SLEEP APNEA KILLS

The John Lindsay Foundation

www.SleepApneaKills.org

Prepared By:

Jim Cole
Will Sciba

Cole, Cole & Easley P.C.
302 W. Forrest St.
Victoria, Tx 77901
361.575.0551
Cce-vic.com

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I. Introduction

On May 7, 2010 John and Wanda Lindsay were traveling from their home in New Braunfels Texas to visit relatives in Kentucky. They were traveling in their white Hyundai on I- 30. They entered a well marked construction zone near Texarkana Texas. The speed limit dropped to 60 mph. Traffic was moderate. Traffic began slowing and came to a stop. At almost the instant the Lindsay vehicle came to a stop, it was struck from the rear by a Celadon truck traveling 65 mph in the construction zone, with the cruise control engaged. The driver had been recently diagnosed with severe, uncontrolled, sleep apnea.

Sleep apnea is a physical condition or illness that prevents a person from receiving quality sleep. The result is that a person with the condition often suffers excessive daytime sleepiness, drowsiness and fatigue resulting in falling asleep at inappropriate times, micro sleeps and a severe degradation in reaction times.[1]

There is a sleep apnea epidemic among truck drivers and the trucking industry knows it. Trucking companies have made a conscious decision to ignore the problem, putting profits over safety. The nature of the truck driving lifestyle results in a large percentage of truck drivers having sleep apnea. As a result, drivers are driving while asleep, excessively drowsy or suffering from severe fatigue. The consequences of a driver operating a 40 ton truck at highway speed in this condition are predictable. The resulting injury, damage and deaths are unacceptable.

[1] Hartenbaum N, Collop N, Rosen IM, Phillips B, George CF, Rowley JA, Freedman N, Weaver TE, Gurubhagavatula I, Strohl K, Leaman HM, Moffitt GL; American College of Chest Physicians; American College of Occupational and Environmental Medicine; National Sleep Foundation. *Sleep Apnea and Commercial Motor Vehicle Operators: Statement from the Joint Task Force of the American College of Chest Physicians, American College of Occupational and Environmental Medicine and the National Sleep Foundation*, Chest 2006 130: 902-905

According to the FMCSA in 2010 there were 6.8 million registered commercial vehicle drivers in the U.S. Estimates range that between 1.9 and 4 million of those drivers have some form of sleep apnea.[2] In 2009, 3,380 persons were killed in crashes involving large trucks and 74,000 were injured. Studies indicate over 1000 of those deaths and over 20,000 of those injuries may have been caused by drivers with sleep apnea.[3] [4]

Trucking companies have the ability to accurately and economically screen for sleep apnea, but few have chosen to respond to this epidemic.[5] Trucking companies must address this problem and until they do, they must be held accountable.

Often times the fact that the driver who causes these tragedies has sleep apnea goes unnoticed and unreported. It is far easier for a trucking company to attribute the cause of a wreck to the inattentiveness of its driver than to acknowledge its complicity in allowing an impaired driver behind the wheel. The role of sleep apnea should be investigated in virtually every truck crash. Seldom does a driver admit to being drowsy after having been involved in a trucking collision. Often times the driver may not be aware that he suffers from sleep apnea or that he was excessively drowsy. Other times the driver seeks to actively cover up the problem out of concern for the effect on his driving career.[6]

Regardless of how the wreck occurred, sleep apnea may have been the cause or contributed to the wreck. Whether it involves a rear end collision, an intersection collision, a lane change or almost any other type collision, driver fatigue and sleep apnea, in particular, should be considered as a cause.

This paper seeks to address what sleep apnea is, the prevalence of sleep apnea among drivers, how sleep apnea affects drivers, the extent of the trucking industry's knowledge of the problem and the failure of the industry to meaningfully and responsibly respond to the epidemic. The response of the DOT to the problem will also be reviewed.

