and certainly even probably to the third party damage. You know, the onus really does shoot back again to the employer. There is no risk about that. The other point I wanted to make is:

2. An employee made a workers' compensation claim for a back strain and had two weeks off at the start and then proceeded to work regularly. Occasionally he would request a day to go to Sydney, the company being unaware of the nature of that visit. You can think about that one. During this time the driver had visited doctors and preparing a case for a lump sum settlement. Unbeknown to the employer the matter was settled out of court with the driver receiving some \$48,000 for pain and suffering and loss of use, aside from approximately \$12,000 for other medical costs, et cetera. We became aware of the problem a week prior to the renewal of the workers' compensation policy and established this settlement had taken place in that week. The insurer settled on a mid range percentage loss of use in both arms and neck and also for the driver having to take pain killing tablets for headaches when driving long distances. He was an inter State driver. I rang the client to ask their knowledge of this and they were a little stunned. They commented the driver was currently loading a rig to travel inter State and there did not appear to be any problem. We immediately request they have the driver complete the driver questionnaire which had not been done even though the motor policy was falling due - there was a bit of slackness on a few parts. The driver questionnaire

was completed stating that there were no impairments. My recommendation was that they immediately contact their Association for legal advice and at the minimum take that driver off the road. This was done and subsequently the driver's services were terminated.

The point I am making is that if an accident had occurred the Insurers would have argued on both counts that the company should have known or have reasonably been expected to know of the driver's problem and denied liability. The ramifications would have been enormous.

There are many other case histories that could be provided by changing the nature of the cause to sleep apnoea, but unfortunately we do not have enough time and I could give you a whole series of scenarios.

One particular one that I was mentioning to Dr Elizabeth Ellis earlier was that only last week we had one of our major clients travelling from Wollongong with a prime mover and load to the Northern Territory. We received a call saying that the driver had had an accident, he had run off the road, the truck was demolished and the load was demolished. There was nobody else involved, it was at 12.07 a.m. and they did not really know what the cause was. The driver was found some half an hour, supposedly, after what they thought was the time of the accident.

Our immediate questions were "What was the cause? Did the guy have fatigue? How long had he been driving?" et cetera, et cetera. The client said "Oh Jesus, we had better start to find out, hadn't we?" That is just the very nature of the problem. We do not know whether he had fatigue, whether he was a sleep apnoea problem, whether there was a problem with the road or what but this sort of scenario is happening time and time again. It is something that really has to be addressed, and addressed fairly quickly.

I hope my address has been of assistance in preparing for the changes that must be made in attitudes and approaches by companies towards safety and their assets, whether it be on the roads or on premises. I do not leave out employees there either when I am talking about assets of the company. A big majority of employees are really

the company's assets. Thank you.

**MR LES PATTERSON:** I understand that approximately \$9.6 billion a year is the cost of workers' compensation claims in Australia in the private sector, would that be approximately right?

**MR BENNETT:** It could be around that sort of figure.

**MR PATTERSON:** Most of that is borne by insurance companies, a large part of it.

**MR BENNETT:** Initially, I should say.

**MR PATTERSON:** A person who is suffering from sleep apnoea is twice as accident prone as another person. If you could wipe out sleep apnoea you would wipe out 100 times \$9.6 billion. I do not think it is possible that we can completely wipe out sleep apnoea but if we just get to the edge of it you could save probably \$50 million. You as a broker, or the chap next to me who is a broker or any other brokers who might be in the room, wouldn't it be appropriate for you to approach insurance companies and say "There is a way to save approximately \$50 million. It will cost us an hour of our time to see if these figures are roughly right. It must cost us a week's study to see if they are at all accurate."

Now it is difficult to go to the medical professional to ask them for information because if they give you information which relates to \$500 million and they are wrong, they are going to look like fools. But I can tell you that, and then I can walk away from it. The figures are available for anyone in the insurance industry to look at. The health professionals have not put them together because they are so astounding it is hard to believe they are there but the amount involved is somewhere between \$50 million and \$500 million that can be saved by the insurance companies in one sector alone purely on workers' compensation. If anyone wants the information I can show them the source and they can follow it through themselves --

**MR LES PATTERSON:** My question was, are those figures within your ability to handle? How should we approach a problem like this?

**MR BENNETT:** I guess what I could say is that

there are quite a few that are working towards this particular point. Natroad Limited which is just newly formed which is probably the major long distance road transport association in Australia, they are starting to address this problem and I think in the very, very short future - I mean, they are working on one particular aspect of workers' compensation at the moment - and this is certainly the next one on the insurance front on their agenda.

I have been talking to the chap from Workcover Authority today, Victoria are already starting to look at this particular aspect. I was in Brisbane a couple of weeks ago and they are also very conscious of the problem and I do not think it is going to take too much to get the ball rolling. As you say \$500 million that is probably in the insurance-related costs. There are a hell of a lot more dollars involved in all of the other peripherals that hardly anybody takes into account. Even if an accident occurs on a premises or a truck is written off, the repercussions of that in cost is probably ten fold on what the real cost of the damage may have been to an employee. It is certainly very high on the agenda. I do know for a fact, I have a meeting tomorrow, it is going to be a rather lengthy meeting with one of the major national insurers and we are looking at not so much this particular aspect of sleep apnoea but certainly in looking at the ways and means of being able to establish all sorts of data on a national basis, at least through that insurer in relation to trucking industry and any of our other clients as well. One of the things I have made them aware of is this particular sleep apnoea and fatigue related problem.

**MS CHERYL LYONS:** You mentioned earlier the inadequacy of some questionnaires and applications. Have you see the RTF Team 200 medical questionnaire?

**MR BENNETT:** No.

**MS LYONS:** Then my next question is irrelevant. I was going to ask do you consider it to be adequate as a pre-employment medical questionnaire?

**MR BENNETT:** No, I have not seen that. I was trying to get hold of one actually a couple of weeks ago at the Natroad inaugural conference but I have not got one in my hands. But certainly we would be keen to have a look at it, there is no doubt about

that.

Again, we are acting on behalf of employers and, I guess, in some ways it is an area that we would not directly get involved in although, as I did say, we are very conscious of what is on a driver's questionnaire which is not necessarily the same as an application for employment or a medical, but it basically should cover all of those areas because the employer is just left dramatically exposed and in some case, the employee.

**MS ROBYN OWENS (BURKE'S TRANSPORT):** In a lot of cases, the insurance companies themselves give you the questionnaires for the drivers to fill out. Are you now, in turn, saying that they are not really adequate?

**MR BENNETT:** I hope our ones are to you, Robyn.

**MS OWENS:** That's my point.

**MR BENNETT:** I am not sure who you are insured with but some of the driver's questionnaires that I have seen over the last month that I have collated are just ludicrous, they really are. Some hardly ask a question at all, particularly about the ability to drive the vehicle. They might ask questions about whether they have had previous accidents and that sort of thing but the ability, from the impairment or otherwise, physical or mental aspects - I guess they partly both go together - some of them do not ask the questions at all. They need to be, they certainly need to be.

## OVERHEADS

---

# SCREENING OF TRUCK DRIVERS FOR SLEEP APNOEA IN NEW SOUTH WALES: POTENTIAL ROAD SAFETY BENEFITS

**D. Fell**

Manager (Road User Strategy), Road Safety Bureau  
Roads and Traffic Authority of New South Wales

**ABSTRACT:** Many factors contribute to the occurrence of fatigue road accidents and increased risk of fatigue accidents. These factors include sleep deprivation, time on the task, time of day effects, effects of medications, insomnia and sleep disorders such as sleep apnoea and factors which "unmask" existing fatigue such as monotony. These factors will often interact with each other, making the task of tracing back from accidents to contributing factors a difficult one. There were 683 serious accidents estimated to have involved fatigue in NSW in 1993. The potential safety benefits of introducing screening of truck drivers for sleep apnoea in NSW would apply primarily to accidents involving fatigued male truck drivers in the 40 to 60 year age group. This age group is actually under-represented in fatigue accidents as compared to other drivers, but in 1993 there are estimated to have been 12 serious accidents involving such drivers. Assuming as many as half of the drivers in these 12 accidents had sleep apnoea which was the main contributing factor to the accident, measures which were 100% successful in screening and treating all affected truck drivers for sleep apnoea and the associated sleepiness could have prevented two fatal and four serious injury accidents. Whether these benefits would be realised would depend on the thoroughness and effectiveness of the screen in identifying those at risk of accidents due to apnoea and the effectiveness of treatment in addressing the factors which elevate the risk. This effectiveness of screening remains to be established and effectiveness of treatment needs documentation. Whether the measures would be cost effective would depend, again, on the effectiveness of the measures and also on the cost of screening and treatment and the extent of other, non-road safety benefits.

Good afternoon ladies and gentlemen, I think what I have got to say is quite pertinent to our last discussion about the size of the sleep apnoea problem and how that affects the solutions that we choose. Often in the road safety field people say to me, "how can you criticise a road safety solution? Even if it saves one life, surely that is worthwhile". I think the opposite is true; how can you not critically analyse solutions that are put forward if

you have a limited amount of money? If you use it to save one life and you know you could use it to save 10 then the outcome is you have nine lives on your conscience. I think we need to look carefully at countermeasures which are put forward to see that they are justified by the size of the problem.

The first slide shows three real aspects of the development of a solution. The first is the size of



the problem that you will deal with. The second is what countermeasure you have available and how effective that is likely to be, on the evidence that you have got. And the third but very important factor is the cost of that countermeasure. In looking at this you have to try and see that the size of the problem particularly warrants the cost of the countermeasure you are applying. The solution I am going to be talking about is the screening of heavy truck drivers (it is the trucks that are heavy, not necessarily the drivers) for sleep apnoea and I will be focusing mainly on that first point, the size of the problem.

Slide 2 shows the way we think about sleep apnoea and its relationship with fatigue. I have to apologise to Narelle Haworth at the Monash University Accident Research Centre for blatantly stealing her diagram design. We have all those factors pouring in that create the fatigue which has the potential to elevate the crash risk. So you have things like the time of day, sleep deprivation is an important one, affects of various drugs - legal and illegal - the time you spend on the task and of course sleep disorders, things like insomnia; there is a limitless amount of things pouring into that pot that can make you fatigued. So some things like driving hours for instance can cut across a few of those different areas - you have got your time on the task, you often have sleep deprivation coming into it if you have really excessive hours that cut into your sleep time and you have got your time of day effects, because if you are really on the road for a lot of hours, chances are you have got to cross over into some of those bad times of the day which we have seen in other presentations today. So there are lots of interacting effects happening here with the different factors. Sleep apnoea has the potential to interact with a lot of those other factors as well.

In looking at the size of the sleep apnoea problem, several years ago we got together with the University of Sydney and did a study - with the assistance of the Federal Office of Road Safety - looking at sleep apnoea and its relationship with accidents. We interviewed drivers who had sleep apnoea and asked about their experience of accidents on the road and various other related factors and we also did the same for a control group of people who did not have sleep apnoea. The following slides show the kind of information that was coming out. As a background to this, we had

information from overseas that said that drivers with sleep apnoea had elevated crash risk on the whole. So we were interested to see what happened with drivers in New South Wales. The results of the study, showed that the people with sleep apnoea tended to have a higher risk of accidents due to sleepiness as you can see from slide 3. That is when you ask them, "have you had an accident due to sleepiness", they generally were more likely to say 'yes' than your average driver. Another result that we found was that, as you would expect, they were more likely to fall asleep while they were driving (slide 4). They were also more likely to fall asleep at traffic lights and so on.

When we asked them about the accidents they had had in the previous two years, however, we found that the expected effects did not really show up (slide 5). There could be a number of reasons for this and I think we need to look into this issue a bit more. It did seem that on the whole, the apnoea patients did not have an elevated risk of crashes in the two years prior to the survey. That lack of difference was evident for all severities of accidents.

Another method I used in trying to trace the size of this apnoea problem was to look at our mass crash data base. We have information about road accidents provided to us by the police which form part of a large crash data base which we maintain over the years. We can get a certain amount of information about different types of accidents from that data base. Of course, the police cannot always tell when fatigue is involved in an accident and when it is not. They cannot always trace it. We have developed over the years a set of criteria to help us to identify fatigue accidents. Basically this includes accidents that the police initially identify as involving a driver who was asleep, drowsy or fatigued at the time of the accident and also accidents involving various road manoeuvres which appear to have involved fatigue, for instance where people run off the road without any evident cause, where they were not speeding or there was no other factor involved like an animal on the road. Obviously you are not going to have all the information necessary to make that decision in most cases so a lot of it is conjecture but when we compare the numbers of "fatigue" accidents we get through this process with the numbers identified from in-depth crash studies, the size of the fatigue

accident problem comes out looking pretty similar. So even though this process can't identify specific fatigue accidents we do have a general confidence in the numbers we get from this process.

With that information I will draw your attention to slide number 6. I looked at all serious accidents in New South Wales in 1993 and as you can see, there are over 5,500 of those. When you look at how many of those involved a fatigued driver you get 683. Looking at those fatigued drivers (slide 7) you can separate out the ones that involved fatigued heavy truck drivers. That is 40 accidents, or 6 percent of all fatigue accidents. So tracing down from that 6 percent of fatigue accidents, the larger circle here now (slide 8) represents accidents fatigued heavy truck drivers. If you look at the subset of those that involved male drivers between 40 and 60 who are the ones at major risk of sleep apnoea, you get 30 percent, or 12 serious accidents in New South Wales in 1993 which could have involved sleep apnoea. Then you are left with the decision, did the drivers in these accidents have apnoea or not (slide 9). Obviously you cannot know that. We might conjecture, say, that 50 percent of the drivers in those 12 accidents may have had sleep apnoea which was the main cause of the accident (you have to also make that second assumption - just because a person in a fatigue accident had sleep apnoea doesn't mean this was the cause of their accident. They might have been driving long hours or they could be very fatigued through other causes). If you assume that 50 percent of those 12 accidents involved drivers who had sleep apnoea and the apnoea was the main cause of their fatigue accident (slide 10), then you get, obviously, six serious crashes. So for 1993 that was 2 fatal crashes and 4 serious injury crashes. To prevent those six serious accidents, you have to assume a screening process which effectively selected out those people who had sleep apnoea (slide 11) and following that you would have to have a treatment that you could be sure would effectively treat those people (slide 12). You are not guaranteed even with a screening and treatment program of addressing all of those six serious accidents.

