



Excessive Daytime Sleepiness and CMV Driver Safety

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Overview

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- ▶ Full report will be available at the National Transportation Library Web site: <http://ntl.bts.gov>



Objectives

- ▶ To identify and describe literature on impact of EDS and Fatigue on CMV driver safety
 - ▶ To identify and describe literature of self awareness of driver fatigue
 - ▶ To identify methodologies that can be used by medical examiners to identify at risk individuals
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Questions Addressed

- ▶ Is excessive daytime sleepiness and/or fatigue a risk factor for crash?
- ▶ Are there other identifiable sleep-disorder related risk-factors for crash?
- ▶ Are drivers aware of severity of these risk factors?
- ▶ Are tests available that enable medical examiners to identify those individuals with sleep-related risk factors who are at increased risk for crash?

Sleepiness and Crash Risk

- ▶ Excessive daytime sleepiness likely a risk factor for crash among CMV drivers

Study	Chronic Sleepiness	Chronic Sleepiness Increased Risk?	Acute Sleepiness	Acute Sleepiness Increased Risk?	Measure of Sleepiness Relative to Incident
Hanowski, et al. (2007) <i>Prospective cohort study</i>	--	--	Objective measure of sleep quantity using actigraphy and video monitoring of sleepiness	▲	Simultaneous
Dingus, et al. (2006) <i>Prospective cohort study</i>	--	--	Karolinska Sleepiness Scale Video monitoring of sleepiness	▲	Simultaneous
Gander et al. (2006) <i>Retrospective cohort study</i>	ESS	--	General Questionnaire about immediate prior sleep	▲	Close in time following crash
Perez-Chada et al. (2005) <i>Retrospective cohort study</i>	ESS	▲	--	--	Variable (data report on crash at anytime in past)
Sabbagh-Ehrlich, et al. (2005) <i>Retrospective cohort study</i>	General questionnaire	▲	--	--	Variable (data report on crash at anytime in past)
Souza et al. (2005) <i>Retrospective cohort study</i>	ESS PSQI	▲	--	--	Variable (data report on crash within past 5 yrs)
Howard, et al. (2004) <i>Retrospective cohort study</i>	ESS FOSQ	▲	--	--	Variable (data report on crash within past 3 yrs)
Carter, et al. (2003) <i>Retrospective cohort study</i>	ESS Self assessed sleep debt	▲	--	--	Variable (data report on crash within past 10 yrs)
Mitler, et al. (1997) <i>Prospective cohort study</i>	--	--	Objective measure of sleep quantity using polysomnography electroencephalography Video monitoring of sleepiness	▲	Simultaneous
Maycock, et al. (1997) <i>Prospective cohort study</i>	ESS	▲	--	--	Variable (data report on crash within past 3 yrs)

Other Risk Factors for Crash or Falling Asleep at Wheel

Study	Sleep-related					Driving Exposure		Other	
	Symptoms of Sleep Disorder	Quantity of Sleep	Time of Day	Sleep Habits/Quality	Night Driving	Work Duration/Schedule	Time Driving	Older Driver	Medication Use
	● Indicates a significant relationship observed with increased crash risk and/or falling asleep at wheel								
Heaton, et al. (2008)	--	●			●	●			●
Hanowski, et al. (2007)	--	●	●	--	--	--	--	--	--
Dingus, et al. (2006)	--	--	●	--	●	--	--	--	--
Gander et al. (2006)	--	●	●	●	--	--	●	--	--
Souza et al. (2005)	--	●	--	●	--	--	--	●	--
Howard, et al. (2004)	●	●	●	●	--	●	●	--	●
Carter, et al. (2003)	●	●	--	--	--	--	--	--	--
McCartt et al. (2000)	●	--	--	●	●	●	●	●	--



High Risk or Low Risk?

- ▶ No reliable methods for predicting which individuals with sleep a sleeping disorder is most at risk



Epworth Sleepiness Scale

This is a measure of how likely individuals are to doze off or fall asleep in the following situations, in contrast to feeling just tired? It is intended to capture an individual's usual way of life in recent times. Individuals are instructed to assign the most appropriate number for each situation.