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[2] Commercial Motor Vehicle Facts, Federal Motor Carrier Safety Administration December 2010, available at http://www.fmcsa.dot.gov/documents/facts-research/CMV-Facts.pdf

[3] Stoohs RA, Bingham LA, Itoi A, Guilleminault C, Dement WC. *Sleep and Sleep-Disordered Breathing in Commercial Long-Haul Truck Drivers*. Chest.1995;107;1275-1282

[4] Pack, AI, Dinges DF, Maislin G. *A Study of Prevalence of Sleep Apnea Among Commercial Truck Drivers* July 2002 Publication No. FMCSA-RT-02-080

[5] Talmage JB, Hudson TB, Hegman KT, Thiese MS, *Consensus Criteria for Screening Commercial drivers For Obstructive Sleep Apnea: Evidence of Efficacy,* J Occup Environ Med. 2008;50: 324-328

[6] National Center on Sleep Disorders Research and National Highway Traffic Safety Administration. *Drowsy Driving and Automobile Crashes: NCSDR/NHTSA Expert Panel on Driver Fatigue and Sleepiness* 1988. Available at http://www.nhtsa.gov/people/injury/drowsy_driving1/drowsy.html

II. What is Sleep Apnea, How it is Diagnosed and How it is Treated

Sleep Apnea or Obstructive Sleep Apnea (OSA) occurs when the muscles in the back of the throat relax too much to allow normal breathing. When this happens the person is awakened. Persons with sever sleep apnea may be awakened hundreds of times a night. The result is inadequate sleep, excessive daytime sleepiness, drowsiness and fatigue.[7]

Sleep Apnea is most prevalent among males over 40 years old that are overweight and live a sedentary life style. These are factors that are prevalent among truck drivers.[8]

First described in 1965, signs and symptoms of sleep apnea that have been described in the literature include:

Loud snoring

Abrupt awakenings accompanied by shortness of breath

Observed episodes of breathing cessation during sleep

Gasping and snorting

Difficulty staying asleep

Excessive daytime sleepiness

Forgetfulness

Trouble concentrating

While anyone can have sleep apnea, risk factors that increase the likelihood that a person, including a truck driver, will have sleep apnea include:

1. **Obesity** – More than half the people with sleep apnea are overweight.

2. **Age** – Over 40 years old.

3. **Male**- Men are generally twice as likely as women to have sleep apnea.

4. **A large neck** – A neck circumference men over 17 inches women over 15 inches.

[7] US Department of Transportation, Federal Highway Administration. *Conference on Neurological Disorders and Commercial Drivers.* Publication No. FHWA-MC-88-042. Washington DC: US DOT, Federal Highway administration, Office of Motor Carriers, 1988

5. **High blood pressure** – Sleep apnea is common among people with hypertension.

6. **Smoking** – Smokers are nearly three times as likely as nonsmokers to have sleep apnea.

7. **Use of alcohol, sedatives or tranquilizers** – These may relax the muscles in the throat.

8. **Diabetes**[9]

The existence of the above described risk factors is extremely effective in predicting sleep apnea. Determining whether a driver has the above risk factors can be as simple as reviewing the driver's DOT physical. A formal diagnosis of sleep apnea is usually made by having a sleep study. A sleep study normally involves overnight monitoring of breathing and other bodily functions. There are screening methods that can be used at and home and more recently at trucking terminals and even truck stops.[10]

There are several common treatments for the condition including surgery, the use of an oral appliance or the use of a continuous positive airway pressure (CPAP). Use of a CPAP machine is the most common treatment and is often effective in controlling sleep apnea. A driver that is being successfully treated for sleep apnea is qualified to drive. Compliance with treatment must be continuously monitored. Of course, the trucking industry should address the health risk common to drivers including weight loss, stop smoking and avoiding the use of alcohol, sedatives and tranquilizers. [11]

When properly treated and monitored, the effects of sleep apnea can be controlled and the driver may resume normal activities, including driving a truck.