The overall process of deduction is shown in slide 13. When you come down from all serious accidents in New South Wales to the ones which would be effectively screened and effectively treated under a sleep apnoea screening program

which is an unknown number but possibly less than six.

In going through this process I was a bit surprised I must say, by the smallness of these figures, as I am sure some of you here today are, and I think there could be other factors which could help us to consider this issue a bit differently.

If you look at it just in terms of heavy truck accidents (slide 14) those six accidents represent 15 percent of the total number of serious truck driver fatigue accidents, which could be seen as a more significant problem.

Another way of assessing the size of the sleep apnoea road safety problem is by looking at fatigue accidents, to see what extent the group of people who are most susceptible to sleep apnoea are represented in the fatigue accidents on the whole. Slide 15 shows the general accident population; this is not truck drivers, it is drivers in general and you can see how over time people's risk of fatigue accidents drops away. By the time you get to the 40-60 age group, involvement in fatigue accidents is a lot lower than for those younger groups. Fatigue accidents do typically involve more young people. This is partly because they do more driving, but if you control for that, research shows that older people do seem to be involved in less fatigue accidents. The next slide (slide 16) shows the involvement of truck drivers between the ages of 40 and 60 in fatigue accidents as compared with what you would expect from their exposure to long distance driving. The left bar of each pair is the fatigued male truck drivers in accidents, so that is a measure of their accident involvement and I have derived an estimate of exposure to long distance driving from the work of Hensher, Battelino, Gee and Daniels at the University of Sydney. This is the right bar of each pair on the left of the screen, there are less accidents in the 40-60 age group than you would expect given their representation in long distance road transport. That age group is under represented, not over represented in accidents. That is not to say that sleep apnoea is not affecting these people but perhaps that that age group is at a much lower risk of fatigue accidents which is not offset by their higher incidence of sleep apnoea. Going back to solutions (slide 1), you can see that from the accidents statistics we have the approximate size of the problem, so then it is a matter of determining

how effective the screening and treatments are; that you could implement to achieve your solution and what costs they would involve to see if the expenditure can be justified by the size of the problem.

One thing about the size of the problem that I have not brought out so far, is that truck accidents, have a lot more potential for serious injury than other accidents. If trucks have a collision, obviously the mass of the vehicle can cause a devastating scenario. In those two fatal fatigue accidents which may have involved sleep apnoea, there were actually three people killed and there were five people seriously injured from the 4 serious injury accidents. But it need not be that small, over the years it would be likely that some would be more severe. So you need to take that into account when you are costing how much spending on solutions is justified by the problem. If we can get countermeasures and solutions to the problem that are well justified by the size of the problem as we can see it, we will get the most for our road safety dollar. So if we can broaden the road safety solutions out from one small group to a larger group, for instance by effective education to all drivers about sleep apnoea, then we are getting more for our dollar, because we are spending less per person on the countermeasure. Also if we can come up with low cost solutions then that can help to maximise the road safety benefits per dollar, and hence save more lives. And also if we can tap into existing activities we can maximise the road safety benefits of expenditure.

They are the statistics from road safety as we can see them. Obviously there are other issues besides road safety and testing drivers for sleep apnoea such as health and productivity, so obviously the funding pool will increase if we can involve the various groups who have an interest in the area. Thank you for your attention.

### *QUESTIONS*

**MR FAULKS:** I think Ms Fell's paper is quite useful. If I can make one quick observation: I think what we might have run into in your paper was essentially almost a head-on confrontation between the road safety orientation to evaluating whether or not programs should run that is based on a public

health model and on costs and benefits, whereas a lot of the material we have discussed today - and it was a feature of Mr Bennett's paper, was really looking at a different kind of evaluative mechanism such as something to do with industrial risks or the elimination of all avoidable crashes and so on. The evaluative criteria appeared to be slightly different.

**MR ADRIAN DENNY (ROAD TRANSPORT TRAINING BOARD):** I think, as it should be, your statistics have erred on the conservative side starting right back with the police statistics relayed to you and you then made a few assumptions and added some and subtracted some. I have a gut feeling also that you erred conservatively throughout it which is probably what you ought to do. I wonder, starting right back where the police statistics were supplied, whether or not you are able to do any further work there to delve into that deeper covering those areas that a policeman might not think is fatigue but many of us who are in the industry might suspect; I wonder if you have been able to do an unofficial sort of a 'go-seeing' what the other side, the 'not-so-conservative' side or the extreme side, might do; whether that is possible to do?

**MS FELL:** Thanks for the question. Yes we are having a better look at these criteria to make sure the magnitude of them is right. We have got a project planned to interview people in hospitals and we will have the information from their accident coded and we will be able to apply our criteria to say whether we would have coded that accident as a fatigue accident or not a fatigue accident and to check that against what the driver involved has perceived in that accident. Obviously in some cases if it was a fatigue accident they may not know or they may not tell us. But that will help us to validate our criteria somewhat. I do not necessarily agree that this assessment has been so conservative. When we compare these figures to what we find from in-depth studies they come up with a similar number to what you come up with if you call falling asleep accidents and inattention accidents fatigue, so that is stretching it a little as I think some inattention accidents can be through other causes besides fatigue. So I think we have stretched it in some ways towards the higher end of the scale to see what we could possibly effect. Also in conjecturing that half of those fatigue accidents in that age group amongst males were from sleep apnoea and that was

the main cause, I think that is fairly generous as well given that we think about 10 percent of that age group might have sleep apnoea. Although there is the information from the United States which suggests 43 percent of truck drivers may have significant signs of sleep apnoea. I do not think it is really that conservative.

**DR ROBIN CHASE (MEDICAL PRACTITIONER):** I noticed that you and most of the other speakers today - you had that bin with the water falling out of the bottom - and everyone keeps going on about fatigue and sleep apnoea but nobody seems to mention the other things that are associated with fatigue like other medical problems; cardio vascular disease, diabetes, depressive illnesses and the medication that goes with it; there has been some mention of medication. And also I would like you to comment about medical criteria for doctors. I have tried to contact the RTA to get guidelines about how to do a medical test for someone's drivers licence at the age of 75 and it is impossible to get that information. I have made repeated telephone calls and ultimately never ever got any answer as to how I should assess someone.

**MS FELL:** Firstly, I take your point about different medical conditions that can lead to fatigue. The list of inputs is fairly endless as to what can cause fatigue. There are lots of different factors down to monotonous road conditions, the heat of the vehicles, all sorts of things; in fact, the flashing by of trees has been said by some people to be fatiguing; allergies to milk. It is really quite a diverse range of things and it would include some of those medical conditions mentioned. In terms of doing the medical checks I do not know if you have a copy of the NSW Guidelines to Medical Practitioners - you do?

**DR CHASE:** It is not very helpful at all I am afraid.

**MS FELL:** That is very disappointing to hear. I am sure we do have information to help people to assess older drivers. I will see what I can do for you. If anybody else is interested I will take your names and see if I can chase up a contact for you.

**DR RON GRUNSTEIN:** Going back a couple of points; I think there are several things - they are minor points; one is the sleep apnoea. When I went

to a seminar recently where a speaker discussed sleep apnoea and accidents; a group from the United States claimed that they have the statistics from their official sources to say that 37.4 percent of fatal crashes are single vehicle road way departures - only Americans use that terminology. But in 67 percent, two thirds of these cases, no evasive action was taken. My way of looking at it, and I have a problem separating out the fatigue process - I find that your figure of 12 percent of accidents being fatigue related would be low relative to the U.S. extent. So that is the first question. The second question is do you have data on how valid self-reported accidents is in people compared to actual accident data. Because what we found in our studies is self-reporting data does not bear out this accident risk whereas overseas where they had access to accident data shows an increased risk.

**MS FELL:** The first point; those American figures about run off the road accidents sound fairly high. We certainly find higher figures than the ones I showed here when you look at sub-sets of accidents like fatal, rural accidents for instance, when you look at fatal accidents in general they are more likely to be that kind of accident. When you look at truck fatal accidents you get more of that group of accidents involved so you get your higher percentages coming through as you move towards rural areas and as you look at those that involve truck drivers. On the whole, I do not think our figures for single vehicle accidents are that high. Single vehicle accidents often involve other factors too such as alcohol which can interact with sleepiness obviously and also avoiding animals on the road or even speeding; there are a lot of factors that can lead to people leaving the roadway without seeming to swerve, or take evasive action. So that is a bit of a complicated issue, the overlap between fatigue accidents and single vehicle run off the road accidents, it is not a clear relationship.

The second question was - yes, health reports; I agree it would be better to have information direct for their accident reports from licence records and so on. But the interesting thing about our study is that we did find a difference in some categories and not in others. We did find differences in the reported number of accidents due to sleepiness but perhaps it was the small numbers involved in the last two years question that prevented us from getting any result on that information. So it seems as if; if there

was a difference between the two groups and how they were reporting things that should have followed through into the different questions.

**DR GRUNSTEIN:** You do not have from other studies - if you go to the population - how many accidents have you had in the last five years and compare what they report?

**MS FELL:** No, we generally find self-reporting fairly inaccurate but we would expect in different groups such inaccuracies might be similar. In fact, in the reporting of those findings in the study we did point to some reasons why it might have been different for the sleep apnoea people versus the others; perhaps differences in memory effects of not being treated for sleep apnoea and so on, so there could be some differential coming through there but no I do not have information of that sort. We know it is not good. It is nowhere near as good as objective licence data.

**MR MANJIT RANA (FINEMORE):** I had occasion to attend this seminar in Melbourne last year when Dr Dement and Dr Sullivan were present and Dr Dement particularly talked about sleep debt which was more a question of lifestyle habit. If you are a truck driver and start at 5.30 or 6.00 in the morning but you are one of those people who like to have a late night and do not get to bed until 2 o'clock which means you really have not had enough sleep or rest. It is not a question of fatigue or sleep apnoea, it is a question of lack of adequate sleep and different human beings need different number of hours of sleep. Therefore, I think there is a danger in this where you link up sleep apnoea and fatigue with sleep debt. It may well be a lifestyle problem.

**MS FELL:** Yes I think that is a very important point. We need to keep that in perspective. I think a lot of people in our society, just as in the American society, are suffering from sleep debt and it is going to affect their day to day lives and if you are unlucky enough to have the kind of job where minor lapses in concentration can have such dire consequences as in the road transport industry then obviously you have got to be more concerned about that sleep debt.

Recently there was a proposal to have a 14 hour driving day for truck drivers of which you would no doubt be aware plus whatever other tasks could be required such as loading and unloading, not counted in that 14 hours which makes a 9 to midnight driving day, plus whatever else, and that would be five days a week. Under those conditions you are fairly certain to be getting these kinds of sleep debts. I think that is a very important issue for the road transport industry.

## SUMMARY REMARKS

### **D. Robertson**

Chairman, Road Transport Forum  
and Managing Director, Roadmaster Haulage Pty Limited

Thank you for the opportunity to be here today. I feel that it is a historic occasion really because it is an opportunity for us, as an industry, to mix with people such as Parliamentarians and researchers and to talk about some of the problems that we have recognised for sometime.

There are just a couple of little points I would like to make before we start. Unfortunately the medical practitioner who just moved out of the room - I hope it was not because I was going to speak - mentioned about the fact that there are other medical reasons sometimes that cause people to have some fatigue element in their lifestyle. He obviously perhaps was not here with David Stewart spoke this morning because David heads up our Team 200 program—the Road Transport Industry Team 200 program. He heads up our medical side of the program and I can assure you part of that screening process does more than just sleep apnoea. It does talk about diabetes, and other health type problems that could affect us. I think it is important to keep those things in mind. We are conscious as an industry of those things being needed to be addressed.

Sleep apnoea is what your topic has been here today and I am sure that some of us do suffer from it. There is one little thing I noticed in this little brochure which is put out by SARA. It says "Who Gets Sleep Apnoea?" It says "Anyone including babies." I can assure you my 10 month old grand daughter does not seem to have it because she seems to stay awake all the time.

But nevertheless it is something that isn't only evident in our industry but, of course, it is evident in every walk of life. I have been glad to hear that acknowledged here today but nevertheless, I think it is important that we remember that whether you

are a pilot, a train driver, a truck driver, a cab driver or sitting in our friend's public accountant's office, it is possible to suffer with some of these problems.

So it is a society problem - perhaps it is a little bit like drugs. Sometimes I think these problems get directed directly to a particular industry but nevertheless we have to remember that some of these problems are a society problem.

As I said it is a historic occasion for us today because never before have you been able to see, or have we been able to see, the road transport industry addressing a conference such as this. Never before have you seen the road transport industry as serious about its own performance. We are serious about safety and professionalism and as proactive as tackling this issue than perhaps anyone else head on.

Never before have you heard the RTF's own health specialist, David Stewart, stand here and report on what the road transport industry is doing to tackle the hard issues. These are not easy things to come to grips with as an industry but we are prepared to attack them.

Driver fatigue is certainly one of those hard issues and never before have you heard a Government representative tell you about the ground breaking fatigue management, as Gary Mahon has here today, that is jointly being conducted with the road transport industry.

As my colleague from the road transport industry just said that one thing that we do have to consider always is the lifestyle. It is not always the industry that creates the problem, but sometimes it is the lifestyle of the individual because he/she wants to stay up all night, and then go and do their job later

in the day, so I think it important that we remember those things.

This program, as I have said, that the Queensland Government and the industry have conducted, is something that will look at how many hours a driver spends behind the wheel. It is a program to manage fatigue. It would also look at the entire driving environment. We have asked the question "Why?" Because, for once, Governments have the road transport industry involved in the program.

That is one of the things that I am sure you can all agree that there is nothing worse than having rules and regulations imposed on you, whatever industry you are in, that you do not have the opportunity to have the input into.