Situation	Chance of Dozing
	0 = no chance of dozing
	1 = slight chance of dozing
	2 = moderate chance of dozing
	3 = high chance of dozing
Sitting and reading	
Watching TV	
Sitting inactive in a public place (e.g. a theater or a meeting)	
As a passenger in a car for an hour without a break	
Lying down to rest in the afternoon when circumstances permit	
Sitting and talking to someone	
Sitting quietly after a lunch without alcohol	
In a car, while stopped for a few minutes in traffic	

- A score of 0 – 9: Average score, characteristic of the normal population
- A score of 10 – 24: Indicates some level of chronic sleepiness; sleep specialist advice recommended

Relevant Regulations and Guidance to Medical Examiners – USA

Regulation

391.41(b)(9) A person is physically qualified to drive a commercial motor vehicle if that person:

Has no mental, nervous, organic, or functional disease or psychiatric disorder likely to interfere with the driver's ability to drive a commercial motor vehicle safely.

1988 Conference on Neurological Disorders and Commercial Drivers

Sleep Disorders and Interstate Driving

Regarding interstate commercial driving regulations, panel was concerned mainly with those sleep disturbances which cause excessive daytime somnolence (EDS). These disorders may be classified broadly into two categories(I):

- *Transient disorders causing EDS.*
- *Persistent or chronic sleep disorders causing EDS.* Persistent or chronic sleep disorders can be enumerated as follows:
 - Sleep apnea syndrome
 - Narcolepsy syndrome
 - Primary alveolar hypoventilation syndrome (idiopathic)
 - Central or secondary alveolar hypoventilation syndrome which is secondary to a variety of acute and progressive neurological diseases causing EDS
 - Idiopathic CNS hypersomnolence
 - Hypersomnolence (EDS) secondary to medical or non-neurological causes (metabolic, toxic, or systemic diseases)
 - Restless legs syndrome (RLS) associated with EDS or RLS-DOES (disorder of excessive somnolence) syndrome associated usually with periodic movements of sleep
 - Disorders of sleep-wake cycles
 - Hypersomnolence (EDS) secondary to psychiatric disorders (major or minor depressive illness or schizophrenia)
 - Periodic hypersomnolence

The two most common causes of EDS are the **sleep apnea syndrome** and the **narcolepsy**; these two constitute about 70 percent of cases of EDS.

Guidelines for Patients with Narcolepsy Syndrome--Narcolepsy is generally a life-long condition although the sleep attacks can be shortened or reduced in number by pharmacologic treatment in some patients. But these drugs also have other side effects which generally do not control the sleep attacks completely. Patients with narcolepsy syndrome should not, therefore, be allowed to participate in interstate driving.

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.

Those patients with sleep apnea syndrome whose symptoms (e.g., EDS, fatigue etc.) can be controlled by surgical treatment, e.g., permanent tracheotomy, 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.

Guidelines for Idiopathic CNS Hypersomnolence and Primary (Idiopathic) Alveolar Hypoventilation Syndrome--These patients should not be allowed to drive a commercial vehicle.

Guidelines for the Patients With RLS-DOES Syndrome--These patients also should not participate in commercial driving.

Guidelines for Patients with Hypersomnolence Due to Acute and Progressive Neurological or Systematic Medical Conditions and Psychiatric Disturbances-- Recommendations for these individuals should be determined by the underlying primary conditions causing EDS. In general these patients should not be allowed to participate in interstate driving.



Relevant Regulation – Overseas

	AUS	CAN	EU	NZ	UK
Attributes of Non-U.S. Standards and Guidelines Related to Sleep and Sleep Disorders					
Specifically address sleeping disorders	•	•		•	•
Addresses sleeping disorders aside from obstructive sleep apnea and narcolepsy	•	•			•
Calls for driving privileges to be revoked until disorder treated and under control		•		•	•
Allows driving after taking into account the opinion of a specialist and the nature of the driving task	•				
Offers additional guidance	•	•		•	•