III. The Prevalence of Sleep Apnea Among Truck Drivers

[9] The driver in the Lindsay fatality admits to the first 7 and there is some evidence of all 8.
[10] Parks PD, Durand G, Tsismenakis AJ, Vela-Bueno A, Kales S: *Screening for Obstructive Sleep Apnea During Commercial Driver Medical Examinations.* J Occup Environ Med. 2009; 51:275-282
[11] Tregear SJ, Tiller M, Fontarrosa J, Price N, Akafomo C; *Executive Summary: Obstructive Sleep Apnea and Commercial Motor Vehicle Driver Safety*. Federal Motor Carrier Safety Administration. 2007. Available at http://www.fmcsa.dot.gov/rules-regulations/TOPICS/mep/report/Sleep-Apnea-Final-Executive-Summary-prot.pdf

The number of professional truck drivers with this disease is alarming. The failure of trucking companies to act is appalling. Studies have shown for years a frightening number of truck drivers suffer from some degree of sleep apnea. In May of 1995 a report of a study was published in "CHEST," the official publication of the American College of Chest Physicians, titled "Sleep and Sleep-Disordered Breathing in Commercial Long-Haul Truck Drivers." The study found **78%** of the drivers tested, tested positive for at least mild sleep apnea.[12]

In July 2002 the Federal Motor Carrier and Safety Administration (FMCSA) published the results of a study "*Tech Brief: A Study of Prevalence of Sleep Apnea Among Commercial Truck Drivers."* The slogan of the research study was "Staying Awake Means Staying Alive." This research study on sleep apnea was sponsored FMCSA and the American Transportation Research Institute of the American Trucking Associations (ATA). The project sought to determine the prevalence of sleep apnea among truck drivers, risk factors associated with sleep apnea and truck driving and the impact of sleep apnea on driving performance. The study reported 28.1% (almost 1/3) of the drivers tested had some form of sleep apnea.[13]

Other studies have reported similar results. Whether the prevalence is 78% of drivers as reported in the 1995 study or 28% of drivers as reported in the 2002 study or something in between, considering the number of drivers on the road and the associated risk, sleep apnea is a problem for the trucking industry and the traveling public that has gone too long without being adequately addressed.

IV. The Effects of Sleep Apnea on Truck Driving

Studies involving US and Canada drivers found that patients with sleep disordered breathing were 2 ½ more likely to have automobile accidents. Other studies have shown individuals with sleep apnea are 3- 7 times more likely to be involved in a crash than those who do not have sleep apnea. It has been estimated that between 20 and 30 percent of accidents involving trucks are sleep related. One study found that drivers with sleep apnea are 3 to 5 times more likely to be involved in a head on collision.[14] Common sense tells you that a driver that is asleep, excessively drowsy or fatigued is more likely to be involved in a crash.

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[12] Stoohs RA, Bingham LA, Itoi A, Guilleminault C, Dement WC. *Sleep and Sleep-Disordered Breathing in Commercial Long-Haul Truck Drivers*. Chest.1995;107;1275-1282

[13] Pack, AI, Dinges DF, Maislin G. *A Study of Prevalence of Sleep Apnea Among Commercial Truck Drivers* July 2002 Publication No. FMCSA-RT-02-080

[14] Pack, AI, Dinges DF, Maislin G. *A Study of Prevalence of Sleep Apnea Among Commercial Truck Drivers* July 2002 Publication No. FMCSA-RT-02-080

V. Knowledge in the Industry

Awareness of the truck drivers with sleep apnea problem is not recent. Sleep apnea first began to be discussed as early as 1965. By the late 80s the effects of sleep apnea on driving was under active study with numerous reports having been published.

On April 7 and 8, 1988, over 20 years ago, the Office of Motor Carriers (OMC), Federal Highway Administration (FHA) and the Department of Transportation (DOT) co-sponsored a conference to review medical standards for commercial motor vehicle drivers.[15] The conference consisted of 28 participants representing various fields, including the motor carrier industry. In its report, the panel had the following recommendation which became part of guidelines for medical examiners performing DOT physicals:

> Guidelines for Patients with Sleep Apnea Syndrome – The patients with sleep apnea syndrome having symptoms of excessive daytime somnolence cannot take part in interstate driving, because they likely will be involved in hazardous driving and accidents resulting from sleepiness. Even if these patients do not have the sleep attacks, they suffer from daytime fatigue and tiredness. These symptoms will be compounded by the natural fatigue and monotony associated with the long hours of driving, thus causing increased vulnerability to accidents. Therefore, those patients who are not on any treatment and are suffering from symptoms related to EDS should not be allowed to participate in interstate driving.
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> Those patients will sleep apnea syndrome whose symptoms (e.g., EDS fatigue etc.) can be controlled by surgical treatment, e.g., permanent tracheostomy, may be permitted to drive after 3 month period free of symptoms, provided there is constant medical supervision. Laboratory studies (e.g., polysomnographic and multiple sleep latency tests) must be performed to document absence of EDS and sleep apnea.