I am sure accountants here would have loved to have some time spent with the Treasurer when they were working out the last tax lot of rules. It is important, and we appreciate the opportunity to be able to sit down with the law enforcement bodies and work with them to solve some of these problems.

Our expertise has given Governments more of an insight into road transport. We know that there are different truck configurations that operate on different roads. We know that they have different effects on drivers. Some vehicles are easier to drive than others. Some loads are easier to haul than others.

Years of practical experience has shown us that drivers themselves suffer fatigue at different levels and now because road transport has been given an equal partnership in these programs, we are prepared to share that knowledge. That is another milestone, I feel, in this whole process that our industry is going through in endeavouring to be more professional is that we are sharing our knowledge with the specialists who are able to help us solve some of the problems we have had.

Years of practical experience are giving us the ability to have some input. As I have often said, we in the industry certainly get no joy out of seeing one of our vehicles involved in an accident and much worse, going to visit one of our employees in a hospital bed. We are serious about safety.

Because road transport is being given an equal partnership in these programs we are able to, perhaps, even indicate to the law enforcement people the pitfalls that are out there. We know the lurks and the different things that people get up to but the professional side of our industry wants to put all those things to bed.

This program has the benefit of the hands-on knowledge of the road transport operators and this, ladies and gentlemen, is the great breakthrough that we are seeing here today. It is a sharing of information and knowledge. The road transport industry standing up as an equal partner with Government and offering to work our way through some of the issues affecting the drivers and affecting the road transport industry.

The road transport industry, ladies and gentlemen, does not only belong to the people that work in it. It is part of the infrastructure of this great nation of ours and so we need to all work hard to ensure that we have a safe, efficient and professional industry. In the past that has not been the case. For example, the log book system has been an utter failure. The answer to controlling fatigue is much more than checking log books.

I am sure you will agree that none of us can organise our sleep habits by reading it out of a text book. Everyone's metabolism - if that is the correct medical term - is different and we need to have flexibility but we have to have an all embracing set of regulations that allows that flexibility so that fatigue can be managed in a safe and a correct manner.

In 1994 the answers must come from a cooperative projects with the industry. All industries today are asked to do more, not less, and the road transport industry, as you know, is no different. Not only are we being asked to move more freight more efficiently for Australian industry, we are also being asked to do more in the areas of our own responsibility, our own safety and our own professionalism. The road transport industry has answered the call on all these challenges.

As I have said before we are serious about safety and we are serious about professionalism. A multi million dollar project—the Team 200 project which I have just touched on—covering driver health,

vehicle maintenance, company management and driver training proves undoubtedly to you all, our commitment. Team 200 also proves our commitment to working with Government, every Australian Government except, I am sad to say, Victoria and the A.C.T. which have failed to support our project. Another organisation that has supported it is the National Road Transport Commission and we appreciate the contributions that have been made from those governments that have supported us. We also need you here from Governments to take your fair responsibility as well. You might ask the question how?

Driver fatigue is greatly impacted upon by the Australian road system. No-one in this room could say that the road system is not getting better. I suppose those of you who are old as I am, look back and see how much the road system has improved, but at the same time no-one could say in this room that it couldn't be made better and improved in ways that are not going to cost the earth by the re-introduction, perhaps, of schemes such as the black spot program.

The black spots program was brought in after those tragic accidents in northern New South Wales with those coaches and trucks and some of those blackspots have been eliminated but, sad to say, the Federal Government seems to have decided they have spent enough in that area and has failed to continue that program on. I am sure we would all agree that anything that any of us can do as citizens of this nation to encourage Governments or our members of Parliament to get that re-introduced would be a good thing. The black spots program targeted those spots that required a little more care and required the driver to be a little more alert.

By very cost effective methods such as the black spots program Governments can do their bit for driver fatigue too. David Stewart, the Road Transport forum's Team 200 health expert told you how Road Transport is doing its bit and, of course, Team 200 will not make our industry perfect - we acknowledge and know that. However, we have set our goals at the highest standard in areas that we can control, areas where human error and human oversight can be minimised or, perhaps, eradicated altogether.

Areas such as driver health, driver training, vehicle maintenance and company management. Five

thousand drivers, five thousand examples of our commitment to improving our industry are out there on the road right now. I do not think there is anyone in this room today who could say that the Road Transport industry is not more professional today than it was three or four years ago. We are trying and we are going to continue to try and we know, because of the goals that we have in view, that we will reach them and we will make it a more professional and safer industry.

Every company that those drivers work for must have in place a fatigue management program. A fatigue management program which will be monitored and audited. Already we have in place regular driver medicals, a network of sleep disorder clinics throughout Australia and a growing number of doctors. We have currently got more than 140 doctors throughout Australia who are aware of the industry's needs and who can help support drivers in reducing fatigue.

We have also spent considerable time and resources promoting support networks within the industry. It is essential to have a good support network, I am sure you will all agree with that, particularly for people who spend long periods away from home.

Lastly, but certainly not least, we have pioneered drug and alcohol policies for all drivers. Let us face it, at the end of the day, we do not just want drivers to stop taking drugs, we want to stop the need for them to take them. No-one can say that drivers in our industry do not take drugs, they do, but it is a small minority of a small percentage of our industry. Believe me, the industry is serious about tackling this issue. As I have said before it is not only a problem that our industry has, it is a problem that society has.

Of course, as I have said earlier, in tackling any of these issues we need to have partnerships. We are proud to be a partner of Government and we are proud to be part of a large majority of professional operators who wants to see fatigue tackled and tackled in a common sense, realistic way. We put out the hand of friendship; we put out the hand of professionalism to Governments and professionals who work in this area.

To you I say, trust us and work with us because you need our knowledge just as we need your help in



---

making sure that fatigue management is as commonplace in the road transport industry of tomorrow as a log book in the road transport industry of today. Thank you very much.

## APPENDIX A

### EDITED TRANSCRIPTS OF THE MAIN PRESENTERS TO THE NATIONAL SEMINAR ON SLEEP DISORDERS & ROAD SAFETY, 29 APRIL, 1993.

The main speakers were: Professor Colin Sullivan, Professor William Dement, Ms Helen Bearpark, Dr Narelle Haworth, Dr Phillip Swann. The transcript was prepared by the National Road Transport Commission following the seminar held on 29 April, 1993. Copies of overheads or slides are not included.

**Professor COLIN SULLIVAN**, Director of the Sleep Disorders Centre at the Prince Alfred Hospital, Sydney.

I am and have been involved in treating patients with a range of sleep disorders for many years, and the particular problem that I am going to focus on this morning is the problem which we call sleep apnoea. It's a fancy name for sleep, no breathing, and it's really an extreme form of snoring. When it was first considered it was really thought of and described as a possible cause of cot death back in 1969. Babies who died at 3 months of age were thought to have stopped breathing during sleep and not recovered.

At that stage no-one really knew that there was such a condition that effected adult humans and if you asked a granting body to give you money, they would send you away and say that this condition is so rare as to be irrelevant. In 1993 we know that the problem affects at least 15% of adult males, so I know that in this room there are acknowledged sufferers and unacknowledged sufferers. Today, I am going to talk about this problem and I'm going to talk about it from the perspective of road transport

and the problem of fatigue and sleepiness. Everyone knows all about being awake and fatigue and sleep.

This was a photograph in the Good Weekend about four years ago of these chaps who are truck drivers and they describe their rather horrific work schedule. They drove a semi-trailer load of potatoes up from the south coast to Sydney. Actually what happened was they would leave about 4.00 in the morning from southern NSW, they would stop half way along and have a breakfast which consisted of about 4 eggs and bacon and sausages, etc., they would arrive into Sydney at about 7.30 a.m.. Then they would have to relax and relaxation involved having a few beers and then they would have to drive back again. I want you to have a look at this photograph because this is a dad and son, and dad undoubtedly has this condition and you will see why as I present data about sleep apnoea.

Professor Dement is going to tell you some extraordinary results of a recent study, just how common this condition is and throughout my theme you are going to see people like this. What is the problem? Part of the problem is that this condition is incredibly common. It has been with us forever

but because doctors are not taught about it, it doesn't exist and that still is a problem. We still have a problem even within the medical profession to get them to take it seriously.

This is a slide of a gentleman coming along to the doctor and of course he is saying "I know what you **Professor Sullivan (cont):** have but I'll be dammed if I can remember the name of it? And I think it does represent a problem that we face in our area of the medical profession, convincing doctors to take notice of it. Many women have brought their husbands along to me and said "I have been taking him to doctors for years, he snores, he falls asleep and I took him to the local doctor' and the local doctor (who of course is a 50 year old male) said "I do that, that's normal, take him away". Of course it's not normal, but that's part of the problem of understanding, educating and taking it seriously.

Snoring is one of the funniest things about. There are more cartoons about snoring than anything else. If you hear someone snoring it is a joke, it's hilarious. Sleepiness, which is one of the main symptoms, is also a bit of a joke. If you're sleepy you're lazy. It's your fault. You didn't get enough sleep. So there have been value judgements for these two key symptoms which have actually held back us taking it seriously. Well I think after this morning, you will take it very seriously.

What is sleep? Well everyone knows what sleep is. It's like this picture. It's the moon. You know the moon's there, you know the other side's there but you have never seen it, and that's been our understanding, until relatively recently, of sleep. People know it's important, it's great, get them off to sleep, fine, have a good nights sleep but what goes on in sleep. What is sleep? I am going to talk a little bit about sleep. It is remarkable that it's only relatively recently that we have come to know what sleep is about and that sleep is not a continuous function. In fact there are different bits of it, and you don't go to sleep and sleep through the night, you go through a cycle of sleep and there are different components of that sleep.

One very important component is called REM (rapid eye movement) sleep and that's the phase in which you are having visual hallucination dreams. We are very fortunate to have Professor William Dement from the United States here today.

Professor Dement was involved in the early discoveries of REM sleep, so it's very recently that we have understood this very important part of sleep.

We now know for instance, when you go to sleep, you have a period of REM for about 10 minutes, about an hour, or 90 minutes into sleep. You wake up, roll over, have another cycle and the REM sleep period gets longer and longer as you go into the night. We know that a lot of people who snore only have apnoea during REM sleep and we now are quite sure that if you have apnoea and break your sleep during REM, you can end up with a very selective sort of deficit in the day time which will involve sleep episodes or sleep attacks.

Professor Dement will probably tell you about some of the other sleep disorders and there is a disorder known as narcolepsy, where REM is figured throughout the daytime. So you are driving a truck and suddenly you have a REM sleep episode. Part of the physiology of REM is paralysis. When you go into REM you are trying to carry out your dreams. You are prevented from doing it by internally generated paralysis. So you are actually paralysed. Of course there are some things that are not paralysed. One of them is your breathing muscles, if they were paralysed you would probably have one and only one dream, but the trunk or postural muscles are paralysed, so one of the major symptoms of the disorder of narcolepsy is called catalepsy, and that is going floppy and completely limp and its usually triggered by excitation, so people who have narcolepsy are very dangerous when it comes to driving.

Now a lot of our interests today are about how this disorder may interact with people in the transport industry. I have to confess that some years ago when dealing with this problem, your focus was on the person who comes along saying 'I have this problem of snoring, I go to sleep, what can you do about it?', and my focus was how is that affecting the person. At night time the changes that occur in breathing can be spectacular, so that they can literally have falls in blood oxygen to a level which is like going from Melbourne to the top of Mount Everest four hundred to five hundred times a night. How does it effect his heart, brain, lungs; how does it effect every organ? I have even been so stupid to write that the difficulty of treating these people is

they only have daytime sleepiness. I was worried about how it affects them, but of course what worries us is if they have daytime sleepiness and it makes them more fatigable, they might kill a whole lot of other people and that's what we think is happening. So in fact the focus this morning will be away from how it affects the individual. I am going to talk you about how that individual might effect everyone else by falling asleep driving.

A lot of what is going to be said today is about various transport drivers. There is a high level of suspicion that fatigue, it is almost certainty fatigue, but fatigue **Professor Sullivan (cont):** amplified by conditions such as sleep apnoea are almost certainly a very important part of the group of people who are in the transport industry. I look after a lot of truck drivers and all of them have, or most of them have been highly responsible, so this is not about get the truck driver, it's the other way around. Most of my patients come along and say look this is really worrying me, I am having difficulty driving, I am going to sleep, I want to sort it out. The big positive about this area is that we can sort it out, you can do something about it if you identify it and treat it and you can reverse the dangerous component that sleepiness and excessive fatigue add to driving.

However, it's not just truck drivers. This came out of a study and it may be talked about in more detail, where airline pilots requested that they be studied to work out a better flight schedule, in particular going across the Atlantic, where they fly over one way and then fly back, its a nightmare for them because are they awake or asleep? As part of that they all had these sleep studies done and a very large percentage had sleep apnoea. They were very concerned about that and I think we may talk about that a little later, but the point I make, it's not just the truck driver, it's all of us. Obviously, the truck driver, the bus driver has a very important cargo and when he goes wrong he can take a hell of a lot with him. But this issue concerns everyone.

I am going to go back to a little bit of history. I think the extraordinary thing about this condition is why the hell don't we know about it? If it is so common why has it been so hidden? Well, in fact, it hasn't. It's been described repeatedly in the Old Testament, throughout literature there are descriptions of people who snore heavily and are

sleepy and this is one from Charles Dickens who wrote the Pickwick Papers. Charles Dickens in fact was a reporter, he was a political reporter, so most of what he wrote was from his experience of seeing people around him and in Pickwick Papers he describes two people with clear cut sleep apnoea. This little boy, Joe, used to go to sleep while eating, he would snore while sifting at the table, he would go to sleep while knocking at the front door and his boss old Pickwick, also was a snorer and snored particularly after red wine. Charles Dickens described the disorder absolutely clearly and I suppose the remarkable thing is why hasn't it come to the attention of the medical profession.

