

The Dangers of Drowsy Driving

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Master Instructor Program 2016

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Show video of the Jan. 19 Santa Clara bus crash that killed two women who were ejected from the bus and injured 13 others, including the driver. The NTSB is still determining a probable cause for the accident. The driver had told investigators that he drank coffee because he felt fatigued during a stop in Gilroy, according to the CHP (California Highway Patrol). Witnesses reported the bus was traveling at the speed limit prior to the crash, CHP officials said.

Outcomes

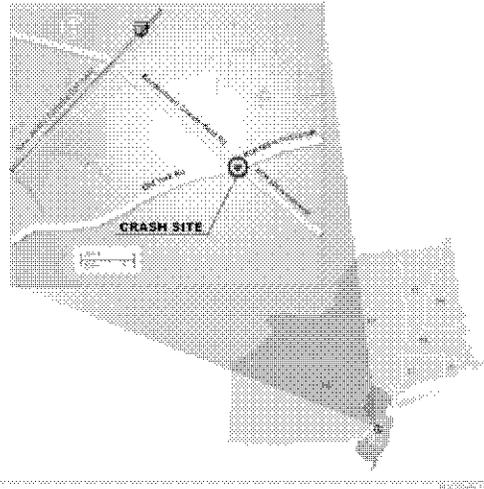
By the conclusion of this presentation, transportation professionals will be able to:

- Identify the impact of driver fatigue within the pupil transportation industry.
- Understand what causes driver fatigue and sleep deprivation.
- List common signs and symptoms of fatigue.
- Hold an open discussion about countermeasures to combat driver fatigue within their own operations.
- Correctly answer a minimum of ten (10) out of (12) questions pertaining to drowsy driving.

Do not teach from this slide. Briefly explain what is expected at the outcome of the presentation.

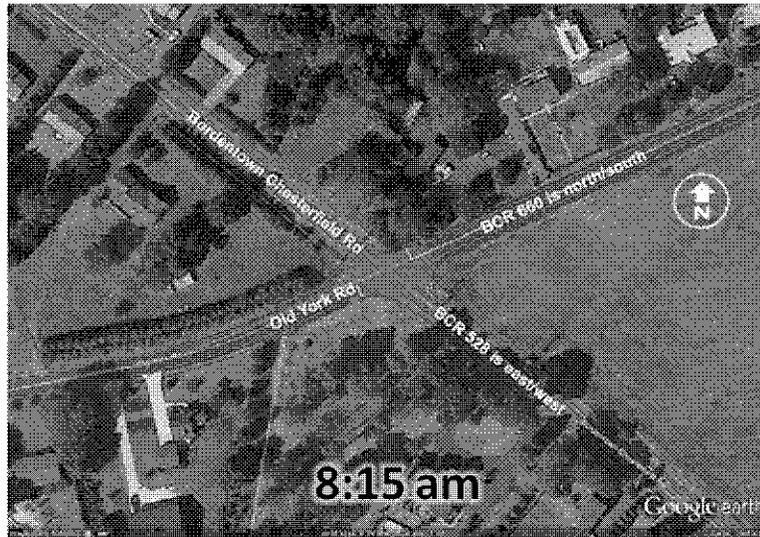
February 16, 2012 Chesterfield, New Jersey

- 66 year old male
- Started working for company on Jan. 30
- 2012 IC Bus
- 25 Chesterfield Elementary students



National Transportation Safety Board. 2013. School Bus and Truck Collision at Intersection Near Chesterfield, New Jersey, February 16, 2012. Highway Accident Report NTSB/HAR-13/01. Washington, DC. - Abstract: On February 16, 2012, about 8:15 a.m., near Chesterfield, New Jersey, a Garden State Transport Corporation 2012 IC Bus, LLC, school bus was transporting 25 students to Chesterfield Elementary School.

February 16, 2012 Chesterfield, New Jersey



The bus was traveling north on Burlington County Road (BCR) 660, while a Herman's Trucking Inc. 2004 Mack roll-off truck with a fully loaded dump container was traveling east on BCR 528, approaching the intersection. The bus driver had stopped at the flashing red traffic beacon and STOP sign. As the bus pulled away from the white stop line and entered the intersection, it failed to yield to the truck and was struck behind the left rear axle. The bus rotated nearly 180 degrees and subsequently struck a traffic beacon support pole.

**February 16, 2012 Chesterfield,
New Jersey**



One bus passenger was killed. Five bus passengers sustained serious injuries, 10 passengers and the bus driver received minor injuries, and nine passengers and the truck driver were uninjured.

February 16, 2012 Chesterfield, New Jersey

The National Transportation Safety Board (NTSB) determines that the probable cause of the Chesterfield, New Jersey, crash was the school bus driver's failure to observe the Mack roll-off truck, which was approaching the intersection within a reasonable amount of time. Contributing to the school bus driver's reduced vigilance were cognitive decrements due to fatigue as a result of acute sleep loss, chronic sleep debt, and poor sleep quality, in combination with, and exacerbated by, sedative side effects from his use of prescription medications.

Further contributing to the severity of the crash were the defective brakes on the truck and its overweight condition due to poor vehicle oversight by Herman's Trucking, along with improper installation of the lift axle brake system by the final stage manufacturer—all of which degraded the truck's braking performance. Contributing to the severity of passenger injuries were the nonuse or misuse of school bus passenger lap belts, the lack of passenger protection from interior sidewalls, sidewall components, and seat frames, and the high lateral and rotational forces in the back portion of the bus.

- **School bus driver fatigue, sedating prescription medications, medical conditions, and commercial driver's license medical examinations:** These factors were contributing to the school bus driver's reduced vigilance at the intersection despite having adequate sight distance after stopping for the red traffic beacon and STOP sign.

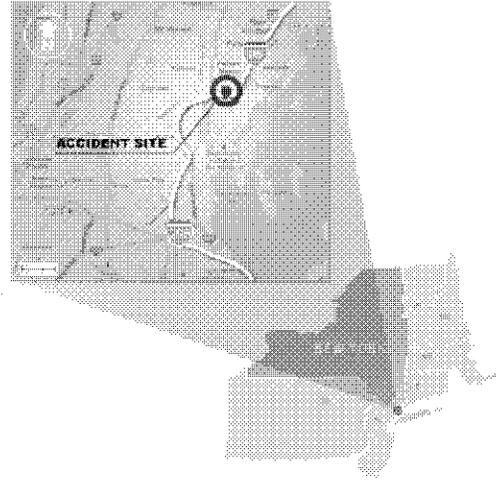
1 A roll-off container is typically an open steel receptacle used to transport and contain construction and demolition waste. Roll-off (also known as roll-off cable hoist) service refers to hydraulically operated rails and a cable hoist that are designed to load rectangular dumpsters atop the truck chassis behind the cab. Hydraulic pistons elevate and lower the forward end of the rails in concert with the cable hoist to raise or lower the dumpster onto the back of the truck.

viii

Major safety issues identified in this investigation were **school bus driver fatigue, sedating prescription medications, medical conditions,** and commercial driver's license medical examinations; truck driver speed, oversight of overweight commercial vehicles, brake maintenance, and final stage manufacturing air brake system installation; connected vehicle technology; and school bus occupant injuries and school bus crashworthiness.