Two and a half years later, on September 13th 1990, the OMC, FHA and the DOT cosponsored a second conference to develop standards for commercial vehicles driven by

[15] US Department of Transportation, Federal Highway Administration. *Conference on Neurological Disorders and Commercial Drivers.* Publication No. FHWA-MC-88-042. Washington DC: US DOT, Federal Highway administration, Office of Motor Carriers, 1988.

drivers with "disorders of the lungs and respiratory system."[16] The conference consisted of 25 participants representing various fields, including the motor carrier industry and specifically the American Trucking Associations. In its report, the panel had the following recommendation which became part of the guidelines for medical examiners:

> Individuals with suspected or untreated sleep apnea (symptoms of snoring and hypersomnolence) should be considered medically unqualified to operate a motor vehicle until the diagnosis has been dispelled or the condition has been treated successfully. In addition, as a condition of continuing qualification, commercial drivers who are being treated for sleep apnea should agree to continue uninterrupted therapy as long as they maintain their commercial driver's license. They should also undergo yearly multiple sleep latency testing (MSLT).

The panel noted a reported "twofold to fourfold" increase in crashes in individuals with untreated sleep apnea. The panel noted:

> This is of particular concern because most men with this illness are unaware of the problem. In addition, it worsens with advancing age and increasing body weight. It is believed that undiagnosed sleep apnea may be an important cause of vehicular accidents in North America today.

That was over 20 years ago. In the intervening years it has become widely accepted that the driver's report of no symptoms is completely unreliable in diagnosing sleep apnea. Drivers are either unaware of the problem or chose to conceal it. No trucking company can reasonably claim ignorance of the presence of sleep apnea among its drivers and the terrible risk to those with whom they share the roadway.

VI. Laws Governing Truck Drivers and Sleep Apnea

16. US Department of Transportation, Federal Highway Administration, Office of Motor Carriers. *Conference on Pulmonary/ Respiratory Disorders and Commercial Drivers.* Publication No. FHWA-MC-91-004. Washington DC: USDOT;1991

The Commercial Motor Vehicle Safety Act of 1986 (CMVSA) governs the qualifications of truck drivers. The standards established by the CMVSA are **minimum** standards.

49 CFR 391.1 (a) states:

> The rules in this part establish **minimum** qualifications for persons who drive commercial motor vehicles as, for, or on behalf of motor carriers. The rules in this part also establish **minimum** duties of motor carriers with respect to the qualifications of drivers. (Emphasis added)

49 CFR 391.11 provides:

> … a motor carrier shall not require or permit a person to drive a commercial motor vehicle unless that person is qualified to drive a commercial motor vehicle.

When it passed the Commercial Motor Vehicle Safety Act (CMVSA) in 2002 congress stated the purpose was to reduce the number of fatalities and injuries related to commercial motor vehicle operations. The CMVSA requires that the U.S. Department of Transportation (DOT) develop MINIMUM standards that ensure the physical condition of operators is adequate to enable them to operate a vehicle safely. The CMVSA further directs the DOT to establish a Medical Review Board to advise the Federal Motor Carrier Safety Administration (FMCSA) regarding physical qualifications of drivers.[17]

49 CFR 391.41 the provision relating to physical qualifications of drivers, provides as follows:

> §391.41 Physical qualifications for drivers - (a) A person shall not drive a commercial motor vehicle unless he/she is physically qualified to do so…
>
> . . .
>
> (b) a person is physically qualified to drive a commercial motor vehicle if that person:
>
> 1. Has no established medical history or clinical diagnosis of a respiratory dysfunction likely to interfere with his/her ability to control and drive a commercial motor safely.