It did in bits and pieces, but one of the things that has changed is that it is now possible for us to look at people during sleep and the technology is there to make measurements easily, the sort of measurements, where if you wanted to measure what happens to blood, you had to stick a line into the artery. Its very hard to go to sleep if you have got a needle in your artery. Technological development of devices which give us very good information about oxygen by measuring the colour change in the ear lobe, have allowed us to look at what happens at night time and when you look there is an awful fright.

The other aspect is that most doctors go home in the afternoon so there has been a tendency to focus on what happens in the daytime and assume that it is alright at night. So once they are asleep, it's okay: nothing could be further from the truth. You are most likely going to die at 4.30 a.m., and the reason you are going to die at 4.30 a.m. whether you have got heart disease or whether you have got cerebrovascular disease is because snoring and apnoea are worse then and it makes you more likely to have a stroke, and that is a very important point which we will come back to.

This is Alby Church and Alby was my friend. He is now dead and I present him because he was the first person that I became aware of with the condition of sleep apnoea. You can see this is 1.12 a.m., November 1975. Alby was well known to our staff at Royal Prince Alfred Hospital, for years he would come in usually on a Friday night in terrible trouble. His ankles would be swollen, he would be blue, he wouldn't be breathing and they would bring him into hospital. They would usually intubate him,

ventilate him—that's put a tube down—knock him out and breath for him, and a few days later, he would sit up in bed and say, 'What's the matter, when am I going home?' He would do that repeatedly.

Alby was a truck driver and Alby used to get very sleepy when he started to get like this and I remember very clearly that he would have problems driving and he was actually quite responsible. I know things are very different now than in the early 1970's, but Alby used to drive long distances and to download himself he would drink quite substantial quantities of beer. He didn't touch the rough stuff, only beer, but he might have ten schooners and of course that would settle him down. What we realised, and we realised it from reading a European publication in Italy, that this fellow was probably having trouble at night time. We brought **Professor Sullivan (cont):** him in at night time, had a look at him and he was turning blue during sleep. We were so worried—this is at 1.30 a.m.—and thought that we could not let him go on like this, his oxygen level was half of what it ought to be. This man was choking in his sleep. So what did we do, we woke him up and gave him oxygen and you can see how dramatically he changes from blue to quite bright pink. It then dawned on us that this guy has been doing it for the last ten years. So that's Alby Church and our first experience of sleep apnoea.

What is sleep apnoea and snoring? Actually it is very easy to understand on one level. I can snore for you and what I do is relax my throat and draw in through the upper airway. You can all do it, I know that there are some people who can do it better than others and what is happening is that it's the upper airway acting as a flutter valve. Now don't worry I know that every male will snore under some circumstances. The people who won't like it are the people who produce alcohol. So, after alcohol of course, most males will snore and it's a threshold phenomenon, Some of you will snore after one glass, some of you might need twelve schooners like Alby, but you will snore.

Females tend to not snore so much, in fact, I have no doubt that one of the ways alcohol effects people, males particularly, is by amplifying snoring. Females are relatively protected. If you just take 100 males you will find about 30% snore. By

snoring I mean they do it every night, most of the night. I don't mean the rest of you who do it on Friday night and Saturday night for part of the night on your back. But 30% do it every night, and do it loudly every night, and if you look at those 30% you will find a very large proportion sometimes during the night do the next stage. The next stage is going from "So long as I am snoring, I'm getting some air in" and "I'm just irritating everyone around me" but then the next stage is apnoea, where the soft palate and tongue are sucked closed and now we have apnoea. Now it's stable. The upper airway is stable and the individual may take 5, 10, 15 efforts and struggle, so that a big man will look like a newborn baby. His chest wall is going in, dissipating his efforts or distorting his chest wall, not getting any air flow in it

Because as that occurs the blood oxygen falls, blood carbon dioxide goes up. They are the main things that breathing deals with: putting oxygen into the system, taking out carbon dioxide. And what happens? It arouses them. So at some point there is a rescue arousal. I know some of you are going to tell me or ask me about your brother who does this. My brother tells me that he snores and he sometimes wakes up with a start, hears himself snoring, and feels as though he has caught his breath, he is waking up choking. That is when the snorer is having his first episode of obstruction. So that symptom which is quite common and some of you in this room have done it, and know exactly what I mean, is when it is first starting. Start to do it ten times a night, ten times an hour and guess what happens. it depresses your arousability and you are still rescuing yourself, but it becomes much more a motive phenomenon. The fellow now may be doing this 400 times a night, blocking, no breathing, fallen oxygen, arousal and now its much more a major arousal. The wife will know about it, you throw your arms around, you may actually hit her if she is still in the bed. She may well be in the back room by now, or you may be in the back room. But once it begins there is a depression of arousability so the individual may now be completely unaware of what's going on at night.

The worst person to ask about this condition is the one who is suffering from it, so typically individuals will come in and say "I have been sent along here". You will say 'Well what's the matter?', 'I don't know', "Do you snore?" And they often say "No, I

don't but my wife thinks I do.' Then you say, 'Well are you sleepy at all?' 'No I am not', and if you stop there that's it. You then go and ask the wife and she says 'Yes, he snores terribly, he stops breathing at night time, he always falls asleep during conversations'. "That normal is it?" "He also falls asleep even when he has had a decent sleep." So the last person you ask is the person who is doing it because you are not there while you are doing it. You are oblivious to it. One of the things about being sleepy, it's not like having a pain in your chest. If you get chest pain, you are going to go to the doctor very quickly, but if you are sleepy its not particularly unpleasant. So typically of someone whose snoring and develops apnoea, sleepiness develops slowly and may have done so over 15 years and thinks he is normal and it is not until he is treated that he suddenly realises that it is not that I am getting old, it's not that I'm loosing my zest for life, I thought it was just ageing, but no its pathological.

What's the cause of this condition? Now I am not going to go on too much about cause, because that's not our purpose today. But we do think there is an interaction between structure, so the size of the airway, your genes **Professor Sullivan (cont):** that determine whether you have a narrow upper airway, and often it runs in families and the young guy who is snoring in the initial photograph is the splitting image of dad. You can guarantee when he gets to 30 or 40 he is going to be snoring and having apnoea. So the genetics that give you your shape, its not an abnormality, if you like, but, probably a function of being human and standing up and having to use our upper airway for other purposes. The upper airway is a very complex tube. It does not have any sub-structure. Its a muscular tube and you need a muscular tube and you need muscle tone in it all the time to keep it open. That's why you have an anaesthetist when they give you drugs. They paralyse you. If you didn't have them, you would block your airway, they put a tube down to prevent that they have known it for ages.

The same thing happens in sleep. When you go to sleep you lose muscle tone and that is why you start to snore. Your jaws drops back, tone is lost and you start to snore. There is one condition that clearly demonstrates an abnormal loss of tone.

What's that condition? Booze. Alcohol is a

phenomenal way of getting this condition. If you really want to do a study on yourself, take alcohol regularly, record your snoring and you would probably have to do it over 5 to 10 years but alcohol, of course, loosens the tongue both awake and asleep. This has been known for years, but it does indeed relax the upper airway and its an excessive loss of tone in sleep which induces sleep apnoea. I am quite sure that some people would not get it if they didn't drink. That's not to say that they are alcoholics, the alcohol range here may in a completely harmless range but if you have this you can be in deep trouble from it. Of course this guy is old but it's not just his age that's doing that, he has got sleep apnoea and it just shows you what happens when you go to sleep, you loose tone and this is actually a surgeon examining the patient. But the loss of tone which occurs in sleep is in a sense one of the key reasons you develop sleep apnoea. It's sort of semi-normal, 30% of adult males. This fellow is sleepy because as you get older you are more likely to have sleep apnoea.

Now if you go into an old peoples' home or you go into an old people's village, there is one observation which you all know. How many men and how many women? There are 9 women to each male. If you go up and ask that healthy male, who is 80, does he snore, he would probably say that he does now. If you ask him whether he snored at 50 he'll say no and if you look at the prevalence of snoring through the ages it increases markedly in men up until the 50's and 60's and then it falls off. If you look at it in females there is a 20 year delay, females catch up. So by the time you get out to the 80 year old healthy females they are all having snoring and apnoea. What do you think has happened to the other 9 men? They are dead and they have been killed off by their snoring. There is no question that heavy habitual snoring is a clear risk factor independent of everything else of getting high blood pressure, so if you are a heavy snorer, you are much more likely to have high blood pressure and you are much more likely to have a stroke.

It's no joke in terms of the individual's physical make-up. There is no doubt that snoring is a key reason why men do not live as long as women. The reasons are probably because it amplifies all the common diseases. If you go into a cardiac ward and walk around the ward, half the patients in there have

snoring and sleep apnoea. Most of them are not recognised and I think that's the experience of anyone who works in this area.

Alright, so what happens? Why do you go from snoring to sleep apnoea? This is a slide of someone's throat, note their teeth. The throat normally looks like that, that's the soft palate, that's the bit that vibrates, and now look at someone who is

snoring. What do think happens in snoring? You can't even see the back of it. This soft palate is boggy. Try snoring for a few breaths and see what happens. You irritate your upper airway, so in fact the changes that occur are the same sort of changes that a jack hammer operator gets in his hands. There is vibration injury of the throat. Little blood vessels get damaged, blood supply is taken away, bits of your throat die and all the nerves die off. So, 15 years of heavy snoring belts the hell out of your throat and it's no wonder then 10 to 15 years down the line your throat starts closing off and that's almost certainly one of the reasons why heavy habitual snoring evolves into obstructive sleep apnoea.

Now I am going to show you very briefly what happens during sleep. This is a record of someone asleep. We are doing a sleep test and the top trace is coming out slowly on the record and there is a period of 30 seconds. The top traces oxygen level recorded with a device called an oximeter, it measures colour change. When you have enough oxygen on board you're pink, when you don't you're blue and it's a very accurate **Professor Sullivan (cont):** change that occurs that can be picked up by this device. This is measuring chest wall and abdomen movement, the bottom is air flow, if you could hear him, he is snoring then silence for 40 seconds and during this time he is trying very hard to breath but look what's happening to his oxygen, it's failing and at this point he is aroused and taken thorough breaths. Now this is one cycle and typically, this man had 400-500 such episodes at night time.

I am just going to show you a video, it's actually an old recording of a patient who had severe sleep apnoea, he is a 30 year old, I hate to tell you but he was a truck driver. This fellow has been recorded in the day time as he was so sleepy. This is an old

device, an oximeter device, where we are measuring airflow, its been recorded on a polygraph recorder and I am just going to show you what happens. This is an oscilloscope, that's where his oxygen should be and that's where it's going. Look at it, its going down and in a moment you're going to see him go through one cycle of apnoea. Look at his lips he is going to go very blue, he is actually trying to breath, but he is completed obstructed in the throat, now look at this oxygen level, its just nose diving. If I took you to 30% saturation you would have a fit, go unconscious and wouldn't recover. That's apnoea, he is trying, in a moment he is going to break it, and we will go through that cycle again as I want you to look at his lips. He has just started, this is in real time, so he is asleep, not breathing, just watch his lips, watch his oxygen fall, you can see him do it hour after hour. Look at this spectacular fall, he has gone over a minute, this is bad apnoea. We see two or three people every week with this condition. Now he is going to break, look how blue he is, watch his lips and face, you don't need an oximeter for this, you just need a bright light and he is going to break and you watch what happens. Look how blue he is and you watch how he changes to pink. It will come with a delay because by the time the blood gets out of the tissues he is obstructed again, there he goes, he is absolutely pink.

Now that occurs nightly in thousands of patients. In any one week we would see a couple of people that severe but at the same time we would see dozens of people with less severe cases. It is easy to realise that whatever it's going to do it's going to do a lot of damage, and there is no doubt that it does a lot of damage, it affects all organ systems.

I am just showing you a record of one of these patients where we have compressed the oxygen levels over night, there is one hour, he is going up and down and up and down with oxygen levels, the second night he is on treatment and the treatment device is the device which we developed in Sydney called the CPAP (Continuous Positive Airway Pressure) device.

We are into prevention. We don't think you should all go onto this device, it will be much better to prevent it and one key way of preventing it is weight loss and alcohol control.

---

The device which we developed and has now become the sole standard of treatment is this one, it's a device which is ridiculously simple and basically it's the hoover in reverse attached to a nose mask and we have created an artificially elevated atmospheric pressure and it acts an inside-out slip. You know when you break you leg on the ski slopes, or in the back of a truck, they blow a splint up around your leg to stabilise it. We are doing the same thing only inside-out So it's not breathing for the individual, it's creating a positive pressure and the good thing about it is that it is an incredibly safe treatment. It's not like a lot of drugs that have side effects, it has virtually no side effects. It completely reverses the obstruction, it doesn't cure the disease or disorder, it reverses the key consequences, and these people will wake up, their heart failure, if they have got it, will go away, their mental function will improve dramatically and the key thing is their sleepiness, correctly treated will go away.

Yes well, that's probably not the case, a lot of these people of course have great difficulty getting up in the morning and its sure sign of their: sleep apnoea. Now, I'm not here to sell these machines, I want to find a cure for the disorder and we work very hard to prevent it, telling people to stop drinking and reduce their weight

I make a big deal about weight and indeed a lot of people have obesity as part of the problem, but a lot of those people have great difficulty with that, not simply that they are overeating. We work very hard to try and reduce weight and there is no doubt that obesity is the key trigger factor in the area.

This is the first patient we ever treated with this CPAP device back in 1981. He is thin, he always was thin and the key thing about this fellow when he came to us he was failing in his job, he went on the treatment and in fact he said we were experimenting, he said "Look I want to take this ridiculous machine home". He took it home and after a few months he was back in work and **Professor Sullivan (cont):** went on to become the Manager of a major south east Asian company, he has only just retired, retired well.

So, do not think that this disorder is self-inflicted. It can be made a lot worse by drinking heavily and obesity but it's not simply self-inflicted. One of the great things about this disorder is that it is funny and

this is a cartoon which came out of an interview which was had by one of my patients. The television crew were keen to have this interview, the television crew saw Mr Jones and Mrs Jones, came around to Mr Jones and said "How do you feel" and he said "Oh it's good, I'm on treatment and I feel terrific" and came around to Mrs Jones and asked Mrs Jones tell us about the problem. "Oh yes, well, we have been married for 20 years and after 5 years of marriage he started to snore heavily and after another 5 years he stopped breathing at night time and at first I got really worried. I'd sit up and listen, I'd count and I'd start pushing and wake him up. After about 5 years of this I hoped to hell he would die".

