



# National Transportation Safety Board

Washington, D.C. 20594

## Safety Recommendation

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**Date:** October 20, 2009

**In reply refer to:** H-09-15 and -16

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### Accident Experience

The National Transportation Safety Board (NTSB) has investigated a number of accidents and incidents in all modes of passenger transportation involving operators with sleep disorders. These accidents include the following highway accidents in which the NTSB identified commercial drivers with obstructive sleep apnea (OSA).

On July 26, 2000, the driver of a tractor-trailer travelling on Interstate 40 near Jackson, Tennessee, collided with a Tennessee Highway Patrol vehicle trailing construction vehicles, killing the state trooper inside.<sup>1</sup> The tractor-trailer then travelled across the median and collided with a Chevrolet Blazer heading in the opposite direction, seriously injuring the driver of the Blazer. The tractor-trailer driver was 5 feet, 11 inches tall, weighed 358 pounds, and had been diagnosed with and had undergone surgery for OSA, though he had not indicated either the diagnosis or the surgery on examinations for medical certification. The NTSB found that the driver's (unreported) OSA, his untreated hypothyroidism, or complications from either or both conditions predisposed him to impairment or incapacitation, including falling asleep at the wheel while driving. The NTSB determined that the probable cause of the accident was the driver's incapacitation, owing to the failure of the medical certification process to detect and remove a medically unfit driver from service.

In other investigations, the NTSB has identified drivers at risk for or having OSA where the disease could not be clearly linked to the cause of the accident. For example, the driver of a motorcoach carrying a high school baseball team was found to have several risk factors for OSA (he was overweight, had previously reported snoring, and was on medications for the treatment

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<sup>1</sup> *Work Zone Collision Between a Tractor-Semitrailer and a Tennessee Highway Patrol Vehicle, Jackson, Tennessee, July 26, 2000*, Highway Accident Report NTSB/HAR-02/01 (Washington, DC: National Transportation Safety Board, 2002).

of high blood pressure and anxiety) but had never undergone an evaluation for the disorder.<sup>2</sup> In another accident, an obese motorcoach driver carrying passengers on a ski trip had been diagnosed with and treated for OSA but had specifically denied any history of sleep problems when undergoing examination for medical certification.<sup>3</sup>

Accidents and incidents in other transportation modes have also highlighted the critical importance of screening for and effectively treating OSA among transportation operators. In a recent aviation incident, both commercial pilots fell asleep, passing over their intended destination airport in Hilo, Hawaii.<sup>4</sup> The NTSB determined that the probable cause of this incident was the captain and first officer inadvertently falling asleep during the cruise phase of flight. The captain, who had multiple risk factors for OSA, was subsequently diagnosed with the disorder, and his undiagnosed (and untreated) OSA was found to be a factor in the incident. In a fatal rail accident in Clarkston, Michigan, the engineer of a train that proceeded through a stop indication, striking another train, was found to be at very high risk for OSA but had never been formally diagnosed or treated, and the conductor was found to have been diagnosed with OSA but had not been tested to determine if his treatment was effective.<sup>5</sup> The probable cause of that rail accident was determined to be the crewmembers' fatigue, which was primarily due to the engineer's untreated and the conductor's insufficiently treated OSA. A cruise ship maneuvering through Alaska's Inside Passage was grounded on a submerged, but well-known, charted and marked rock by a pilot with multiple risk factors for OSA, who was subsequently diagnosed with severe OSA.<sup>6</sup> The probable cause was determined to be the pilot's poor performance, which may have been exacerbated by chronic fatigue caused by OSA.

## Obstructive Sleep Apnea

OSA is a condition in which individuals obstruct their own airways while sleeping, typically resulting in hypoxia at night, interruptions in breathing lasting several seconds at a time, loud snoring, and non-restful sleep. They are frequently entirely unaware of the condition. Individuals with the disorder may have extreme daytime sleepiness and often fall asleep within minutes in a quiet or monotonous environment. In the first accident described above, the driver was noted to have been at risk for falling asleep while driving. OSA is associated with significant cognitive and psychomotor deficits, which are at least partially reversible with appropriate treatment.<sup>7</sup> Such deficits are particularly problematic during commercial highway operations where immediate and appropriate responses to external stimuli are often critical to safety. Accident rates have been shown to be considerably higher in drivers with OSA than in

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<sup>2</sup> *Motorcoach Override of Elevated Exit Ramp Interstate 75 Atlanta, Georgia, March 2, 2007*, NTSB/HAR-08/01 (Washington, DC: National Transportation Safety Board, 2008).