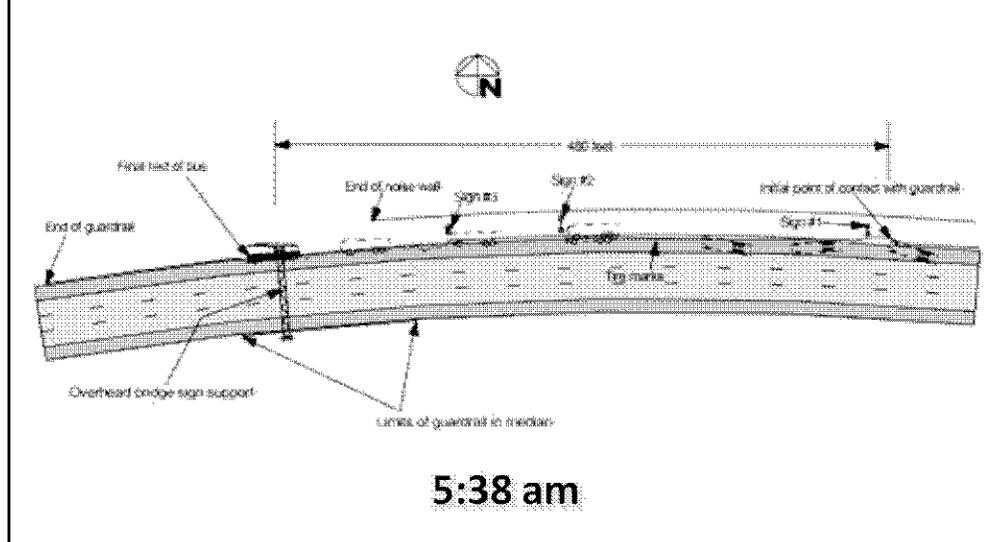
March 12, 2011 New York City, New York

- 40 year old male
- Operating under an alias
- License suspended
- 1999 Prevost 56-passenger motor coach
- 32 passengers



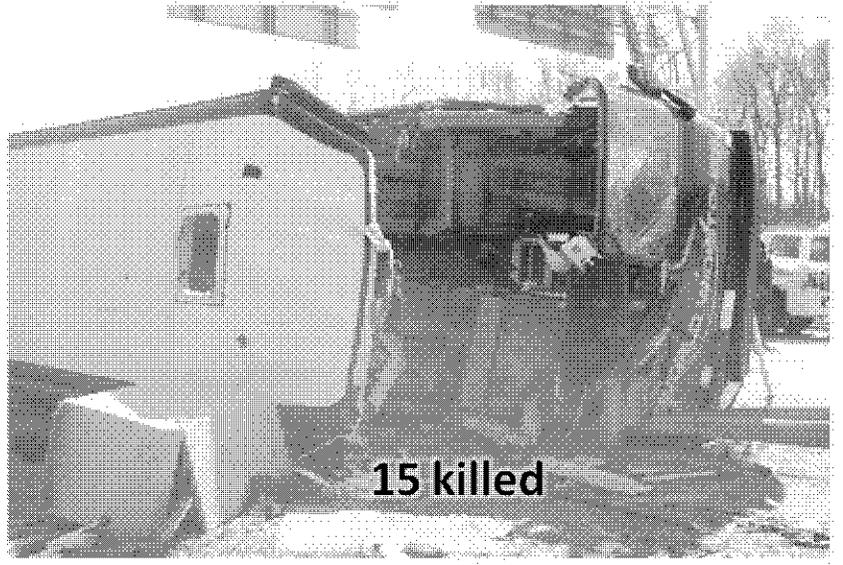
Abstract from National Transportation Safety Board. 2012.: On March 12, 2011, about 5:38 a.m., a 1999 Prevost 56-passenger motor coach, operated by World Wide Travel of Greater New York, was traveling southbound on Interstate 95, en route from the Mohegan Sun Casino in Uncasville, Connecticut, to New York City, and carrying 32 passengers. Near mile marker 3.2, the motorcoach departed from the travel lanes, driving over the rumble strips on the right shoulder edge. It then crossed over the 10-foot-wide paved shoulder and struck a guardrail.

March 12, 2011 New York City, New York



Traveling about 480 feet alongside and on the guardrail, before overturning and flattening it. The vehicle then collided with a vertical highway signpost consisting of two vertical 8-inch-diameter steel tubular poles linked by cross-beam diagonal metal supports. The support structure's two poles entered the passenger compartment along the base of the passenger windows as the vehicle slid forward, resulting in the roof panel being torn from the bus body for almost its entire length.

**March 12, 2011 New York City,
New York**



Fifteen passengers were killed, 17 passengers received serious-to-minor injuries, and the bus driver received minor injuries.

March 12, 2011 New York City, New York

base of the passenger windows as the vehicle slid forward. The impact resulted in the roof panel being jolted from the bus body for almost the entire length of the bus. As a result of this accident, 13 passengers were killed, 17 passengers received serious-to-minor injuries, and the bus driver received minor injuries.

Investigative Synopsis

The accident occurred when the motorcoach departed from the travel lanes to the right at about a 7° departure angle from the roadway, no tire marks were made on the travel lanes to indicate braking or evasive steering. The driver then traversed a 10-foot-wide paved shoulder enhanced with rumble strips and struck a roadside barrier. Post-accident examination of electronic control module data revealed that the accident motorcoach was traveling at least 64 mph for at least 10 seconds before it struck the guardrail. The control module data also indicated that the driver did not apply the brakes in the 60 seconds before leaving the travel lanes, crossing the shoulder, and striking the guardrail.

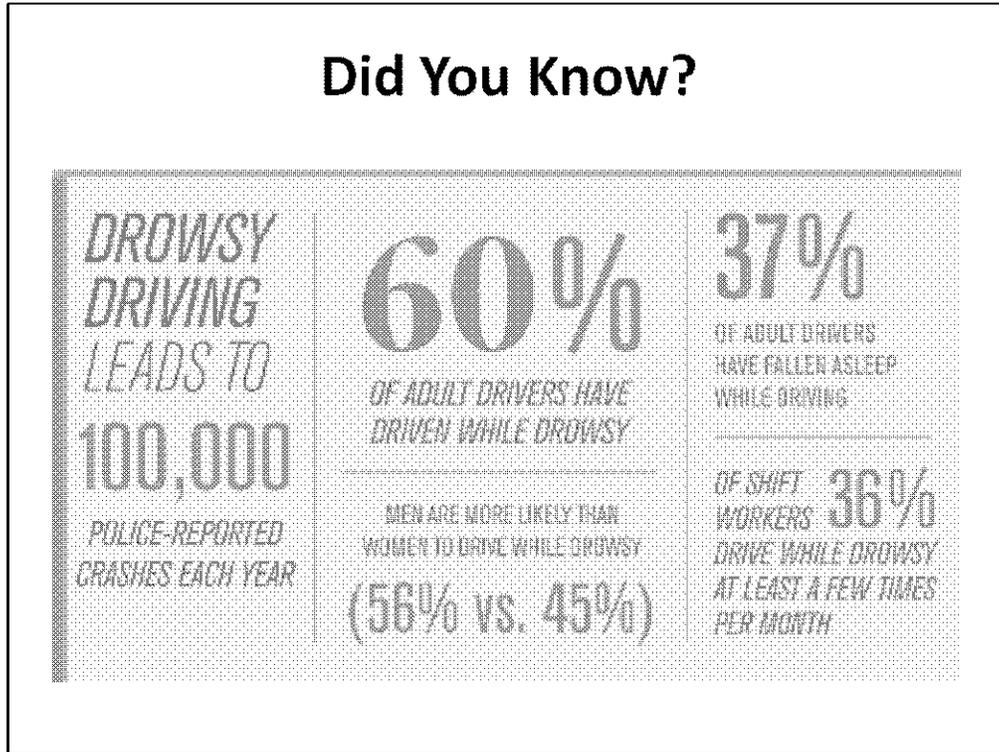
Safety issues identified in this accident investigation include:

sleep opportunities did not exceed 4 hours. Circadian factors related to the driver's inverted work schedule and the time of day at which the accident occurred, about 5:38 a.m., would have exacerbated the effects of fatigue. No Federal requirements currently exist for motor carriers to implement fatigue management programs.

that monitor driver behavior" such as preforming warnings to drowsy drivers or detecting unsafe driving behaviors, are already in the marketplace. However, motor

Safety issues identified in this accident investigation include: Motor coach driver fatigue and onboard monitoring systems: The motor coach driver was experiencing both acute sleep loss and cumulative sleep debt at the time of the accident. Because of the driver's activities in the days leading to the accident, his sleep opportunities did not exceed 4 hours. Circadian factors related to the driver's inverted work schedule and the time of day at which the accident occurred, about 5:38 a.m., would have exacerbated the effects of fatigue.

Did You Know?



Statistics from the **NHTSA** and **NSF** state that there are over **100,000** police-reported MVA caused by drowsiness or fatigue of the operator.