In fact, there are a number of ways of dying from this and one of them is this way and this man had what would have been a sudden unexplained adult death syndrome. A thirty-two year old, truck driver, who in fact had severe sleep apnoea and the only reason we knew he died is because his flat mate called us after he died during the night. We were able to do an autopsy. The autopsy shows that he is blue, had we not been involved, they would have assumed that he had had a fit and inhaled, and in fact we knew he died of sleep apnoea and the only changes which were consistent were that he had blue fingers. This man died of adult cot death and in fact we know that a lot of the cot death is, in fact, exactly the same only that it's a different age spectrum and I am not going to talk about it. Finally, I just make the point that a key issue here is identifying and preventing it and there are a lot of things that can be done at that level.



**Professor WILLIAM DEMENT**  
 Chairman of the United States National  
 Commission on Sleep Disorders and  
 Director of the Sleep Disorders Centre  
 Stanford University.

I am really, really pleased to be here. I didn't realise that I would be quite so pleased when I first arrived, but I believe through the vision of the people here in the transportation industry you are really setting the pace for the entire world in addressing some of these issues. I was especially impressed with Vic Roads and Bob Pearson and his group and I wish there were more like them in the United States.

I want to show this slide, it's a statement made in 1919. Last night I had to refuse a dinner invitation so that I could get up at my proper time when my biological clock wakened me and arrive here fresh and alert and not a zombie who only had two hours of sleep, but it is amazing how much courage it really does take to give sleep the respect it deserves and I think you all know that here, so it's like come out with me tonight and let's do this or that and you say no, no I want to go to bed. Most people do not do that. The other reason for showing this slide is that why did I wake up at 3 o'clock this morning. Well it is totally obvious. I am a little sleep deprived and I should have slept longer only my biological clock woke me up and that is a very important point that I'll come back to later.

The other thing I want to mention and I'll come back later because I think all these things deserve emphasis and re-emphasis is that we get sleepy by two reasons, and two reasons only. One is when we reduce our sleep, we get sleepy. If we frequently interrupt our sleep, we get sleepy and I think truck drivers in particular partly do both and those are the two things. Most of the things we think cause sleepiness really don't. They just unmask it.

The accident we called the billion dollar accident, happened in the USA and there was a van with 8 people, a lot of damage and the law suits and all the indirect costs added up to nearly a billion dollars. That would buy about a million CPAP devices. One accident—the Exxon Valdez grounding which was caused by the third mate being asleep on the bridge, not Captain Hazlewood—was US\$2.8 billion. I

have heard a lot of discussion of the cost of getting into this area but I think another issue we also have to think about is that these are not accidents, these are preventable events and that is the way they should be viewed.

In doing this study for the Commission in America we did a considerable amount of work looking at data on accidents supplied mainly by the National Transportation Safety Board and the damage and destruction and the people killed or maimed for life, the devastation of families and so you finally ask the question, if someone is driving down the road, why would they allow themselves to fall asleep?

This is one answer. Sleep is very powerful, when the drive is intense it can come in seconds. When sleep deprivation is severe you can fall asleep anywhere in any circumstances. It is like a seizure taking over the brain. You have to keep that in mind, the power of sleep.

Why are we awake or asleep at any particular time? The mechanism that puts us to sleep is operating 24 hours a day, it never shuts off. It's either operating weakly or its operating strongly. I want to explain that why we don't fall asleep all the time is that there is an internal process, I've already said the biological clock which opposes it at certain times of the day and not at other times and it opposes but it can be overwhelmed. The opponent process by a whole new static process is nothing more than sleep reduction, sleep interruption increases the tendency to fall asleep. This has been well studied- The way to measure it is the speed of failing asleep. If you walk into this room and you sit down and a minute later you are asleep, we say that you have a very strong sleep tendency and your drive to sleep is very high. If you walk into this meeting and a very dull person is speaking and you don't fall asleep at all then we say your sleep tendency is very weak. It's a very rational way of doing it but there has been very standardised tests that we can actually measure whether the sleepiness or sleep tendency is pathological or not.

This is used all over the world now and this is the version of the test and I would like to take you through because we refer back to it a number of times.

Subjects are put to bed every two hours five times

a day. Then we measure how quickly they fall asleep in a quiet dark room with no disturbance. They close their eyes and try to fall asleep. Nearly everybody falls asleep within 20 minutes and we would like to refer to this area here the speed of falling asleep in a minute or **Professor Dement (cont)**: two as the twilight zone. If people can do this, if you can walk into this room sit in a chair and be asleep in two minutes you are in the twilight zone. You are living in the twilight zone and that is not a good place to live. This is called a multiple sleep latency test (MSLT) and we can also use the mean of the five tests to express the level of sleepiness in an individual. In this case its not bad. It's about 12 minutes the mean and here a couple of 10 minute latency, a 16 minute latency and that's pretty good alertness.

In the twilight zone there are microsleeps, poor motivation, impaired performance impaired cognition and great risk in hazardous jobs. 'Twilight zoners' often say they are not sleepy. They would often fall asleep right in front of you and deny it, may not feel sleepy or may not record it. Now, we all know that if you don't sleep at all, you are sleepy the next day, but this is the most important fact and it is not known by anybody outside of about a few sleep researchers. Sleep loss accumulates precisely as a debt, it does not dissipate.

In this study 10 subjects, young college students probably, went through a protocol in which they slept nine hours a night for three nights so they are pretty alert, the mean of the 5 tests and the mean 10 subjects, so that each day is the mean of 50 sleep latencies, on the baseline period they were all above 15. They then go on a schedule where they sleep 5 hours a night for 7 consecutive nights, this experiment has been repeated many times with slightly different parameters. Notice that they get progressively more sleepy every single day. So, that the sleep they are losing piles up as a debt which drives the tendency to fall asleep. People do not know that. Truck drivers who drive for many days getting 4 or 5 hours of sleep do not know that that debt is sitting there, it doesn't go away unless you make it up with extra sleep. Here is one of the subjects, its very important for me to tell you that on this test the instant you fall asleep, you can tell in the brain waves, the test is terminated, so no sleep

accumulates, these are days without sleep just measuring right up to the moment of sleep. Here is a basic result and by Friday this subject is in the twilight zone. This is your typical high school senior, who needs nine hours of sleep at night, gets about six and by Friday night is one of the most dangerous people on the road.

The other way of getting into the twilight zone is by interrupting sleep and it has been shown in laboratory studies that if you interrupt sleep as the patient in the video interrupted his sleep, if you interrupt it every minute and yet accumulate 8 hours it is as if you have had no sleep at all. Sleep must endure for a certain amount of time or it has no restorative power. You can almost begin to imagine getting into a vicious circle here. You are getting sleepier and sleepier, there is no relief, the sleepier you are the more your throat tends to relax and finally you have a very severe problem.

How do we measure how much sleep people need? This is a plot similar to the one you already saw, where one subject sleeps, has this test for 7 consecutive days and at night is allowed to be in bed for 9 hours. This is the mean of the 5 tests and the range through the single day is this vertical bar. The mean sleepiness of this subject, the mean physiological sleepiness doesn't change with approximately 8 and a half hours of sleep every night, it stays exactly the same. That is, the amount of sleep that person needs. Another person on the same schedule gets progressively more alert each day. That person needs less than 8 and a half hours of sleep, maybe 8 hours to maintain the same level of alertness. Another individual on the same schedule gets slowly more sleepy each day. That person needs a little more than 8 and a half hours. These are young 18-22 year olds from the college school population but this is how you determine how much sleep a person needs.

Almost no one is getting the amount of sleep that they need. So the definition is if that sleep tendency does not increase or decrease from day to day. If you start somewhere you may be the person who comes in here and maybe you fall asleep in ten minutes but if you just stay that way it is always ten minutes over the next month or so the amount you sleep at night is probably your required amount

You've got to sleep more to get more alert and there

is this diagram on the next slide saying that this person is sleeping the required amount or the amount he or she needs, this one is getting extra sleep, this one is getting sleep deprived and that is how we get into the twilight zone, slowly and imperceptibly.

I think we understand a lot more about this now, it camouflages the sleep debt, the biological clock and I am only going to tell you one of its functions, which is this altering function and the kind of study that uncovered it. This is a plot of the temperature rhythm **Professor Dement (cont):** over the course of six days in a monkey in a study done by Dr Dale Edgar at Stanford. This monkey is living in constant conditions and constant dim light in a special situation, these are plots of sleep stages but this is an awake period and without any clue of time of day or night the monkey is awake for about 14 hours and then goes to sleep. The code clock is keeping him awake and then he goes to sleep. It is an internally driven process.

Now the biological clock can be overwhelmed. There is a point where sleep deprived people just completely suppress clock dependent alerting. They tend to be sleepy in the morning and later in the evening because the major period of clock dependent altering occurs late in the day. This is one of the things that has everyone so confused about sleep deprivation.

We think that there are two ways of clock dependent alerting. A 24 hour sleep latency curve looks like this, so there is a weak period in the morning which can overcome a small sleep debt when you've reduced your sleep debt through the night, the sleep debt builds up through the day and the strong period of clock dependant altering opposes it later in the day and then it turns off and the largest sleep debt which is at the beginning of the night is unopposed. So, are you all living in the twilight zone, do you know it? I know you can't see through it. It's very likely that you will be in the twilight zone if you are falling asleep in the morning if you're an older person.

Now, is America sleep deprived? The answer is yes. The sleep gap and the pressures of modern life mean America is a sleepy nation. The National Commission found a resounding yes to that question

and I will just give you two examples of the kind of data it found.

Nodding off not on a break, on the job, 62% of night shift workers reported frequently falling asleep while on the job. Notice that the lowest levels are in the evening that correspond in younger people to that period of clock dependent altering but there is a lot of day time sleeping in this group as well. Now here is a group of young adults who said they never got sleepy in the day time. They did the multiple sleep latency test on 176 young adults who said they were never sleepy and 33% were in the twilight zone, they fell asleep in 5 minutes or less on every test. And over here about 15 to 18% had optimum alertness. Now what if they had recruited just everyone so that the people who said 'yes I get sleepy' were in this too, so you'd have 50% in the twilight zone and the clock is still working so they manage to struggle along.

So, America is sleepy and what about truck drivers. We would say that we know from the schedule that they maintain that they would have to be carrying a very big sleep debt. There is no way that's not likely.

The National Transportation Safety Board and this is one of the first reports that was given to the National Commission. They did a study of fatal to the driver truck accidents where the leading cause was fatigue not drugs and alcohol. I don't know how many of you may be familiar with this report. I looked at every report in this study, as Chairman of the National Commission I would have added another 10 or 15% to that but you had to be very, very conservative when you can't absolutely be sure of the causes of an accident.

Another, statistic is when a driver went to the grave because he fell asleep, 4.2 innocent victims went to the grave with the driver on average. So, I remind you one more time, what puts you in the twilight zone, not enough sleep due to frequent arousals.

I will now tell you about a study of drivers in a truck company in the State of Utah. We had become very interested in sleep related accidents as a result of our studies and the potential cause, depending on whether you are conservative or not conservative, could be from somewhere around \$20 billion a year to \$100 billion a year in the USA. We

approached a number of companies and said that we would like to study sleep deprivation. The immediate response in America, I am just tremendously excited to realise not here in Australia, is that once again, the reaction was, "Are we are going to limit driver hours?, Is it going to cost more?, What's going to happen?", so there was a lot of resistance.

We went to another company, we said there is a medical problem that a few of your drivers might have and the National Commission would like to do this study and screen a sample of truck drivers with this new device which allows you to do it very quickly and cheaply and one company agreed.

The rationale of course is that there are accidents and obstructive sleep apnoea is known to increase the risk. There have been a number of studies and even some data, that doesn't seem to be focused. But the costs are **Professor Dement (cont):** high and these are two studies that document an increase in accidents in people who have obstructive sleep apnoea. Everyone accepts that now its not something that anybody challenges.

In the study we interviewed drivers, we actually interviewed 600 drivers and then using a device called Mazon 4, on 200 drivers, we ended up with 159 all night recordings because many drivers had to get up and take their load and leave, so those were incomplete. We had 159 valid recordings with this device, which takes about 2 minutes to apply and measures breast sounds, snoring, heart rate which shows acceleration and deceleration with these apnoeic intervals and oxygenation of the blood. Those three signals enable you to identify the presence of apnoea with good accuracy. Here are the results and this is in terms of oxygen desaturation events, so when the oxygen drops significantly, that's called an apnoeic event or an oxygen desaturation event and 86% had five apnoea's or more an hour, and in 79% had five or more episodes of oxygen desaturation or oxygen drop. If the cut off is ten events an hour then it's 46%, twenty events per hour it's 20%, and that's a level where doctors feel the condition should be treated and it is a very level 9%.

So this is a mind boggling prevalence. Here is some data on accidents of this sample of drivers from

company data. There were 22 accidents, 31% of all drivers, self reported 50, combination 60 accidents, fatigue related by report were said to be 8. Here are the conclusions, obstructive sleep apnoea is an easily treatable sleep disorder therefore obstructive sleep apnoea is a preventable risk factor for motor vehicle accidents.

Obstructive sleep apnoea in commercial truck drivers is a serious problem. The high prevalence calls for a screening and treatment program. We've been saying this in the United States for three or four years now. The influence of sleep deprivation on the prevalence of obstructive sleep apnoea needs further investigation, we are saying "How could the prevalence be so high?", the mean age was 35 years, that's kind of young. What's called the body mass index was mean 28 which is overweight but not spectacularly overweight. So, we thought sleep deprivation might be a major cause, but look at this finding.