[17] The Commercial Motor Vehicle Safety Act of 1986. Public Law 99-570, 100 Stat. 3207-170, 49 U.S.C. chapter 313

The FMCSA has published the following medical advisory relating to the subsection above, specifically identifying sleep apnea as a risk factor that should be addressed:

> There are many conditions that interfere with oxygen exchange and may result in incapacitation, including emphysema, chronic asthma, carcinoma, tuberculosis, chronic bronchitis and **sleep apnea**. If the medical examiner detects a respiratory dysfunction, that in any way is likely to interfere with the driver's ability to safely control and drive a commercial motor vehicle, the driver must be referred to a specialist for further evaluation and therapy. (Emphasis added)

Finally, 49 CFR 392.3 provides as follows:

> §392.1 Scope of the rules in this part – Every motor carrier, its officers, agents, representatives, and employees responsible for the management, maintenance, operation, or driving of commercial motor vehicles, or the hiring, supervising, training, assigning, or dispatching of drivers, shall be instructed in and comply with the rules in this part.
>
> § 392.3 III or fatigued operator – No driver shall operate a commercial motor vehicle, **and a motor carrier shall not require or permit a driver to operate a commercial motor vehicle, while the driver's ability or alertness is so impaired, or so likely to become impaired,** through fatigue, illness, or any other cause, as to make it unsafe for him/her to begin or continue to operate the commercial motor vehicle. (Emphasis added)

VII. Proposed Rules Relating to Sleep Apnea

In 2006, noting the lack of consensus for screening commercial drivers for sleep apnea, a joint task force was convened between the American College of Chest Physicians, The American College of Occupational and Environmental Medicine and the National Sleep Foundation.[18] The task force published its findings in September 2006 *Journal of Occupational Medicine*. The task force included its recommendations for screening for sleep apnea. The panel recommended

[18] Hartenbaum N, Collop N, Rosen IM, Phillips B, George CF, Rowley JA, Freedman N, Weaver TE, Gurubhagavatula I, Strohl K, Leaman HM, Moffitt GL; American College of Chest Physicians; American College of Occupational and Environmental Medicine; National Sleep Foundation. *Sleep Apnea and Commercial Motor Vehicle Operators: Statement from the Joint Task Force of the American College of Chest Physicians, American College of Occupational and Environmental Medicine and the National Sleep Foundation*, Chest 2006 130: 902-905

that a driver's BMI (body mass index) be calculated, a determination be made whether the driver has hypertension that requires two or more medications to control and that the drivers neck circumference be measured to determine if it is greater than 17 inches for a man or 16 inches for a woman. The panel recommended that if a driver was found to have two or more of those three criteria that the driver be certified for three months pending a sleep study.[19] Body mass index is easily calculated by plugging the driver's height and weight in a table that is readily available, including on the internet.

A subsequently study was done to evaluate the effectiveness of the 2006 recommendation. The study was reported in the March 2008 JOEM.[20] The report was titled "Consensus Criteria for Screening Commercial Drivers for Obstructive Sleep Apnea: Evidence of Effectiveness." The study involved 1443 commercial drivers. Using only the questions on the current medical examination form, none of participants would have been detected for sleep apnea. Using the qualifiers above, one hundred ninety drivers were flagged. Of those drivers who were flagged and who were subsequently screened using a sleep study, 94.8% had sleep apnea. The results confirmed a high predictive value of these criteria. A subsequent study found the criteria recommended accurately predicted sleep apnea in 100% of the drivers.[21] Considering the danger involved, responsible trucking companies must know the results of these critical and well publicized studies. With this knowledge, trucking companies must have a program for screening its drivers for sleep apnea.

On August 13, 2007 the FMCSA five member Medical Expert Panel, along with industry experts, convened a two day conference tasked specifically to review the existing FMCSA guidelines relating to certification of drivers with or suspected to have sleep apnea and to recommend changes to existing guidelines.[22] On January 14th, 2008 the panel published its report "Expert Panel Recommendations: Obstructive Sleep Apnea and Commercial Motor Vehicle Safety."