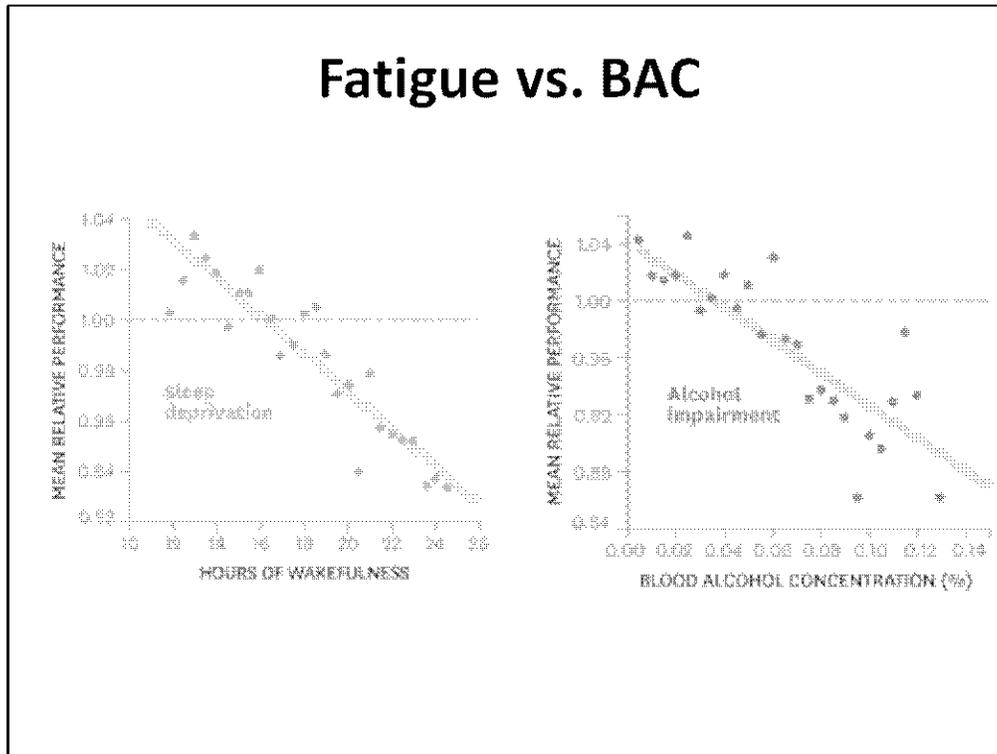
1,550 deaths and **71,000 injuries** are the direct result of a driver falling asleep at the wheel.

21% of all serious transportation injuries on the nation's highways are related to sleep. A more recent survey of Americans found that **60%** of all adults reported driving while drowsy at least once in the past year.

37% reported that they had **actually** dozed off while driving.

1% reported that they had **crashed because they dozed off.**

Fatigue vs. BAC



A study by researchers in Australia showed that being awake for 18 hours produced an impairment equal to a blood alcohol concentration (BAC) of .05, and .10 after 24 hours; .08 is considered legally drunk.

Other research indicates commercial drivers and people with undiagnosed sleep disorders such as sleep apnea and acute insomnia are also at greater risk for fall asleep crashes.

Sleep deprivation has been shown to produce psychomotor impairments equivalent to those induced by alcohol consumption at or above the legal limit. This slide shows the effect on performance of even a moderate level of fatigue is equivalent to or greater than what is considered acceptable for alcohol intoxication.

SOURCE Drew Dawson and Kathryn Reid's "Fatigue, Alcohol, and Performance Impairment," *Nature* Vol. 388, July 1997.

Why is this important to us?

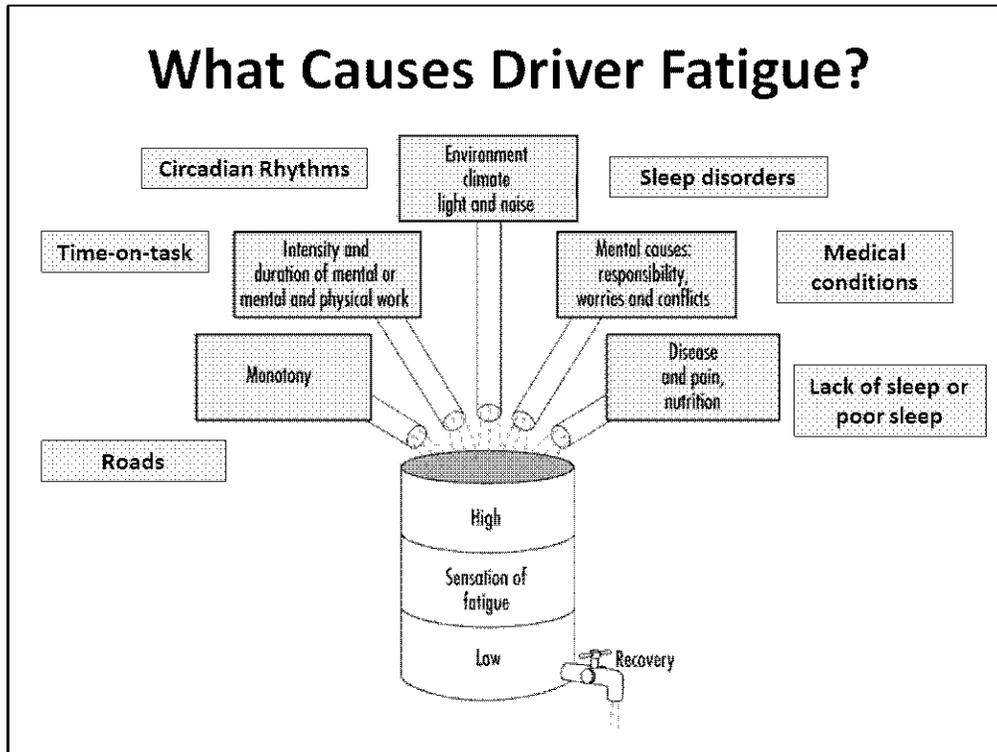
- **Knowledge** – understanding the common signs and symptoms of driver fatigue can prevent tragedy.
- **Skills** – Applying this knowledge to better manage demands of our work and daily life.
- **Attitude** - Value sleep, alertness, and wellness as major factors in your driving performance, safety, and happiness.

To understand why the issue of driver fatigue is important to us, we must first get to the bare roots of the equation **Knowledge + Skills + Attitude = Performance**. Knowledge in a particular subject is to comprehend and understand the subject matter. In this case, understanding the common signs and symptoms of driver fatigue can prevent a tragedy. When one possesses a skill in a field, it is meant to have an expertise or ability within that field. The skill is to apply the knowledge that we have obtained so we can better manage the demands of our work and daily life. The final and most important piece to the equation is attitude. Attitude can be defined as a settled way of thinking or feeling about someone or something, typically one that is reflected in a person's behavior. In this regard, if we value our sleep, alertness, and wellness as major factors in our driving performance, our obligation to keep our passengers safe can be achieved.

So What is Driver Fatigue?

- **Fatigue is the signal from the body to stop the ongoing activity may it be physical or mental.**
- **Sleepiness is the neurobiological drive for sleep.**
- **Circadian rhythm (body clock)**
- **Basically, driver fatigue is a decrease in mental and physical driving ability!**
- **Causes are different, but the effects are the same!**

The terms “Fatigue” and “Sleepiness” are usually used interchangeably, but in reality have different meanings. Fatigue is the signal from the body to stop a physical or mental ongoing activity. Sleepiness is the neurobiological need to sleep which is regulated by your individual body-clock. This “body-clock” drives our circadian rhythms.



This diagram is a representation of the variety of factors that contribute to fatigue and the build up of chronic fatigue if recovery time is insufficient. Other factors include:

- Lack of sleep or poor sleep
- Internal body clock
- Time-on-task
- Monotonous Roads
- Sleep Disorders
- Medical conditions

Who suffers from fatigue the most?



Can you name some other groups?