In this trucking company not one driver, not one manager, not one safety manager, not one company physician had ever heard of sleep apnoea. As Chairman of this Commission, this was most shocking to me of everything we learned. It was just unbelievable. We think we know a lot about this, it's just amazing how little has really permeated out to society. Our challenge now is to make it happen. This ignorance is no longer acceptable at any level.

In the study there is one guy that should have been taken off the road immediately. He is overweight, he fell asleep while he was being hooked up, sat there and fell asleep, here he is talking to the person who is doing it, she is a technician. The patient said "Yeah I was tired ... slept ... kept going then I wound up rear ending a car in the middle of traffic ... was on the verge of failing asleep ... on the verge ... on the verge, there's a lot of people on the verge". I like to think of it as being on the edge of the abyss.

In car accidents from a study from Great Britain, if you fall asleep and actually have an accident you are likely to die in 87% of cases. The reason we know so little about sleep-related accidents is that people don't come back to tell about it, most of them die. We have managed to do a preliminary study of sleep deprivation, sort of like the protocol I showed you, 7 nights on 4 hours a night. That was 5 hours a

I would call three mile island, Bohpal, the Exxon Valdez grounding and the Challenger Space Shuttle explosion a catastrophe, it cost the space industry \$8 billion. The NASA managers were found to have made an erroneous decision to launch whilst they were horrendously sleep deprived.

Now, I remind everyone that with a large sleep debt you can go from alert to sound asleep in a minute or second. People don't really realise that and there is a lot of impairment once you feel the wave of drowsiness, this would be the range of alertness, but people don't pay any attention to it. In interviewing these 600 truck drivers, we said "What's the signal to get off the road?" I bet the companies don't say "Here's the signal, when you do this or feel this it is absolutely essential to get off the road". The signal that we were told was falling asleep. When I fall asleep I get off the road. It's not eye closure, not drowsiness and what almost certainly happens is that there would be millions of accidents, where you have the momentary sleep, your head drops, you have a startle and you get off the road or you have hypnological hallucination, and I'm driving into this tree. This is when you should get off the road, because now you are having a retributive amnesia, automatic behaviour, impaired performance and micro-sleep.

**Professor Dement (cont):** That education isn't there nor is it there in the case of the primary care physicians. It's easy, because all you need to know to get started is that they will have hundreds of patients in their practice and very few of them will not have one or the other sleep disorder. We have actually changed a primary care practice in a rural town of about 20,000 people called Wow Wow Washington. Primary care physicians had not never identified a sleep apnoea patient in a hundred year history of the company. As of February 1992, they had identified 25 patients a month and they are getting interested in other sleep problems. Therefore primary care behaviour can be changed fairly easily.

Furthermore, the Congress of the United States has actually implemented the recommendations of the National Commission. There is now a new entity in the American Government to deal with sleep problems, education, and give grants for more research. One of its primary missions is a national awareness campaign, directed to the general public. So all of this is bound to expand a great deal.

Finally, I remind you, because there is a lot of litigation going on, as I said at the very beginning these are not accidents, they are preventable events and someone is responsible. It's either the driver for not getting enough sleep or not getting his apnoea treated, the company for not heeding the knowledge that is now beginning to go out to the work place, or maybe it's society for neglecting this area.

---

Congress, Federal Agencies and the scientific community have done something, but industry is lagging terribly. Maybe the policy will be made by the judge, the jury, the plaintiff and the defendant, but it should not go that far.

It should be proactive and this is what I mean by indoctrination. Twenty-five years ago, or at least when I was a boy, if you got drunk and had an accident it was an accident. The astronauts, as you know, were tremendous drinkers and drivers, but along came Mothers Against Drunk Driving (MADD), we began to see the results of all this and I added to this change. I mean, if I were the teenage boy who was America's safest driver, if I were the family of that boy who fell asleep and killed, it wouldn't matter to me whether they found alcohol in his blood or not I would be grieving for my son, so I remind you of the power of sleep and the damage it can do. I am so very pleased and I would like to commend this group and those who convened it. I would like to commend Dr Colin Sullivan also for introducing a treatment, I mean if there weren't the treatment for sleep apnoea we probably wouldn't be here today. And I am looking to take the story of Australia back to the United States because it is just terrific what you are doing, how you have the courage to face this issue and do something about it. Good work and carry on.

**Ms HELEN BEARPARK**, Physiologist with the David Read Laboratory Dept of Medicine, University of Sydney.

In this session I am going to talk a little bit about road accidents and sleep apnoea and then you are going to see a video in which a couple of our patients talk about their personal experiences with sleep apnoea. For the third part of the session I will talk about an epidemiological study we did in Western Australia to put the whole issue of sleep apnoea and how common it is into the Australian context.

Sleeping and driving at the same time is obviously not to be encouraged, and in fact one of the reasons that we have done some of the studies that we have done as Professor Sullivan pointed out, was that quite a few of our patients complained to us that they had problems driving, and one of the things that they often said was that they dropped off at traffic lights. So, it is all very well to go along to road transport authorities and say that a lot of our patients complain about this, but actually quantifying it is another matter.

We had the cooperation of the Road Traffic Authority of NSW in a study that we did where we surveyed a group of patients who were being studied at one of our sleep laboratories, and we studied a group of controls. Now, these were people who came along to the Road Transport Authority stand at the Royal Easter Show in Sydney, people who were just passing by and we selected men, men between the ages of 40 and 60 because that's the major proportion that's made up of our patients. We asked them questions about driving behaviour, and I would like to show you some of the responses.

When we said do you fall asleep at traffic lights and they were given four options: never, occasionally, sometimes, and often. I should tell you that we had 101 people in the apnoeic group, 35 people in the snorer group. Now these were people who came along to the lab complaining enough to be studied overnight in the sleep laboratory but who turned out not to have an apnoea index greater than 10, but who snored and therefore they are in the snorer group, and these are the people from the Easter Show, the control.

The apnoea group as you can see, 20% of them, sometimes or often fell asleep at traffic lights. In fact one fellow told me that he had actually slept through three changes of traffic lights. The man in the car behind ran out because he thought he had had a heart attack, he was slumped across the wheel and had just gone to sleep and didn't wake up in time. As you can see it's still fairly high and these people who are heavy snorers, now this is a very important observation because what we have been talking about this morning to date is about people that are actually and sometimes fairly far along the continuum of severity with apnoea, but these are people that might not be considered to have apnoea in the standard sense of the word, of course the controls are very few instances of this. Then we said have you ever fallen asleep actually while you were driving, not at the traffic lights but actually driving, and this is the horrific statistic that we came up with here, 20% of both groups had actually fallen asleep while driving and very, very few of the controls. I should point out that within this control we know statistically that we almost certainly picked up quite a number of people who had apnoea and severe snoring and I would suggest that this is actually indicated in this figure here. Then we asked them do you ever pull over due to sleepiness when you are driving along on a long journey? And you can see the people who have apnoea pull over more frequently than the controls or the snorers who were about equal. And this suggests to us that people who have sleep apnoea in some way adapt to this, they know that they are sleepy and they are more likely to pull over and have a sleep, which is good of course, but it also indicates that these people are having much more trouble staying alert enough to drive.

We asked have you ever had an accident due to sleepiness and almost 20% of the people in the apnoea group reported that they had in fact had an accident due to sleepiness and this was very much lower in the snorers and controls, but quite surprisingly high even in the control group. Now, this was have you ever had an accident due to sleepiness?

When we asked people if they had actually had an accident in the last two years, we found no difference between the three groups and we consider that this is possibly due to the fact that accidents are actually rare events and two years isn't a very long

period of time. Also it is self-report data, so we are never quite sure about that.

To summarise what we found, if we compared the apnoeic to the controls, apnoeics were twice as likely to report pulling off the road due to sleepiness, **Ms Bearpark (cont)**: sometimes or often, two and a half times as likely to report to having had a motor vehicle accident due to sleepiness, seven times as likely to report to falling asleep while driving and twenty times as likely to report falling asleep sometimes or often at traffic lights. If we compare the snorers with the controls you can see that this is less severe, these people who are heavy snorers were seven times more likely to fall asleep while driving and 15 times more likely to fall asleep at traffic lights, but they didn't report significantly more accidents due to sleepiness.

As a result of this study the Road Traffic Authority in NSW sent out a poster, which also included at the bottom information about sleep disorders centres in the State to every general practitioner in the State and asked them to put this poster up in their waiting room and they also sent a little pad of tear-off slips that had a bit of information about apnoea on it so that the General Practitioners could ask their patients. So this was an effort at the education that Professor Dement was suggesting should be done at the level of GP's and we did never evaluate this program in a scientific way but we certainly got quite a number of referrals as a result of the fact that people had seen this poster.

Now I would like to look at some of the overseas data that has been collected. As I said we didn't find in our patients that they didn't actually report more accidents the previous two years, but in some of the overseas studies, and this was the first one ever, it was in 1987, where a Canadian group from Manitoba reported apnoea and accidents as being causative in the literature and here you can see that 45% of the controls had had no accidents at all, whereas with an apnoea patient group it is very much higher, there is less than 10% that had had no accidents and nearly 40% had had at least one accident with quite a few having had more accidents, so that's certainly alerted the community at large to the fact that accidents are more common.

There was a question this morning about relative risk and this is actually a study from Sweden. What

they did was they looked where it says single accident, that's actually an abbreviation for single vehicle accidents, because as I am sure you all know single vehicle accidents are more likely to have been caused by fatigue and it's actually quite difficult to work out how many accidents in total are caused by fatigue. Here we have some relative risks for single vehicle accidents for controls relative to an incomplete syndrome of sleep apnoea which would possibly be aquatint to the heavy snorer group that you saw in the last few slides, however for sleep apnoea syndrome which included oxygen desaturations but not reported sleep spells, those people had four times the relative risk of having had a single vehicle accident over a five year period. If they had sleep apnoea with sleep spells where they reported having fallen asleep then the risk rose to nearly 12% relative risk and in terms of a clinical sleep apnoea syndrome which doesn't necessarily include sleep spells, the risk was 9% to the relative risk.

A group in Virginia, and Professor Dement mentioned this group earlier, that those you can see here what is called the dose response relationship, that the more severe the apnoea the more likely it is that they would have had a crash in the previous five years. So with very mild apnoea they were the same as controls, with moderate apnoea the risks doubled and with severe apnoea again you have twice as many accidents being reported. This was a relatively small sample but since then they have increased the sample size and the relationship holds.

In case you get the feeling that it is only drivers that are affected by this there are other people in the transport industry. There are sleep disorders in pilots that were reported by the Stanford group almost as an incidental finding, they were looking at jet lag in pilots on a long haul flight, and as part of recording their sleep they also recorded respiratory variables in sleep and found that 42% of this group of pilots had sleep apnoea and that half of these were severe, half of them had respiratory disturbance indexes of more than 20 events, more than twenty times an hour. But in fact this increase with time zoning change which gives us again the feeling that perhaps apnoea increases with sleep deprivation, and 30% had another disorder called periodic leg movements in sleep which again disrupts sleep to some extent.



We might have a look at this video now and then have a look at the epidemiological data.

[Royal Prince Alfred Hospital and Sydney University employees interviewed two drivers and a transport manager about their experiences with sleep apnoea. The first interview is with Alan, who is a bus driver. Alan has sleep apnoea which was diagnosed four months ago and he is now being successfully treated with CPAP]

INTERVIEWER: Can you tell me what work you do?

ALAN: I'm a driver for .....

INTERVIEWER: And how long have you been a special driver?

ALAN: About four years altogether.

INTERVIEWER: And how was this problem brought to your attention?

ALAN: It was brought to my attention by a number of people, my wife initially kept saying, "Oh, you stopped breathing last night" and this went on for a number of years.

INTERVIEWER: You have been a snorer for many years?

ALAN: Yes, since cutting wood.

INTERVIEWER: Five, ten, twenty years?

ALAN: As far back as I can remember I have snored.

INTERVIEWER: So as far as you were concerned you were sleeping well?

ALAN: Well, yes I was a really big sleeper, but I was constantly tired.

INTERVIEWER: How did you feel in the morning?

ALAN: Tired. Very, very tired. Over the last say,

12 months I was getting very irritable and very, very tired, unbelievably tired.

INTERVIEWER: So that's at work?.

ALAN: All the time, it didn't matter where I was.

INTERVIEWER: So how did it affect your life? When would you fall asleep?

ALAN: Mainly if I was watching television, always out like a light. If I was, I can't say, that yes I ever went to sleep at the wheel. I can't say I didn't, but I can't say yes that's what happened.

INTERVIEWER: Do you ever remember feeling sleepy or your eyelids being heavy whilst you were awake?

ALAN: No, I could never feel that. I could remember feeling very tired, very, very tired. If you could imagine going weeks with no sleep, my eyes would burn and so incredibly tired and every morning, because then I wasn't sleeping at night, I would go to bed later trying to get a good nights sleep and found that I wasn't sleeping at all and I put it down to my weight and I also put it down to early starts and late finishes, early mornings, late nights oh yeah I'm involved in a lot of outside activities.

INTERVIEWER: So you didn't think you had a problem?

ALAN: No, only that I was tired.

INTERVIEWER: In retrospect do you think it was affecting your work performance?

ALAN: I can't see it was, but it probably was but I can't see it. Thinking back and without like talking to people involved at the time, I think that things went pretty well the same, my tolerance wasn't as high, my tolerance level was very low, but everything else just went on. Between shifts we would have a card game going and I would go to sleep in the middle of dealing cards. I knew that. They used to do a lot of cheating while I was asleep, but I had that problem. If I was sitting and doing paper work at home for banking I'd go out like a light. Real quick.

INTERVIEWER: So, did you think or were you

concerned that you would fall asleep at the wheel?

ALAN: No, because I thought I'm doing something and it didn't enter my mind oh that's what could happen. Someone outside indicated that maybe I wasn't well and showed concern, not in a critical way, in a concerned attitude and it was just mentioned by my boss, you know, have you got a problem are you sick, what seems to be the problem, these people are concerned,

INTERVIEWER: Your boss was sympathetic

ALAN: Very, very, from the top right down, office staff to the people I work with, I never got one smart remark from anybody. Oh look at him he goes to sleep, we can cheat while his asleep and we are playing cards, there was none of that, once they knew what I had, right to the bottom, the sympathy the whole way.