<sup>3</sup> *Motorcoach Rollover Near Mexican Hat, Utah, January 6, 2008*, NTSB/HAR-09/01 (Washington, DC: National Transportation Safety Board, 2009).

<sup>4</sup> Aviation Accident Brief, Hilo, Hawaii, February 13, 2008:  
<[http://www.nts.gov/ntsb/brief2.asp?ev\\_id=20080222X00229&ntsbno=SEA08IA080&akey=1](http://www.nts.gov/ntsb/brief2.asp?ev_id=20080222X00229&ntsbno=SEA08IA080&akey=1)>.

<sup>5</sup> *Collision of Two Canadian National/Illinois Central Railway Trains near Clarkston, Michigan, November 15, 2001*, NTSB/RAR-02/04 (Washington, DC: National Transportation Safety Board, 2002).

<sup>6</sup> *Grounding of the Liberian Passenger Ship Star Princess on Poundstone Rock, Lynn Canal, Alaska, June 23, 1995*, Marine Accident Report NTSB/MAR-97/02 (Washington, DC: National Transportation Safety Board, 1997).

<sup>7</sup> L. Ferini-Strambi and others, "Cognitive Dysfunction in Patients with Obstructive Sleep Apnea (OSA): Partial Reversibility after Continuous Positive Airway Pressure (CPAP)," *Brain Research Bulletin*, vol. 61, no. 1 (2003), pp. 87–92.

those without the disorder, with one case-control study demonstrating a more than six-fold higher risk of traffic accidents in drivers with OSA, after controlling for other possible confounding factors.<sup>8</sup> In addition to the substantial risks of impairment or incapacitation as a direct result of the fatigue associated with OSA, the untreated disorder increases the likelihood of other operationally relevant medical conditions, including stroke, heart failure, coronary artery disease, and diabetes.

The condition is formally diagnosed through polysomnography, extensive monitoring done as part of a sleep study in which the patient sleeps under controlled conditions. If diagnosed, OSA can be effectively treated, usually through the use of a continuous positive airway pressure (CPAP) device worn at night to deliver air pressure that forces the airway open. Most modern CPAP devices are capable of recording detailed information regarding use. In some cases, surgery may be recommended to modify the individual's anatomy to allow the airway to remain unobstructed during sleep.

Obesity and high blood pressure are significantly associated with an increased risk for OSA. In one study, the prevalence of OSA was more than 50 percent in patients with an average body mass index (BMI)<sup>9</sup> of 40.0.<sup>10</sup> Another study found that 96 percent of male patients with resistant hypertension (high blood pressure poorly controlled despite the use of three or more antihypertensive agents) had unsuspected OSA.<sup>11</sup> A 2006 consensus statement from the Joint Task Force of the American College of Chest Physicians (ACCP), American College of Occupational and Environmental Medicine (ACOEM), and the National Sleep Foundation (NSF) on screening for OSA in commercial drivers recommended in part that drivers with a BMI of 35 or higher and hypertension that cannot be controlled on less than two medications not be certified for longer than 3 months pending a formal evaluation for OSA.<sup>12</sup>

A 2002 review of the epidemiology of OSA estimated that roughly 7 percent of adults have at least moderate OSA.<sup>13</sup> An FMCSA-commissioned study on the prevalence of OSA in commercial drivers found that 17.6 percent of drivers studied had mild OSA, 5.8 percent had moderate OSA, and 4.7 percent had severe OSA.<sup>14</sup> As there currently exists no central database to record diagnoses identified in commercial drivers on examinations conducted for medical certification, it is unknown how many drivers have reported the condition.

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<sup>8</sup> J. Teran-Santos, A. Jimenez-Gomez, and J. Cordero-Guevara, "The Association Between Sleep Apnea and the Risk of Traffic Accidents, Cooperative Group Burgos-Santander," *New England Journal of Medicine*, vol. 340, no. 11 (1999), pp. 847–51.

<sup>9</sup> Body mass index is a person's weight in kilograms divided by height in meters squared. An index of 30 or more is defined as obese by the National Institutes of Health.