In light of the insurmountable evidence relating to the prevalence of sleep apnea in truck drivers and the extreme danger that results, the Panel recommended the following guideline:

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[19] The driver involved in the death of John Lindsay had all three at the time he was hired.

[20] Talmage JB, Hudson TB, Hegman KT, Thiese MS, *Consensus Criteria for Screening Commercial drivers For Obstructive Sleep Apnea: Evidence of Efficacy,* J Occup Environ Med. 2008;50: 324-328

[21] Parks PD, Durand G, Tsismenakis AJ, Vela-Bueno A, Kales S: *Screening for Obstructive Sleep Apnea During Commercial Driver Medical Examinations.* J Occup Environ Med. 2009; 51:275-282

[22] Ancoli-Israel S, Czeisler CA, George CFP, Guilleminault C, Pack AI, *Expert Panel Recommendations: Obstructive Sleep apnea and Commercial Motor Vehicle Driver Safety* Federal Motor Carrier Safety Administration. Washington DC. 2008. Available at http://www.fmcsa.dot.gov/rules-regulations/TOPICS/mep/report/Sleep-MEP-Panel-Recommendations-508.pdf

The Medical Expert Panel identified the following individuals who should **not** be certified or recertified as being qualified to drive a commercial motor vehicle:

- Individuals that report that they have experienced excessive sleepiness while driving, or
- Individuals who have experienced a crash associated with falling asleep, or
- Individuals with and AHI that is greater than 20, until such an individual has been adherent to Positive Airway Pressure (PAP). They can be conditionally certified based on the criteria for CPAP compliance as outlined in Guideline 3, or
- Individuals who have undergone surgery and who are pending the findings of a 3 month postoperative evaluation;
- Individuals who have been found to be non-compliant with their treatment at any point, or
- **Individuals who have a BMI of greater than 33 kg/m2 (pending evaluation by a sleep study)**[23]

The Medical Expert Panel further recommended that the following groups of individuals with obstructive sleep apnea be allowed to conditionally drive a CMV:

- Individuals with a BMI of greater than 33kg/m2 may be conditionally certified for one month pending the findings of a sleep study. The panel noted that this period should be less than one week. However, given the current infrastructure for sleep studies in the United States, obtaining a sleep study within one week is unlikely to be feasible in many cases. Consequently, the panel recommended that a transition period of two years be allowed during which time efforts should be made to improve the infrastructure so that the period between requesting a sleep study and obtaining that study can be reduced to one week for certification purposes.

VIII. The responsibility of Trucking companies for Deaths and Injuries caused by Drivers with Sleep Apnea

Since it was determined that truck drivers with untreated sleep apnea should not be permitted to drive trucks more than 20 years ago, it is likely that more than 20,000 people have died as a result of wrecks involving drivers with untreated sleep apnea. Holding trucking companies responsible for the needless, preventable, mayhem caused by drivers impaired by sleep apnea may be the only path to change.

[23] The driver involved in the truck crash that resulted in the death of John Lindsay had a BMI of 42.

It is now widely accepted that body mass index (BMI) is an accurate predictor of the existence of sleep apnea. Screening is no more complicated than obtaining a drivers height and weight and going to a table. A driver with a body mass index (BMI) over 30 probably has sleep apnea. A BMI over 30, a neck circumference over 17 and high blood pressure for a male driver has been found in one study to predict the existence of sleep apnea 100% of the time. The most current recommendation by the FMVCSA Medical Expert Panel requires **every** driver with a BMI over 33 be tested for sleep apnea yet many, if not most, of those drivers still are not tested today.

Every time a truck driver causes a crash the existence of sleep apnea should be evaluated. Questions to determine the existence of risk factors must be asked. Driver's qualification files must be examined for the existence of risk factors. If the risk factors are there and no screening has been done the question "Why?" must be asked.

The trucking company's safety program must be examined to determine what, if any, screening the company performs to identify drivers with sleep apnea.

Until it is more costly to ignore the epidemic than to take steps to correct the problem, it is unlikely there will be any change.