INTERVIEWER: So when was the diagnosis actually made. Or who put you on to the sleep clinic?

ALAN: Well, when it become apparent that there could be a problem, my immediate boss made some phone calls and I went and spoke to, because they felt I shouldn't drive until it was sorted out, and I thought its not a problem, then I started to worry that people we going to think there was something wrong with me, I'm no good. My boss spoke to the powers-that-be who she rang I don't know but she spoke to several people. As a result I was put onto a transport doctor and I went and saw him two days after I was approached and then about two weeks after that I was referred to the specialist. He said, I think you have got sleep apnoea.

INTERVIEWER: I've actually got your record here and you can see for yourself how bad the problem is. The brain wave activity shows that you are asleep, here we have got your oxygen level and down here your breathing and as you can see your breathing in and out here and then suddenly you stop breathing, on this occasion for 45 seconds but in fact the longest occasion on the night was 105 seconds, so that's over a minute and a half. When you stopped breathing the oxygen level plummets down to very low levels which are quite dangerous and then finally you brain wakes you up so that you start breathing again and your oxygen level comes

back up. And what they found was that you were doing that minute after minute and they found that you were doing it 88 times an hour, so you can imagine why you feel so sleepy when you consider that you have been woken 88 times an hour. And on that night because you were so severe they put you straight on to the CPAP machine because they were so concerned, and that really made a dramatic difference to your breathing, it basically stopped all that obstruction and how did you feel the next day?

ALAN: I think that after three and a half hours sleep with the machine I got up and felt a million dollars. I walked from there down to central station, which I thought was a fair hike, I didn't feel a bit tired.

INTERVIEWER: So how long have you been on the machine now.

ALAN: Since November.

INTERVIEWER: Did you continue to improve?

ALAN: Yes. My weight has started to come down, not through any weight loss program at this stage, but I am getting back into doing things.

INTERVIEWER: So you have got more energy now.

ALAN: A lot more energy. I can do things, well where I live I have to go say twenty kilometres. I couldn't do it before now I come three times that distance or twice that distance into here today and I'm not feeling a bit tired. I feel great. I really do.

INTERVIEWER: And so you have been on CPAP now since November and it doesn't bother you to wear it at all?

ALAN: No.

INTERVIEWER: Are you back at work?

ALAN: I've been back at work since 30 December,

INTERVIEWER: Do you feel different now when you driver?

ALAN: I feel, well I know now obviously there was a problem, I can drive a lot longer and just

feel at the end of the day, oh gees I'm tired, like everybody, I'm a normal person. You go on a CPAP machine, you are thinking a lot better, your thinking ahead. I've taken on things outside work that I have always been involved in, but I'm in a greater role now and my mind has been able to go into a different direction, because I couldn't do that before. So it changes everything. It really does.

INTERVIEWER: It sounds like life's much more enjoyable these days.

ALAN: It is. Life is lots more enjoyable.

[Andrew is a transport manager in the bus company where Alan works. Andrew described how the company assisted Alan to be diagnosed and treated for his apnoea]

INTERVIEWER: Andrew can you tell me what work you do?

ANDREW: I'm a Manager for a bus company and we have got several depots, one of which where Alan works. We are in the Sydney metropolitan area and employ about 300 people.

INTERVIEWER: I've just been talking to Alan about his sleep apnoea. How was the problem brought to your attention?

ANDREW: Because we noticed a change in Alan as well. The changes were basically his attitude. We have to record every complaint or inquiry given into the depot so we recorded this on our reports to say that Alan looked very, very worn out and actually that the person said that his eyelids looked heavy. So on that particular day I said to the Manager out at the depot Alan's immediate boss, to call Alan into the office because she rang me to say 'look what should I do' I said 'look we have noticed a change in Alan recently, or six months prior, we better send him off to the doctor to get advice on what could be his problem, if it is overweight or whatever. Alan was obviously concerned for his job and we are union yard so I said to his immediate boss to ring the union direct and ring the union organiser and ask for their assistance to save all the rigmarole of union delegates and the like, so she rang the union organiser and they were obviously very protective of Alan being a union member and

we were very supportive of Alan as well, and he suggested he goes to see the union doctor. So we were all for that obviously, so two days later he went down and he was diagnosed with this sleep apnoea. From now on we sort of said, well Alan told us that he shouldn't be driving until it's rectified so he had some holidays and rostered days off up his sleeve, so we worked it around and even gave him some holidays in advance I believe, so that he could go be treated.

INTERVIEWER: So your company was quite supportive and there was never any question of him losing his job?

ANDREW: No. We were supportive to the point that as long as we knew that he was going to be rectified and fixed 100% there was no problem, if there was any doubts whatsoever that the man was never going to be fully recovered and there was a chance of him falling asleep at the wheel, well obviously, carrying people around it was a great liability to the company so, but when we found out that he was fully treatable well there was no hesitation, so it's hard to gauge what percentage of drivers within our organisation would actually have it. If Alan's got it there would probably be at least one other in 300 would have it, I would imagine.

INTERVIEWER: Has your company now formulated a policy to handle cases that might arise in the future?

ANDREW: Well, we have discussed it but actually haven't got a policy on paper yet, but as discussed early that maybe we put it in as part of the screening as pre-employment medical check. Before we employ anyone we give them a full medical and maybe we can put this under a screening test as well. I mean it's a pretty crucial thing to diagnose if someone's got it, especially in our industry.

INTERVIEWER: And do you think that management has a role in helping pick up this problem and then help the affected individual when they are getting diagnosed and subsequently treated?

ANDREW: If someone has already got someone in their employment that has been diagnosed yes, there are no problems, after they have been treated is pretty clear with Alan. Yes, there is no reason why it should not be supported and highlighted because

I believe if someone in the company thinks they are going to get the sack for having this or whatever and not disclose it to their management they are causing more and more problems and more and more people are going to closet people with this sleep apnoea. So I really believe it is the role of management to say 'ok you've got it, we know it can be remedied, go and get remedied and anyone else that thinks they may have it, come and see me'.

[The third interview is with Barry who also has sleep apnoea. Barry's symptoms were investigated extensively over an 18 month period, before he was referred to the sleep unit where an overnight study showed that he had sleep apnoea. Barry is now on effective treatment for his apnoea]

INTERVIEWER: So Barry, your wife has been concerned about your sleep for a number of years. Can you describe what her concerns were?

BARRY: Yes, she for years before I had any signs of the problem she was concerned that I used to stop breathing or hold my breath during the night and she would give me a nudge to wake me up and that went on for some years and then finally at the end of 1988, she woke me up and she thought I had a heart attack. I had a lot of tests and they were all clear.

INTERVIEWER: That was mainly for your heart. They thought it was heart problem.

BARRY: They did a stress test and that type of thing.

INTERVIEWER: Sure

BARRY: And then I went to a gastroenterologist and that proved OK and I had an epilepsy test and that was OK.

INTERVIEWER: So you had lots of tests and they were all OK and not too long after you had a bit of a frightening experience. Can you tell us about that.

BARRY: Yes, it was actually a Sunday morning. I just come home from church and on the way home, the actual church is down a side street off a six-lane highway and with a big island in the middle of the road, and on approaching the six-lane

highway I felt a little bit funny, saying, "I'm not going to mow the lawn when I get home this afternoon", and the next I remember was a guy actually shaking me and I'd gone through five lanes of traffic and hit a parked car parked against the kerb and I didn't know what had happened, the Police naturally arrived, I wrote off this poor blokes car and mine didn't look too good either, and the Police arrived and they wanted to know whether I needed treatment and I told them the story and I never heard anymore from the police. But shortly after the Roads and Traffic Authority wrote me a letter to say that they were going to withdraw my licence, or had withdrawn my licence and it wouldn't be given back to me until I got a clearance to say that I was fit to driver again.

INTERVIEWER: Finally the diagnosis of sleep apnoea was made and then you went on to the CPAP treatment how long have you been on CPAP now?

BARRY: Next month it will be three years.

INTERVIEWER: Right, and what effect did that have on you?

BARRY: Terrific machine. I did nothing for probably 18 months while all these tests were going on, but after I was on the machine, it's normal life, except if I work hard during the day and I'm going out that night I'd lay down at 5:00 p.m. and have an hour's sleep and I can stay awake till 2:00 a.m. then, otherwise I would be asleep at 9:00 p.m..

INTERVIEWER: So your level of sleepiness improved considerably.

BARRY: Yes.

INTERVIEWER: And how long was it before you got your licence back?

BARRY: Less than six months.

INTERVIEWER: And that just involved a letter from your specialist saying that he thought you were safe to drive.

BARRY: Professor Sullivan, yes.

**Ms Bearpark (cont):** Finally, I would like to briefly report on our epidemiological study in Busselton. Busselton is a small town in Western Australia, about 200 kilometres south of Perth, roughly 20,000 people live there, and the reason we did a survey there is that they have been subjected to similar surveys since the 1960's. Every few years a health team goes along to Busselton and they have done work on things like diabetes and asthma. But sleep disorders had never previously been studied in Busselton, and we were given the opportunity to go along to Busselton and study the community there. What we did was send out questionnaires to everyone in Busselton between the ages of 40 and 65 who had previously been involved in the Busselton health surveys. Of the people who returned those questionnaires, we randomly selected about 300 men to come in and be tested and we selected just over 100 women and they were actually selected on a different basis, dependent on the result of the questionnaire.

We had a third of that group who said they didn't snore, one third who said they sometimes snored and one third who snored quite often. We brought these people in in the evening to be studied and we did a number of things. We did ECG monitoring, blood pressure monitoring, to heights, weights, we measured all sorts of body parameters, did lung function testing and so on and then we put on Mezam, which was what Bill Dement was talking about earlier today. These are ambulatory recorders that record body position, heart **Ms Bearpark (cont):** rate, snoring and oxygen saturation and each person then went home for the night, wearing one of these devices.

This is showing somebody having a monitor applied, it doesn't take very long at all, they went home and came back in the morning. As you can see they could do things like drive trucks and so on and what they couldn't do was the milking, so we had to get up early so that we could take the Maximise before they went and did the milking. The Maximise was then downloaded through a PC, this was one of our German colleagues, we had quite a lot of support from overseas for this study, in fact we had donations of Maximise and actually ended up with thirty of these monitors that cost about \$10,000 each, so we were very fortunate.

This is actually what you get out of the print out . On the top line here is snoring, on the second line down is heart rate variability, the third line down is oxygen desaturation and down here you have body position, when there is a change in body position, this moves. Now, each of these segments is thirty minutes long and it's possible to expand it, and I will show you that in a moment. But what you can see here are repetitive noise changes on the snoring channel, repetitive heart rate change, oxygen desaturations here and again in this part here, and here, this is where the individual has got up out of bed, moved around a bit and got back into bed again. Now, these here are what obstructive sleep apnoea looks like using this device. Now, this is just to show you in a little bit more detail how you can expand it out. Each of these segments now is only five minutes instead of half an hour as it is up here. What we have done here is expanded out this part to show you how it looks once its expanded, and again you can see that there are spaces here and snoring, if somebody doesn't snore, if they make no noise at all you don't get any sound coming through on that microphone, except it also picks up speaking as well. So if you have somebody speaking earlier in the night, for example, it picked that up.

But you can see from this that there a very distinctive patterns for snoring, it's quite repetitive, with breaks and here you have got the heart rate change and this shows oxygen desaturation. Oxygen goes down, comes back up again in relation to the snoring and to the heart rate change. Now, we did a rough examination of the data using this kind of print out and then we did a very detailed examination where we went through and actually counted each of these deflections in relation to heart rate and snoring and we also had colleagues in Germany analyse them the way they did in Germany. So, we have actually done as much as we possibly can to make sure that this data is accurate.

This is actually an underestimate in terms of sleep time, because we don't know when these people were asleep, so, if anything its an under estimate. RDI refers to Respiratory Disturbance Index, which is the number of those dips in oxygen saturation with heart rate variability and snoring per hour of recording. It depends where you have your cut off point, what sort of prevalence rate you get. In many places in the States an RDI=5 is considered sufficient to begin treatment. And, in fact, it's very

difficult to actually give a number like this, to give a figure, because in some people if they had a lot of symptoms, say if they had hypertension, an RDI=5 may well be a sufficient indication for treatment and others an RDI=10 and in others an RDI=20. So, if you look at these different values you can see, this is the men, and we ended up with 294 studies, 20% of these men had an RDI=5 or more, 10% had an RDI=10 or more (and this would be considered clinically significant in most places around the world) and an RDI=20 or more was 3%.

I was in Madison, Wisconsin, last week, where they have done a very large cohort study and they didn't use a monitor like this, they brought people in over night and studied them in the lab and they have got exactly the same results from a group of working men of the same age. I haven't got the slide where these ages are compared, but you can see from this that if you took this group here the 53, this group here compared with this group is 54, this group here compared with this group is 55 as compared to 53 and 57 and compared to 53. So, its a very slight increase in age, but in fact it wasn't significant in the men although it does appear that if you had a larger sample you may see that there is a slight increase in age. However, the BMI was significantly different between those with RDI, between this group and this group and then if you separate them out again those with an RDI=10 or more were significantly different to these here.

We have to be cautious in interpreting the data from the women, because as I explained to you these women were selected differently, so it can be considered a prevalent study. In fact, the Wisconsin study suggests that the prevalence rate in women is about 9% and not the 24% that we have here. We don't know the prevalence of women in Australia because of the way **Ms Bearpark (cont):** we did this study so we really need that sort of data and you can see from the ages though there was no difference in the age in these women, but in BMI there was a dramatic difference with the women who had. There were only three in this group with RDI>20, but even if you take RDI>10 which included seven women in the group, their BMI was 38, they were very heavy women and more so even than the men. So, it does look as if the BMI's may well be more important to the generation of less disorder in women.