<sup>10</sup> O. Resta and others, "Sleep-Related Breathing Disorders, Loud Snoring and Excessive Daytime Sleepiness in Obese Subjects," *International Journal of Obesity and Related Metabolic Disorders*, vol. 25, no. 5 (2001), pp. 669–75.

<sup>11</sup> A.G. Logan and others, "High Prevalence of Unrecognized Sleep Apnoea in Drug-Resistant Hypertension," *Journal of Hypertension*, vol. 19 (2001), pp. 2271–2277.

<sup>12</sup> N. Hartenbaum and others, "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," *Journal of Occupational and Environmental Medicine*, vol. 48, no. 9 (supplement) (2006), pp. S4–37.

<sup>13</sup> T. Young, P.E. Peppard, and D.J. Gottlieb, "Epidemiology of Obstructive Sleep Apnea: A Population Health Perspective," *American Journal of Respiratory and Critical Care Medicine*, vol. 165, no. 9 (2002), pp. 1217–39.

<sup>14</sup> *A Study of Prevalence of Sleep Apnea Among Commercial Truck Drivers*, FMCSA-RT-02-080 (Washington, DC: Federal Motor Carrier Safety Administration, July 2002).

## FMCSA Guidance

The FMCSA includes a question on the current form completed by commercial drivers undergoing examination for medical certification that specifically asks about sleep disorders, OSA, daytime sleepiness, and snoring. In addition, on its website under “Frequently Asked Questions – Medical,”<sup>15</sup> in response to “Is Sleep Apnea Disqualifying?” the FMCSA notes the following:

Drivers should be disqualified until the diagnosis of sleep apnea has been ruled out or has been treated successfully. As a condition of continuing qualification, it is recommended that a CMV [commercial motor vehicle] driver agree to continue uninterrupted therapy such as CPAP, etc. / monitoring and undergo objective testing as required.

A driver with a diagnosis of (probable) sleep apnea or a driver who has Excessive Daytime Somnolence (EDS) should be temporarily disqualified until the condition is either ruled out by objective testing or successfully treated.

Narcolepsy and sleep apnea account for about 70% of EDS. EDS lasting from a few days to a few weeks should not limit a driver’s ability in the long run. However, persistent or chronic sleep disorders causing EDS can be a significant risk to the driver and the public. The examiner should consider general certification criteria at the initial and follow-up examinations:

- Severity and frequency of EDS
- Presence or absence of warning of attacks
- Possibility of sleep during driving
- Degree of symptomatic relief with treatment
- Compliance with treatment

In spite of this limited guidance regarding drivers who are excessively sleepy or already diagnosed with OSA, the FMCSA currently provides no guidance regarding how to identify commercial drivers at risk for OSA. The FMCSA Medical Review Board recommended in January 2008 that the FMCSA require screening for OSA in all drivers with a BMI over 30,<sup>16</sup> but the FMCSA has not acted on this recommendation.

## Other Modal Agencies

The Federal Aviation Administration (FAA) provides written guidance to aviation medical examiners (AME) for the submission of appropriate medical information for pilots who have reported a history of OSA<sup>17</sup> but does not screen pilots for the presence of the disorder and

<sup>15</sup> See <<http://www.fmcsa.dot.gov/rules-regulations/topics/medical/faq.asp>>, accessed June 19, 2009.

<sup>16</sup> FMCSA Medical Review Board meeting minutes, January 28, 2008 (see <[http://www.mrb.fmcsa.dot.gov/documents/Final\\_Meet\\_Min\\_Jan28\\_2008\\_MRB\\_Meet\\_Revised\\_Upd\\_2-19-09.pdf](http://www.mrb.fmcsa.dot.gov/documents/Final_Meet_Min_Jan28_2008_MRB_Meet_Revised_Upd_2-19-09.pdf)>, accessed June 19, 2009).

<sup>17</sup> 2009 Guide for Aviation Medical Examiners: <[http://www.faa.gov/about/office\\_org/headquarters\\_offices/avs/offices/aam/ame/guide/](http://www.faa.gov/about/office_org/headquarters_offices/avs/offices/aam/ame/guide/)>.

has no question on the Application for Airman Medical Certificate concerning a history of OSA or the presence of symptoms, such as snoring or excessive daytime sleepiness, related to OSA. The FAA does not provide any guidance to AMEs regarding risk factors for sleep disorders or any symptoms (for example, snoring) that might be related to OSA.