According to the **National Sleep Foundation**, sleep-related crashes are most common in young people, especially men, adults with children and shift workers. According to the NSF's 2002 poll:

- Adults between 18-29 are much more likely to drive while drowsy compared to other age groups (71% vs. 30-64, 52% vs. 65+, 19%).
- Men are more likely than women to drive while drowsy (56% vs. 45%) and are almost twice as likely as women to fall asleep while driving (22% vs. 12%).
- Adults with children in the household are more likely to drive drowsy than those without children (59% vs. 45%).
- Shift workers are more likely than those who work a regular daytime schedule to drive to or from work drowsy at least a few days a month (36% vs. 25%).

Other include:

- People who work long hours
- Commercial drivers, especially those who drive a significant number of miles at night.
- Sleep deprived individuals.
- Persons with undiagnosed or untreated sleep disorders
- Those who have consumed alcohol.
- People taking prescription medication that contain sedatives.

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- People taking prescription medication that contain sedatives.



Use this slide to help answer the brainstorming activity from the previous slide. You will not have to teach from this slide as the topics mentioned on this slide will be discussed in detail later in the program.

Signs of Fatigue Onset

- You have trouble keeping your head up
- You can't stop yawning
- You have wandering, disconnected thoughts
- You have "memory lapses"
- Failure to check your mirrors as frequently as normal.
- Erratic speed control.
- Drifting in and out of your lane of travel.
- Missing a turn or exit.
- Other vehicles surprise you with their actions.
- You find yourself to close to the vehicle ahead of you.
- Braking far more often than is required.
- Your eyes close or go out of focus

The consequences of driver fatigue can be disastrous. Because fatigue impairs mental processing and decision making abilities, drivers can lapse into a "micro-sleep" without realizing. This may only last a few seconds, but if it coincides with the need to perform some critical driving task (i.e. turning the wheel or responding to a stop light), the risk of crashing is greatly increased.

These accidents typically involve a single vehicle that departs the driving lane and collides with another object, such as a tree beside the road or another vehicle. The driver is often alone, having been driving for some hours, often between midnight and 6am. The consequences of accidents attributed to driver fatigue are often the most serious in terms of death, injuries and property damage because the fatigued driver makes no attempt to avoid the impending crash.

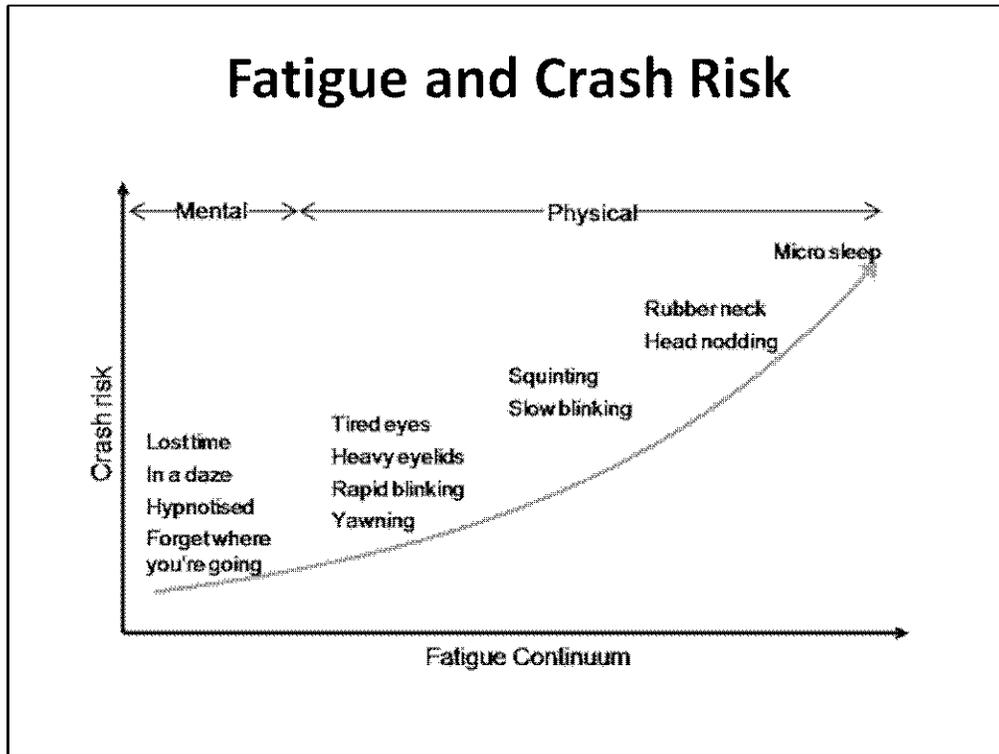
This is why the effects of driver fatigue are so dangerous.

Effects of Fatigue on Driving

- Fatigue leads to decreased driving performance.
- Inability to properly process the Defensive Driving Formula (Recognize hazards, Understand the proper defense, and act correctly in time)
- Drivers may try to compensate for the influence of fatigue.
- “Route Hypnosis” can occur without the driver being particularly tired.
- When drivers are well rested and take enough breaks during driving, they can drive a long time without performance reduction.

As we know, fatigue can lead to decreased driving performance. Understanding the 3 parts of the Defensive Driving Formula, as defined in the New York State School Bus Driver Basic Course manual, can make us more aware of the potential dangers. The three parts to the formula are: Recognizing the Hazard, Understanding the Defense, and Acting Correctly In Time. An alert driver can perceive (perception phase) a potential hazard in .75 seconds. The average alert driver can also respond (reaction phase) to a hazardous situation in another .75 seconds. At 50 mph, .75 seconds = 60 ft. So, 60' (perception) + 60' (reaction) = 120' at 1.5 seconds that an alert driver can perceive and react to a potential hazard. So, if you are fatigued perception and reaction times are greatly increased!

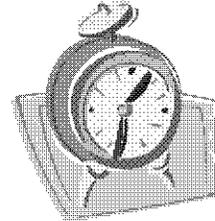
Fatigue and Crash Risk



NHTSA data show that sleepy drivers are less likely than alert drivers to take corrective action before a crash (Wang, Knippling, Goodman, 1996). Anecdotal reports also suggest that evidence of a corrective maneuver, such as skid marks or brake lights, is usually absent in fall-asleep crashes.

How much sleep do we need?

- The average person needs 8 hours sleep every 24-hour cycle.
- An acute lack of sleep can occur after just one bad or short night.
- A chronic lack of sleep is the result of not having enough sleep during a long period.
- If a driver fails to get “adequate sleep” over a 3 or 4-day period, a “sleep debt” will accumulate.



The human body requires a certain amount of sleep each night to function effectively. The average amount of sleep a person needs is 8 hours in a 24-hour cycle. When we reduce the number of hours we sleep at night we start to accumulate what is called a 'sleep debt'.

Sleep Debt

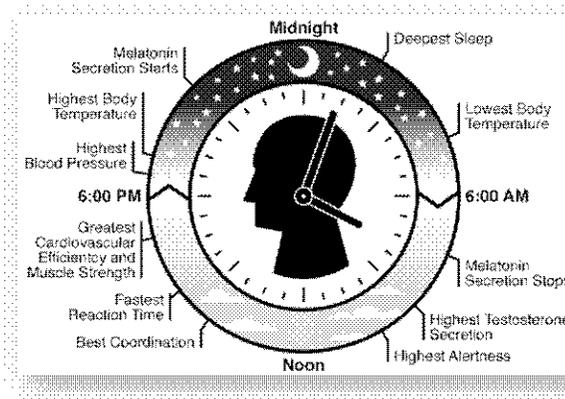
Days	Normal Sleep hours	Actual Sleep hours	Sleep Debt
Monday	8 hours	5 hours	3 hours
Tuesday	8 hours	5 hours	3 hours
Wednesday	8 hours	5 hours	3 hours
Thursday	8 hours	5 hours	3 hours
Friday	8 hours	5 hours	3 hours
Totals	40 hours	25 hours	15 hours

Sleep debt is defined as the difference between the hours of sleep a person needs and the hours of sleep a person actually gets.

For example, if a person needs 8 hours of sleep per night but only gets 6 hours of sleep one night, they have a sleep debt of two hours. These lost hours of sleep need to be replaced. When we have sleep debt, our tendency to fall asleep the next day increases. The larger the sleep debt, the stronger the tendency to fall asleep. Sleep debt does not go away by itself. Sleeping is the only way to reduce your sleep debt.