The sort of things we have been talking about in the break-out groups have been, "how do you identify this sort of problem in the general community?". If you look at BMI as a very strong indicator you can see that in the men in this group 36%, just over one third of the people with a BMI of 30 or more had an RDI>10. So, BMI is obviously an important indicator but in that case it wasn't quite so strong with the women, but again we had a smaller sample of women. However, you should see that in fact even in those people who had a BMI under 25, which in fact is under weight, we still found 3.5%, this is still a problem for people even when they are underweight. But in terms of trying to screen for sleep disorder breathing then using a high BMI may very well be quite a useful screening mechanism. I mentioned that we had looked at the data, not very well defined data but the sort of rough data, if you like, initially, and we compared that with the questionnaire that we had sent out to these people. On the questionnaire that we sent out, which had been validated in a clinical population, a large clinical population in Israel, a cut off point of 3.9 on this particular questionnaire was considered indicative of sleep apnoea.

Now, what had happened in previous studies before these kinds of ambulatory devices became available, was that people had gone out with questionnaires and actually screened people using the questionnaire, selected the people on the basis of the questionnaire, brought them into the lab and studied them. Now, had we done that, if we just screened people on the basis of the questionnaire, we would have ended up with three people in this top group, we would have ended up with a prevalence rate of 3 out of 294 (about 1%), and this is just the men we are looking at here. And in previous studies 1-2% has been considered the prevalence rate for sleep disorder breathing. The problem has been something that hasn't been identified in the past has been that the people who don't report snoring or daytime sleepiness and all the other symptoms, quite often have the disorder. So, here we had twenty of these people, 87% of this group that we would not have picked up if we had used the two-step screening method. Therefore, the questionnaires are not reliable tools in terms of being able to pick up this disorder. Some of the questions from the questionnaire may very well be reliable in addition to some of the other measures, for example, like BMI or some of the body idiosyncrasies we have collected and we are looking at that data now, to see whether or not we can come up with a very much better way of predicting sleep apnoea. But obviously at the moment it certainly looks as if, in order to get an accurate assessment you need to make physiological measurements.

**Dr NARELLE HAWORTH** Research Fellow at the Monash University Accident Research Centre.

The analyses that I am presenting today attempt to assess the prevalence of sleep apnoea among semi trailer drivers. The data are from an interview study that we conducted in 1990. We did conduct sleep tests but the interviews provided much useful information about risk factors for sleep apnoea such as age, obesity, alcohol consumption and snoring.

This slide shows the age range of the drivers we interviewed. The age range is important, as people have mentioned before the prevalence of sleep apnoea does increase with age. Most of our truck drivers were aged 30-39 years of age but there were quite a large proportion, about a quarter of them, were actually aged 40-49, 50 and above as well, age brackets in which sleep apnoea is reasonably prevalent. As far as driving patterns were concerned about two thirds of our drivers drove long distances or a mixture of short and long distances, so because its an articulated vehicle, for example, it's mainly long distance driving that we have got here.

We looked at the age distributions as a function as to whether people are owner drivers or employees, whether they drove long distances, short distances and so on, but there is no difference there. So this is the overall pattern, the age of the drivers.

The next thing we looked at was obesity, being a strong risk factor for sleep apnoea as well as many other disorders (which we need to bear in mind). What we see here is we don't have very many underweight truck drivers. About one third are normal, about one third are overweight, but then we have got 21% of our drivers being considered obese according to the calculation of body mass index. Now, I should add that body mass index, which is a person's weight divided by the square of their height, in our sample that we have done from self reports, we asked them how much do you weigh, how tall are you.

If people under-estimated their weight, or over-estimated their height, then these body mass indices might be conservative, but they are certainly not an exaggeration. So we have got 21% of our drivers

obese and quite a much greater proportion being overweight. We have got quite a problem now.

The question which arises is how do these compare to other males? Do truck drivers have more of a problem than any others? This is the comparison. the figures on the left are the semi-trailer drivers, on the right Australian males. If you look at the obese, which is to the far right of the diagram, you will see that the proportion of truck drivers who are obese is roughly double that for other Australian males. In this calculation I should comment that I have done the age distribution adjustment so it is not a feature of a different age distribution, given the same age, the truck drivers are twice as likely to be obese.

The next thing we looked at was alcohol consumption, now the National Heart Foundation have developed a classification based on how many drinks you drink at once and how often per week you drink, you can put those together and come up with categories with people either being a non-drinker, no risk, low risk, intermediate or high risk drinker. And these are the results for the truck drivers: 20% of our truck drivers were non drinkers according to self report, given that a lot of these truck drivers are willing to admit taking stimulants I think that in their reporting, they would be willing to report drinking but, anyway you might query the 20% non-drinkers, I'll let you do that if you think it's necessary.

Certainly we have still got almost 15% of our drivers being intermediate or high risk, alcohol consumers. Again I will give you the comparison with the Australian males, we have got more non-drinkers in our truck driving sample than for Australian males, but, when we are looking at the low risk, intermediate risk, and high risk we have got more truck drivers in those groups than in Australian males as a whole, so certainly it looks like there is a problem with the consumption of alcohol and that, I should say, a consumption of alcohol after work this is not directly related to drink driving although one speculates that it might have some relationship. So we have got some thing of an alcohol problem and a greater alcohol problem than in Australian males in general. One of the things we also looked at was whether alcohol consumption is the same across different types of truck drivers, here we have got the long distance drivers and other drivers. The long distance drivers



were more likely to be non-drinkers than their shorter distance fellows, but when you are starting to look out at the high risk group, there is a nasty little bulge there of 10% of our long distance drivers having been high risk alcohol consumers, so that is a bit of a concern and it points that there is a **Dr Haworth (cont):** small proportion of long distance drivers who may be a problem.

As far as sleep characteristics are concerned, as I said before we weren't able to do any physiological measurement at the stage at which we conducted this survey. We were advised to use Lavies Mini Sleep Questionnaire to be able to give some indication as to whether people suffered from sleep apnoea. Unfortunately it wasn't until after we had done all the surveying that we found out that the questionnaire doesn't work very well with a non-clinical population, so I won't report those results, save to show some results about snoring. This is frequency of snoring amongst our sample of long distance of semi-trailer drivers, you can see that more than 20% of drivers or their partners reported always snoring and then there is the quite often, often and very often as well. So there is quite a bit of snoring there. There isn't Australian data for male snoring that we could find quickly, so I can't tell you whether truck drivers are greater snorers than other males, but, I would just like to say that there certainly seems to be a snoring problem there.

To investigate other things related to snoring we divided out the sample into those who were snorers which we classified as snoring quite often or more frequently and non-snorers so we had 51 snorers and 89 non-snorers, what we have here is more snorers than non-snorers in the 40-49 year age group which is what we would expect, we haven't got the same pattern in the 50 and above which we might have expected, and as we would have expected from the previous research the snoring is less frequent in the younger age group, so that fits in with what we know about snoring and particularly with snoring in relation to sleep apnoea. At one stage I got my research assistant to run all sorts of analysis just to tell me what came out to be significant—I mean its the sort of lazy thing that one does sometimes—and rather interesting but hard to comprehend, snorers, owner drivers are more likely deep snorers than employees are, now, this one requires a bit more work but I can think of a couple of possible

explanations.

Perhaps our owner drivers are a little bit older and therefore more likely to be snorers, maybe, maybe not, I don't know. Perhaps our owner drivers are driving longer distances, therefore more sleep deprived, therefore they snore more. I think it is certainly worthwhile having another go at the data and trying to pull that one out, but it's an interesting pattern even if we are not sure of what we are going to do about it.

One of the things that we did do in our study was to ask about crash involvement of drivers. Basically, we didn't have enough drivers to have enough crashes to be able to make any strong conclusions about this, so I can't say much about the crash involvement. In our initial study we did find that there were more single vehicle accidents in one of our high risk groups so we suspect there is something in the crash data but not in this smaller sub-set. One of the things which I would like to, first of all just to sum up that our interview study showed that almost a 1/4 of the drivers belong to an age bracket in which the prevalence of sleep apnoea is high, 20% of the drivers are obese and it's likely from earlier studies that a third of these drivers would show signs of sleep apnoea. An additional 40% of the drivers are over weight, about 1/4 of the drivers always snored. With regard to alcohol consumption, the results weren't quite so straight forward, the drivers seem to be either non-drinkers or heavier drinkers compared to other Australian males.

I should stress that in our study we were looking at semi-trailer drivers, we weren't looking at rigid truck drivers, whether the same pattern would actually help for the rigid truck drivers who are likely to be at home more and so on, have got a different pattern of work is unclear, but, on the other hand if we look at the crash data then drink driving seems to be more of a problem amongst the rigid truck drivers, so maybe they have higher alcohol consumption so there is a possibility of that.

One of the things which concerned us is trying to draw conclusions about how prevalent sleep apnoea is that fortunately there is a driver self-selection factor operating. If you are having trouble with long distance driving, particular if you are the artic driver you may change to round town work and that, so

---

their drivers adapt and if they have too many problems of being overtaken by the white horses on the freeways they may change to driving around town instead. So, hopefully there is some sort of adaptive behaviour in that respect.

One of the things which we were considering was, how can we narrow down the number of drivers that you have to test in order to find out whether they have got sleep apnoea. On the basis of our work one of the things we might suggest is to look at those drivers who are aged 40 plus, be a migrator to 30, low risk alcohol consumption at least and snorers and perhaps if they **Dr Haworth (cont):** have got two or more of those features then they might go for further testing. When we applied those criteria back to our sample then we found that 60% of our sample had at least one of those characteristics, 24% had two or more characteristics, 5% had three or more characteristics, so perhaps testing those with two or more characteristics is not a bad idea.

But again I should warn on the dangers of using self-report for screening, but it is cheap and it should also be noted that in screening the benefits that you get, aren't just in the ability to detect sleep apnoea, in general those risk factors are associated with a number of other disorders of health which could also result in crashes.

**Dr PHILLIP SWANN** Manager, Road Safety, VicRoads.

I have been asked to present to you some information that hopefully you will use this afternoon in the break-out groups. We have been told this morning about the incidence of sleep apnoea. Dr Haworth has just mentioned some of the indicators and predictors of apnoea, such as overweight and alcohol.

At the present time if you feel that you could be suffering from sleep apnoea the process that's used is that you go to a general practitioner who refers you to a respiratory physician and then you go to a sleep clinic where you are required to spend two overnight stays. At the moment our data that we have got together for this will show you the two streams, the public stream and the private stream. Not a lot of cost difference between them if you are in a good health scheme, but there is a big difference in terms of the speed at which you are treated.

If you are fortunate enough to live in Tasmania, there is one bed—that's not so bad when you consider how many people live in Tasmania. If you live in Western Australia there is two beds,

where in Tasmania they would do 100 tests with that one bed, they do 600 in Western Australia. If you live in South Australia there are 10 beds, and you can see the utilisation of the beds is quite high. If you live in Queensland there are 9 beds. If you live in Victoria there are 5 beds, and if you are lucky enough to live in New South Wales there are 27 beds.

When divided into public and private there is a total of 21 units, 15 public, 6 private and then for interest we divided the units by the number of people in each State, which is probably the most meaningful thing and you are well served if you are in South Australia or New South Wales, but relatively you are not well served if you are in Victoria. Now, that is a nice point for me to lead into what is an important part of this afternoon, which is where do we go from here and one of the things that limits sleep apnoea treatment is this requirement of taking two overnight stays effectively in a hospital bed in order to find out if you are a victim of it, and I've asked Professor Sullivan to speak about some of the developments that have occurred in using less expensive, more efficient machines to get better targeting of our resources in treating sleep apnoea.

---

**Professor COLIN SULLIVAN**, Director of the Sleep Disorders Centre at the Prince Alfred Hospital, Sydney.

It is important to understand the history of the development of sleep laboratories. There is no question that our understanding of sleep apnoea and the many other conditions you find is dependent on being able to do a full sleep study. Now, the business of there being hospital beds is actually a technical one. They don't need to be hospital beds. It's how you define them. These people come in and go out so that when you define them as a hospital bed and regard it like an intensive care bed, it's not like that at all and it doesn't have to be like that. There is a lot of development technologically now with ambulatory devices.

One of them is the Maximise device which we have got a lot of data on, and we do have Australian data on snoring from Bussleton. There are actually a whole lot of devices which record only a few signals and they are highly discriminating. One is the Maximise 4 device which really records snoring, oxygen saturation, body position and heart rate and that's what Professor Dement used in his study, and that is actually quite a useful device.

There are however a set of other devices coming down the line. The question about how this is best done is not all that easily answered. If you are going to do ten studies a night, you need ten machines, currently they cost about \$8000-\$9000

and you might be a bit reluctant to send them home on the bus with someone who is sleepy and have to replace it the week after next.

If you do the studies that way, it's quite labour intensive, although they are easy to put on, you do need technical skills to put them on, so you need the staff there between 5 p.m. and 6 p.m. put them on, then you have to down load them the next day so in terms of cost efficiency it sounds easy to go and send them home with one of these devices. But the device doesn't put itself on, doesn't take itself off and doesn't determine and give you a full picture of what the problem is. The issues that confront us all is that there is no simple way out of this.

I think what we have learnt that although we talk about sleepiness and snoring being very discriminating. Unless you went very carefully, you would find that sleepiness wasn't part of his history until after he was treated. So, there is no getting away from someone who knows what their doing, talking and seeing the patients. But there are tremendous developments and I think that the ambulatory devices are coming. One last point is that, yes, there is a problem of trying to get someone set on this device, that is essentially going to be solved by intelligent devices which set their own pressure, and that's already happening, so that will reduce the numbers needed from two to one night.

<sup>1.</sup> In June 1995, the new STAYSAFE Committee of the 51st Parliament, under the chairmanship of Mr Paul Gibson MP, announced an inquiry into driver licensing issues. The focus of the inquiry is to examine the operation of the licensing system in New South Wales from the time when a person is granted a provisional drivers licence to drive unaccompanied through to the time when that person, voluntarily or involuntarily, permanently surrenders the licence to drive. The medical review process for driver licensing will be examined during this inquiry.