The Federal Transit Administration (FTA) has no formal medical standards for transit operators; each authority independently arranges medical programs for its operators, and many operators are required, either due to their functions or by the authority for which they work, to maintain a current commercial driver license. The NTSB is not aware of any existing programs that routinely screen transit operators for OSA.

The U.S. Coast Guard is currently revising forms and guidance regarding medical certification and the most recent draft form includes a specific question regarding OSA, among questions on other sleep disorders. The draft form does not at this writing, however, include any questions about symptoms of OSA, including daytime sleepiness, snoring, or observed OSA.

The NTSB has issued safety recommendations to the FAA and the FTA and is now issuing recommendations to the Coast Guard to ensure that operators in the relevant modes are appropriately screened, evaluated, and treated for OSA. On August 7, 2009, in connection with the Hilo, Hawaii, incident, the NTSB issued Safety Recommendations A-09-61 through -63 to the FAA.<sup>18</sup> On July 14, 2009, in its report on the Newton, Massachusetts, rail collision, the NTSB made similar safety recommendations to the FTA (R-09-08 and -09) and to the regional rail transit authorities (R-09-10 and -11).<sup>19</sup> The NTSB is also issuing three safety recommendations to the Coast Guard (M-09-14 through -16).

In addition, in response to NTSB recommendations issued in 2002 (R-02-24 through -26), the Federal Railroad Administration is working on new forms and guidance regarding medical certification; drafts from this work have a specific question regarding sleep disorders, OSA, and snoring and provide guidelines on screening specifically for OSA.

## Summary

The relative risk of accident involvement for individuals with OSA is clearly elevated and quite clearly associated with the untreated disease. FMCSA's own research suggests a prevalence of more than 10 percent of at least moderate OSA in commercial drivers. Because OSA is commonly unrecognized by individuals who have it, the extent to which it is responsible or partially responsible for the approximately 5,000 fatal large truck accidents and the approximately 250 fatal bus accidents annually may never be known. However, the condition demonstrably leads to an increased risk of motor vehicle accidents and cognitive impairment and substantially increases the likelihood of both critical errors and of actually falling asleep while driving. The FMCSA has guidance through which drivers who are effectively treated for their OSA can routinely be approved for continued medical certification. The FMCSA already requires the documentation of objective and subjective information that might be used in

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<sup>18</sup> Safety recommendation letter available at <[http://www.nts.gov/Recs/letters/2009/A09\\_61\\_66.pdf](http://www.nts.gov/Recs/letters/2009/A09_61_66.pdf)>.

<sup>19</sup> *Collision Between Two Massachusetts Bay Transportation Authority Green Line Trains, Newton, Massachusetts, May 28, 2008*, Railroad Accident Report NTSB/RAR-09/02 (Washington, DC: National Transportation Safety Board, 2009).

developing screening criteria. Further, the use of such screening criteria in a formal program has already been proposed by the Joint Task Force of the ACCP, the ACOEM, and the NSF in its 2006 consensus guidance and by the FMCSA's own Medical Advisory Board.

### **Recommendations**

Therefore, the National Transportation Safety Board makes the following recommendations to the Federal Motor Carrier Safety Administration:

Implement a program to identify commercial drivers at high risk for obstructive sleep apnea and require that those drivers provide evidence through the medical certification process of having been appropriately evaluated and, if treatment is needed, effectively treated for that disorder before being granted unrestricted medical certification. (H-09-15)

Develop and disseminate guidance for commercial drivers, employers, and physicians regarding the identification and treatment of individuals at high risk of obstructive sleep apnea (OSA), emphasizing that drivers who have OSA that is effectively treated are routinely approved for continued medical certification. (H-09-16)

Please refer to Safety Recommendations H-09-15 and -16 in your reply. If you would like to submit your response electronically rather than in hard copy, you may send it to the following e-mail address: [correspondence@ntsb.gov](mailto:correspondence@ntsb.gov). If your response includes attachments that exceed 5 megabytes, please e-mail us asking for instructions on how to use our secure mailbox. To avoid confusion, please use only one method of submission (that is, do not submit both an electronic copy and a hard copy of the same response letter).

Chairman HERSMAN, Vice Chairman HART, and Member SUMWALT concurred in these recommendations.

*[Original Signed]*

By: Deborah A.P. Hersman  
Chairman