Is your body clock set? (Circadian Rhythms)

- **Physiological**
 - **Body temperature**
 - **Hormone secretions**
- **Controlled by the brain**
- **Virtually all animals**
- **Resistant to change**
- **Occur even if you get plenty of sleep**

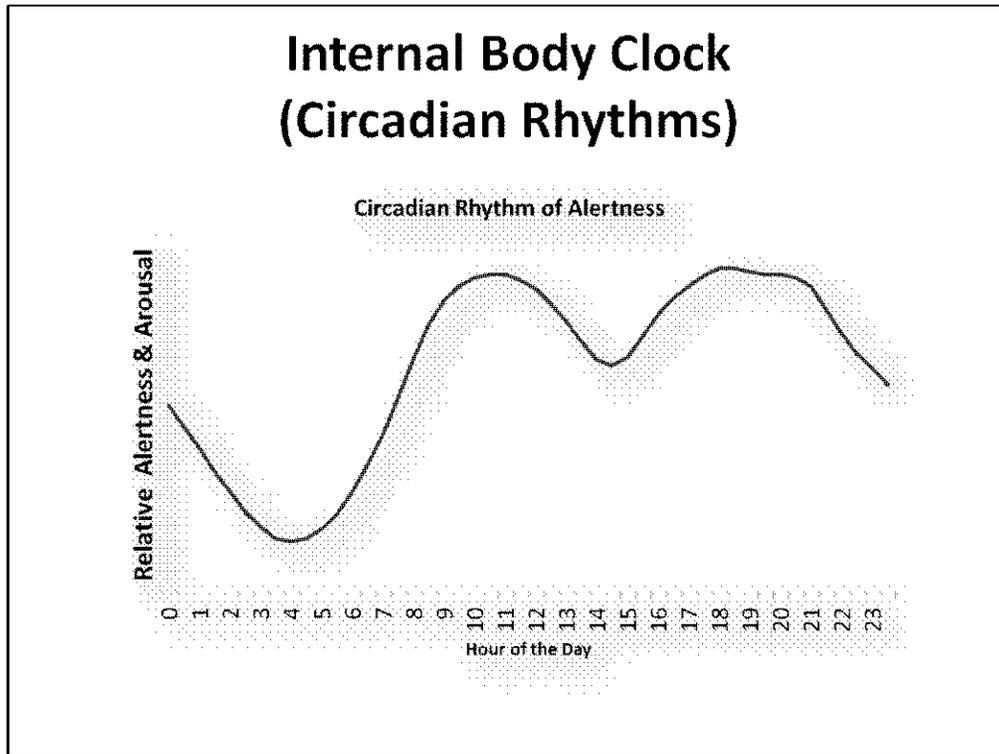


Circadian rhythms are physiological cycles that follow a daily pattern. We are "programmed" by our circadian rhythms to sleep at night and to be awake during the day.

During night time hours and to a lesser extent during afternoon "siesta" hours, most types of human performance are significantly impaired, including our ability to drive.

Problems occur if we disrupt our natural sleep cycles (i.e. by staying awake during the night), do not get enough sleep, or get poor quality sleep. Circadian rhythms cannot be reversed. Even if you have been working nightshifts for many years, your body will still be programmed to sleep at night.

Internal Body Clock (Circadian Rhythms)



Peak performance times include:

- Mornings after 8 am

- Evenings

Valleys include:

- Deep valley: early mornings before sunrise

- Shallow dip: early- to mid-afternoon (i.e., after lunch)

Circadian disruption (i.e., time zone and shift changes) can be difficult

Sleep loss makes circadian valleys deeper

Some people are “larks” or “night owls”

Performance is almost always better during peak periods

Time-On-Task

Internal Factors (Endogenous)

- Excessive stress and worry.
- Excessive physical activity.
- Excessive mental or cognitive work (thinking, reasoning, decision making)
- Your physical fitness.
- Endurance

External Factors (Exogenous)

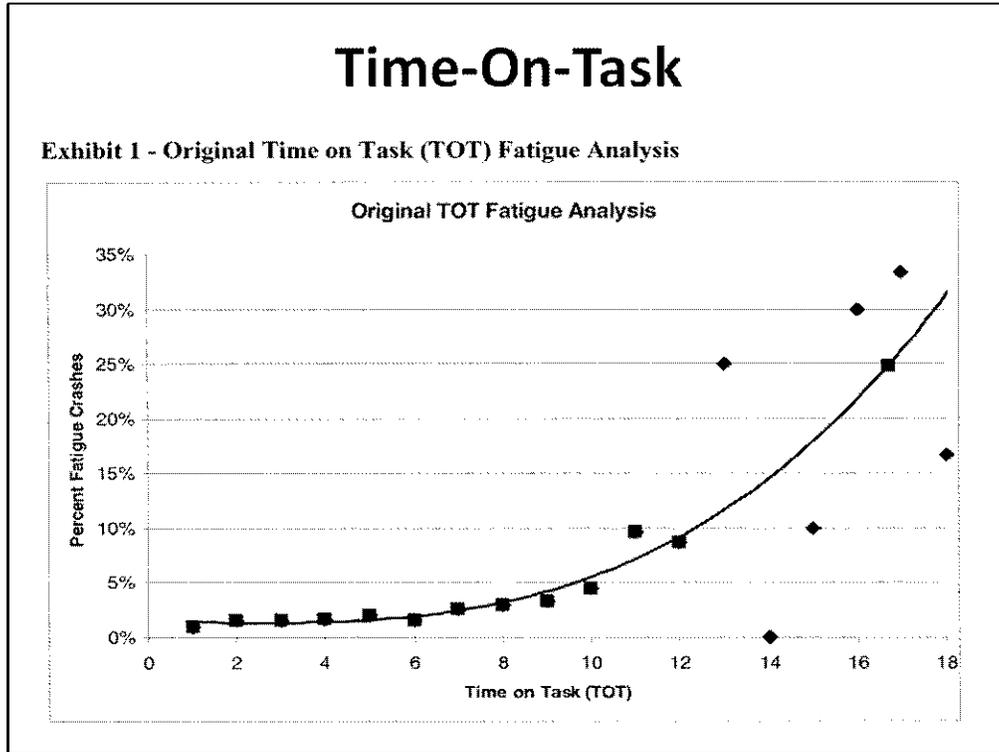
- Character of task performed (Tasks that demand constant attention)
- Environmental conditions (Temperature, humidity, amount of light and noise)
- Driving in rain, fog, snow or even in clogged rush hour traffic can increase fatigue!
- Sustained hours of work.

Some studies show increased crash risks after long hours of driving.
Factors which increase time-on-task effects:

- Task difficulty
- Task monotony
- Other alertness factors

Time-On-Task

Exhibit 1 - Original Time on Task (TOT) Fatigue Analysis



FMCSA - <http://www.fmcsa.dot.gov/rules-regulations/topics/hos/regulatory-impact-analysis.htm>

Graph outlining the relationship between number of hours driving and incidents of crashes involving truck drivers in the United States. All hours over 12 are combined, due to the low number of sample data.

Monotonous Roads

- Road environment monotony usually refers to the environment that remains unchanged or will change in a predictable pattern. Namely, if the road environment ahead is easily predictable by the driver perception of environment, the road environment is monotonous.
- The heart rate is found to change significantly under different road environments with different monotony

Sleepiness may account for up to 20% of crashes on monotonous roads, especially highways. A task is monotonous when its stimulants don't change or the changes are predictable or there is a high level of repetition. Suburban highways where road environment changes are limited and there is a small volume of traffic match this definition. O'Hanlon and Kelly [84] pointed out that driving on a monotonous road is equal to a vigilance task, thus driver vigilance decrement is an expression of fatigue. Thiffault & Bergeron [104] found that in a monotonous driving situation, driver steering wheel movement is greater and occurs more often, showing that the fatigue effect and effect on driver vigilance caused by a monotonous road situation is relatively large. Also, driving on a relatively long and monotonous driving environment also has a clear negative effect on driver valid peripheral visual field [95].

Sources:

84. O'Hanlon, J. F., & Kelley, G. R. (1977) Comparison of performance and physiological changes between drivers who perform well and poorly during prolonged vehicular operation. In R. R. Mackie (Ed.), *Vigilance: theory, operational performance and physiological correlates* (pp. 87–109). Plenum Press, New York

104. Thiffault, P. & Bergeron, J. (2003) Fatigue and individual differences in monotonous simulated driving. *Personality and Individual Differences*, 34 (1), pp. 159-179

95. Rogé, J., Pébayle, T., Hannachi, S.El., Muzet, A.(2003) Effect of sleep deprivation and driving duration on the useful visual field in younger and older subjects during simulator driving. *Vision Research* 43, 1465-1472

Sleep Disorders

- **Insomnia**
- **Sleep Apnea**
- **Restless Leg Syndrome**
- **Narcolepsy**

Do not teach from this slide. Use this slide to briefly go over what will be covered.

Insomnia

- Onset Insomnia
- Maintenance Insomnia
- Termination Insomnia
- Drug Dependency Insomnia

Sleep-onset insomnia - person has difficulty falling asleep at the beginning of the night, often a symptom of anxiety disorders.

Sleep-maintenance insomnia – person wakes frequently during the night and sleep is fragmented.

Terminal insomnia — also called “late insomnia” — is what you have when you can fall asleep easily soon after you go to bed... but then wake up too early in the morning.

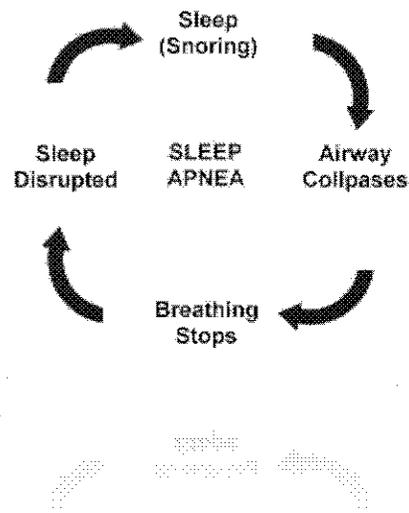
Drug Dependency Insomnia - Many who live with a sleep disorder like insomnia will resort to drug and alcohol abuse to attempt to remedy the problem themselves or turn to a physician in order to attain ongoing access to addictive prescription medications to help them sleep. In both instances, drug and Alcohol use can often turn into abuse or even addiction; when that happens, immediate intervention and treatment is necessary, not just for the substance abuse issue but the insomnia disorder as well.

What Causes Insomnia?

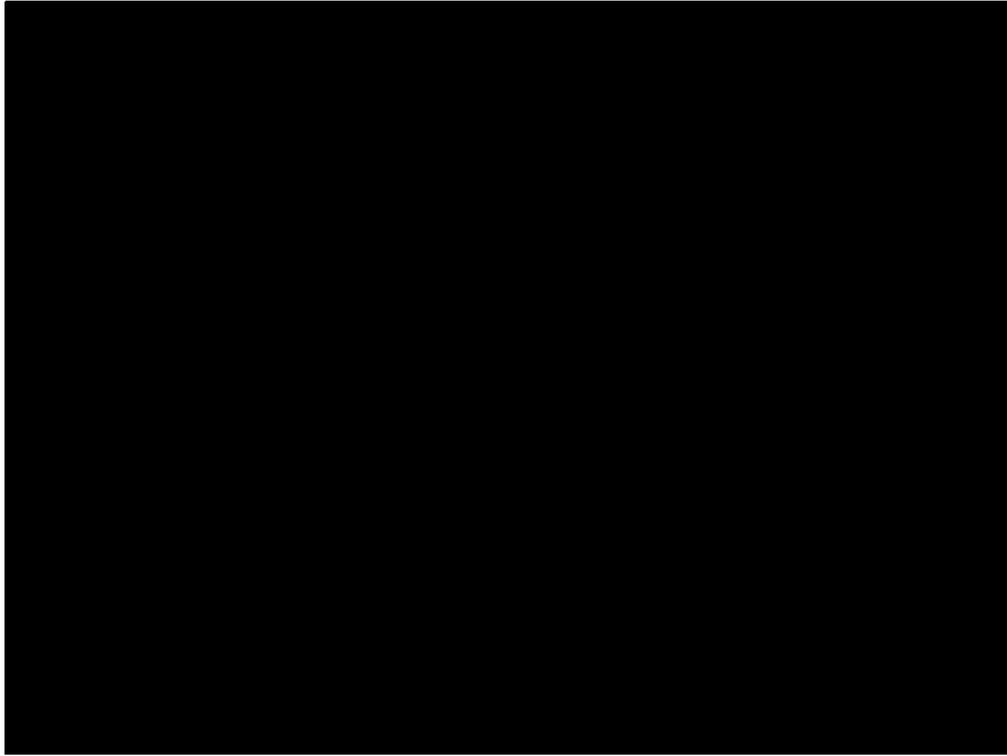
- **Worry and Stress**
- **Disruption of the circadian cycle**
- **Drugs / medications**
- **Trying to sleep in an unfamiliar place**
- **Awkward sleep posture**
- **Uncomfortable room temperature**
- **Noisy environment**
- **Consuming caffeine or alcohol before going to bed.**

Sleep Apnea

- Apnea = stoppage of breathing lasting 10+ seconds
- Affects more than 18 million Americans!
- People with sleep apnea receive inadequate quantities of oxygen while asleep.
- Sufferers are commonly tired during the day and more prone to symptoms of fatigue, including “micro-sleeps”



Sleep apnea is a serious sleep disorder that occurs when a person's breathing is interrupted during sleep. People with untreated sleep apnea stop breathing repeatedly during their sleep, sometimes hundreds of times. This means the brain -- and the rest of the body -- may not get enough oxygen. A “micro-sleep” is a brief and unintended loss of consciousness characterized by head snapping, nodding or closing your eyes for more than a couple of seconds. Micro-sleeps occur when you try to stay awake to perform a monotonous task such as driving. Micro-sleeps can last from a few seconds to several minutes and often people are not aware that a micro sleep has occurred.



Sleep Apnea video.

Could it be you??

- Sitting and reading
- Watching TV
- Sitting, inactive in a public place (e.g. a theatre 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 the traffic

The **Epworth Sleepiness Scale (ESS)** is a scale intended to measure daytime sleepiness that is measured by use of a very short questionnaire. This can be helpful in diagnosing sleep disorders. It was introduced in 1991 by Dr Murray Johns of Epworth Hospital in Melbourne, Australia.

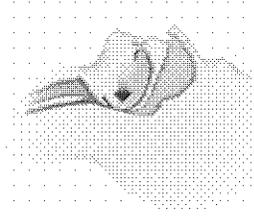
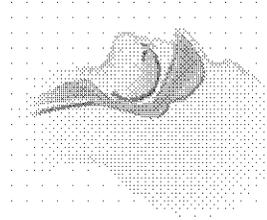
*Johns MW (1991). "A new method for measuring daytime sleepiness: the Epworth sleepiness scale" (PDF). *Sleep* **14** (6): 540–5. PMID 1798888.*

Sleep Apnea and Driving

- **Studies of non-CMV drivers suggest 2 to 7X higher crash risk.**
- **Can result in medical disqualification (although often undiagnosed and undetected during qualification process)**
- **Estimated 28% of CMV drivers have mild to severe OSA**

Obstructive Sleep Apnea

- Obstructive sleep apnea is the restriction of a person's airflow during sleep, caused by the closure of the upper airway.
- Apnea rate per hour:
 - <5 = normal
 - ≥ 5 = OSA
- OSA severity (mild, moderate, severe) based on rate
- Some people with severe OSA can have 100 per hour!



Obstructive sleep apnea (OSA) is the most common type of sleep apnea and is caused by complete or partial obstructions of the upper airway. Obstructive sleep apnea (pronounced AP-nee-ah), also called OSA, is a chronic disorder. People with OSA stop or "pause" their breathing or have shallow breathing when they sleep. Almost everyone has brief times when they stop breathing while they sleep. People with OSA:

- Pause their breathing or flow of air (called "hypo-apnea") more often than normal.
- May start breathing again with a loud snort or choking sound.
- Have breathing pauses five or more times an hour; sometimes as often as once or twice each minute.

OSA can be mild, moderate, or severe, depending on:

- How many times a person pauses their breathing or has lower airflow per hour.
- How low a person's oxygen level in their blood drops during those times.
- The amount of sleepiness a person feels during the day.

OSA Risk Factors & Warning Signs

- Higher risk:
 - Obese and overweight individuals
 - Male
 - 40+ years old
 - Large neck size (>17" for men, >16" for women)
 - Recessed chin, small jaw, or large overbite
 - Family history
- Physical effects and warning signs:
 - Excessive daytime sleepiness and reduced performance
 - Snoring
 - High blood pressure (hypertension)
 - Diabetes
 - OSA tends to worsen obesity

If left untreated, sleep apnea can result in a growing number of health problems, including:

- High blood pressure
- Stroke
- Heart failure, irregular heart beats, and heart attacks
- Type 2 Diabetes
- Depression
- Worsening of ADHD
- Headaches
- In addition, untreated sleep apnea may be responsible for poor performance in everyday activities, such as at work and school, motor vehicle crashes, and academic underachievement in children and adolescents.

OSA Treatment

- **Screening**
 - **Assessment of risk**
 - **Sleep study**
- **Treatments can be very effective if followed; i.e.,**
 - **Continuous Positive Airway Pressure (CPAP) machine**
 - **Weight reduction and behavioral changes**

Certain devices can help open up a blocked airway. In other cases, surgery may be necessary. Treatments for obstructive sleep apnea may include:

Continuous positive airway pressure (CPAP). If you have moderate to severe sleep apnea, you may benefit from a machine that delivers air pressure through a mask placed over your nose while you sleep. With CPAP (SEE-pap), the air pressure is somewhat greater than that of the surrounding air, and is just enough to keep your upper airway passages open, preventing apnea and snoring.

Although CPAP is the most common and reliable method of treating sleep apnea, some people find it cumbersome or uncomfortable. Some people give up on CPAP, but with some practice, most people learn to adjust the tension of the straps to obtain a comfortable and secure fit.

You may need to try more than one type of mask to find one that's comfortable. Some people benefit from also using a humidifier along with their CPAP systems. Don't just stop using the CPAP machine if you experience problems. Check with your doctor to see what modifications can be made to make you more comfortable.

Additionally, contact your doctor if you are still snoring despite treatment or begin snoring again. If your weight changes, the pressure settings of the CPAP machine may need to be adjusted.

Other airway pressure devices. If CPAP continues to be a problem for you, you may be able to use a different type of airway pressure device that automatically adjusts the pressure while you're sleeping (Auto-CPAP). Units that supply bilevel positive airway pressure (BiPAP) are also available. These provide more pressure when you inhale and less when you exhale.

Expiratory positive airway pressure (EPAP). These small, single-use devices are placed over each nostril before you go to sleep. The device is a valve that allows air to move freely in, but when you exhale, air must go through small holes in the valve. This increases pressure in the airway and keeps it open. The device may help reduce snoring and daytime sleepiness in people with mild obstructive sleep apnea. And it may be an option for some who can't tolerate CPAP.

Oral appliances. Another option is wearing an oral appliance designed to keep your throat open. CPAP is more reliably effective than oral appliances, but oral appliances may be easier to use. Some are designed to open your throat by bringing your jaw forward, which can sometimes relieve snoring and mild obstructive sleep apnea.

A number of devices are available from your dentist. You may need to try different devices before finding one that works for you. Once you find the right fit, you'll still need to follow up with your dentist repeatedly during the first year and then regularly after that to ensure that the fit is still good and to reassess your signs and symptoms.

Central Apnea

- The brain does not tell your muscles to breathe.
- Interruption of the rhythmic contractions of the diaphragm and the chest muscles.
- This type of sleep apnea is usually associated with serious illness, especially an illness in which the lower brainstem (which controls breathing) is affected.

Central sleep apnea is a disorder in which your breathing repeatedly stops and starts during sleep. **Central sleep apnea** occurs because your brain doesn't send proper signals to the muscles that control your breathing.

Restless Leg Syndrome (RLS)

- **Afflicts approx. 2-3% of adults**
- **Usually not a serious condition**
- **Tingling or other leg discomfort causes excessive movement**
- **Cannot relax to sleep**

Restless legs syndrome (RLS) is a neurological disorder characterized by throbbing, pulling, creeping, or other unpleasant sensations in the legs and an uncontrollable, and sometimes overwhelming, urge to move them. Symptoms occur primarily at night when a person is relaxing or at rest and can increase in severity during the night. Moving the legs relieves the discomfort.

As many as 10 percent of the U.S. population may have RLS. Several studies have shown that moderate to severe RLS affects approximately 2-3 percent of adults (more than 5 million individuals). An additional 5 percent appears to be affected by a milder form. Childhood RLS is estimated to affect almost 1 million school-age children, with one-third having moderate to severe symptoms. Some people with RLS will not seek medical attention, believing that they will not be taken seriously, that their symptoms are too mild, or that their condition is not treatable. Some physicians wrongly attribute the symptoms to nervousness, insomnia, stress, arthritis, muscle cramps, or aging.

Narcolepsy

- **Narcolepsy affects 1 in 2000 persons.**
- **Sufferers commonly have “sleep attacks.”**
- **Possible side-effects of the disorder include hallucinations, temporary paralysis on waking, and cataplexy (loss of muscle control in emotional situations).**
- **This disorder is genetically based and can be treated with stimulants and anti-depressants.**

Narcolepsy is a rare sleeping disorder affecting 1 in 2000 persons. Sufferers commonly have “sleep attacks” in which they fall asleep without warning. This often occurs in inappropriate settings and even after a good night sleep. The sleep episode can last between a few seconds and an hour. Possible side-effects of the disorder include hallucinations, temporary paralysis on waking, and cataplexy (loss of muscle control in emotional situations). This disorder is genetically based and can be treated with stimulants and anti-depressants.

Medications that affect sleep

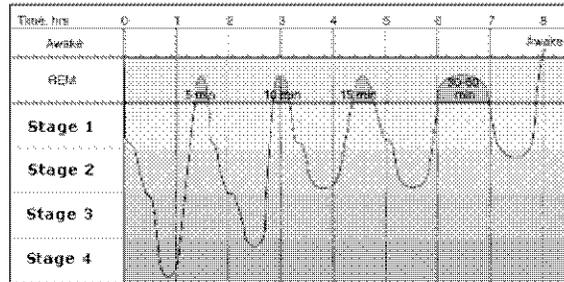
- **Pseudoephedrine, including the brand Sudafed.**
- **Medications with caffeine. These include the brands Anacin, Excedrin, and No-Doz, as well as many cough and cold medications.**
- **Nicotine, which can disrupt sleep and reduce total sleep time. Smokers report more daytime sleepiness and minor accidents than do nonsmokers, especially in younger age groups.**

The following nonprescription drugs can cause sleep problems:

- Pseudoephedrine, including the brand Sudafed
- Medications with caffeine. These include the brands Anacin, Excedrin, and No-Doz, as well as many cough and cold medications.
- Nicotine, which can disrupt sleep and reduce total sleep time. Smokers report more daytime sleepiness and minor accidents than do nonsmokers, especially in younger age groups.

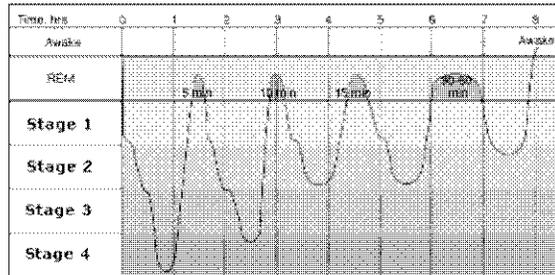
Is ALCOHOL an effective sleep aid?

- Some people try to use alcohol as an aid to getting to sleep as if it were a sleeping pill.
- Alcohol influences the type and quality of sleep we actually get.



Is ALCOHOL an effective sleep aid?

- Alcohol suppresses REM (an important part of the sleep cycle), leading to disrupted sleep and withdrawal effects.
- Alcohol can interact with sleep loss to increase drowsiness.
- Generally, alcohol is NOT a very effective sleep aid.



Countermeasures

- **Minimize noise and other disruptive factors.**
- **Sleep in a dark, quiet room.**
- **Maintain a comfortable temperature.**
- **Use a comfortable sleeping surface.**
- **Develop a sleep routine (i.e. reading, planning the next day.)**
- **Best to sleep within Circadian “valleys”.**

Countermeasures

- **Seek assistance with personal problems that may create stress and worry.**
- **Watch your health. Exercise regularly and eat properly.**
- **Take “strategic naps” when you feel sleepy.**
- **Use caffeine sparingly.**
- **Develop a plan for staying alert while driving.**
- **Understand “HOS Regulations”**

Federal HOS Regulations

- **Part 395 – FMCSA**
- **10-Hour Driving Limit**
- **15-Hour On-Duty Limit**
- **60/70-Hour Duty Limit**
- **On-Duty Time**
- **Off-Duty Time**
- **Exceptions??**



U.S. Department
of Transportation

**Federal Motor Carrier
Safety Administration**

The hours-of-service regulations are found in Part 395 of the Federal Motor Carrier Safety Regulations. These regulations are developed and enforced by the Federal Motor Carrier Safety Administration, which is part of the United States Department of Transportation.

15-hour on-duty limit - Following 8 consecutive hours off duty, you must not drive a commercial motor vehicle after being on duty 15 hours. You may do other work after being on duty 15 hours, but you may not drive.

10-Hour Driving Limit - The second limit is the driving limit. You are allowed 10 hours of driving time after 8 consecutive hours off duty. There is no limit on how many of those hours you are allowed to drive at one time — you may drive for as little as a few minutes or as much as 10 hours in a row. Once you have driven a total of 10 hours, you have reached the driving limit and must be off duty for another 8 consecutive hours before driving a commercial motor vehicle again.

60/70-Hour Duty Limit - In addition to the limits explained above, there is the 60/70-hour DAY HOURS limit. This limit is based on a 7-day or 8-day period, starting at the time specified by your company for the start of a 24-hour period. This limit is sometimes thought of as a “weekly” limit. However, this limit is not based on a “set” week, such as Sunday through Saturday. The limit is based on a “rolling” or “floating” 7-day or 8-day period. The oldest day’s hours drop off at the end of each day when you calculate the total on-duty time for the past 7 or 8 days. For example, if you operate on a 70-hour/8-day schedule, the current day would be the newest day of your 8-day period and the hours you worked 9 days ago would drop out of the calculation.

On-Duty Time includes all time you are working or are required to be ready to work, for any employer. Specifically, it includes the following activities:

- All time at a bus station, yard, terminal, or other facility of a motor carrier or customer, unless you have been relieved from duty by the motor carrier;
- All time inspecting or servicing your vehicle, including fueling it and washing it;
- All driving time;
- All other time in a commercial motor vehicle unless you are resting in a sleeper berth;
- All time loading, unloading, supervising, or attending your motorcoach/bus, or handling paperwork for trips;
- All time taking care of your vehicle when it is broken down;
- All time spent providing a breath, saliva, or urine sample for drug/alcohol testing, including travel to and from the collection site;
- All time spent doing any other work for a motor carrier, including giving or receiving training and driving a company car; and
- All time spent doing paid work for anyone who is not a motor carrier, such as a part-time job at a local restaurant. The bottom line is that on-duty time includes all time you are working for a motor carrier, whether paid or not, and all time you are doing paid work for anyone else.

Exceptions – Adverse Driving Conditions Exceptions, Vehicles designed to transport 9 – 15 passengers, including the driver, not for direct compensation, transportation of school children and/or personnel from home to school and school to home, state government operated.

Review Quiz

1. Coffee overcomes the effects of drowsiness while driving.
2. I can tell when I'm going to go to sleep.
3. Rolling down my window or singing along with the radio will keep me awake.
4. I'm a safe driver so it doesn't matter if I'm sleepy.

Answers to Driver Fatigue Quiz

1. False- Stimulants are no substitute for sleep. Drinks containing caffeine, such as coffee or cola, can help you feel more alert but the effects last only for a short time.
2. False- Sleep is not voluntary. If you are drowsy, you can fall asleep and never even know it. You cannot tell how long you have been asleep.
3. False - An open window or the radio has no lasting effect on a person's ability to stay awake
4. False- The only safe driver is an alert driver. Even the safest drivers become confused and use poor judgment when they are sleepy.

Review Quiz

5. You can stockpile sleep on the weekends.
6. Most adults need at least seven hours of sleep each night.
7. Being sleepy makes you misperceive things.
8. Young people need less sleep.

5. False -Sleep is not money. You can't save it up ahead of time and you can't borrow it. But, just as with money, you can go into debt.

6. True -The average person needs seven or eight hours of sleep a night. If you go to bed late and wake up early to an alarm clock, you probably are building a sleep debt.

7. True -One of the warning signs of a drowsy driver is misjudging his/her surroundings.

8. False -Young people need more sleep than adults. Males under 25 are at the greatest risk of falling asleep. Half of the victims of fatigue-related crashes are under 25.

Review Quiz

9. Wandering, disconnected thoughts are a warning sign of driver fatigue.
10. Little green men in the middle of the road may mean the driver is too tired to drive.
11. On a long trip, the driver should never take a break but try to arrive at the destination as quickly as possible.
12. A “microsleep” lasts four or five seconds

9. True- If you are driving and your thoughts begin to wander, it is time to pull over and take a break
10. True -Seeing things that are not there is a good indication it is time to stop driving and take a rest.
11. False -Driving, especially for long distances, reveals a driver’s true level of sleepiness. To be safe, drivers should take a break every three hours
12. True- During a “microsleep” of four or five seconds, a car can travel 100 yards, plenty of time to cause a serious crash.

For More Information on Driver Fatigue...

- National Sleep Foundation - Sleep Research & Education - <https://sleepfoundation.org/>
- National Highway Traffic Safety Administration - www.nhtsa.gov/
- Federal Motor Carrier Safety Administration - <https://www.fmcsa.dot.gov/>
- National School Transportation Association | NSTA - www.yellowbuses.org
- American Academy of Sleep Medicine - www.aasmnet.org/
- National Transportation Safety Board – NTSB - www.nts.gov/
- **New York State Partnership Against Drowsy Driving (NYPDD)**

National Sleep Foundation - Sleep Research & Education - <https://sleepfoundation.org/>

National Highway Traffic Safety Administration - www.nhtsa.gov/

Federal Motor Carrier Safety Administration - <https://www.fmcsa.dot.gov/>

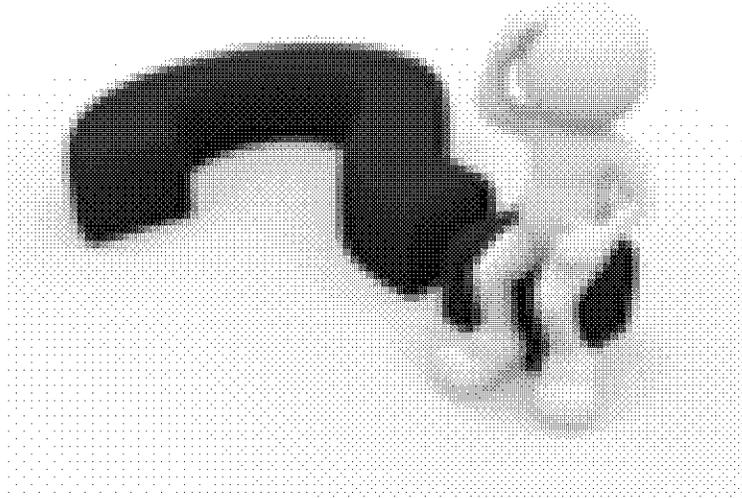
National School Transportation Association | NSTA - www.yellowbuses.org

American Academy of Sleep Medicine - www.aasmnet.org/

National Transportation Safety Board – NTSB - www.nts.gov/

New York State Partnership Against Drowsy Driving (NYPDD)

Questions?



**Just remember...
If you snooze, you lose! Taking a break
will save a life!**

