NTSB National Transportation Safety Board

Two Emerging Issues of Interest to the NTSB

Presentation to: National Safety Council, Transportation Safety Division

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Outline

– NTSB Basics

– Two Emerging Issues
  - Obstructive Sleep Apnea
  - Personal Electronic Devices

NTSB Basics

- Independent agency, investigate transportation accidents, all modes
- Determine probable cause(s) and make recommendations to prevent recurrences
- Conduct special studies and investigations
- Assist victims and their families

Independent

- 5 Members, nominated by the President, confirmed by the Senate
- Members are not investigators
- Safeguards for independence
- Conclusions from facts, not politics

Purpose

- Single focus is *SAFETY*
- Primary product:
  Safety recommendations
- Favorable response to recommendations:
  More than 80%

Challenges re Fatigue

- Underlying science not well developed
- Difficult to measure
  - Initially
  - Degradation while underway
  - Post-accident
- One size may not fit all
  - At work: Depends upon shift, duties, environment, many other factors
  - Not at work: Can't regulate activities, lifestyle
- How to assure coming to work well rested?

Fatigue Factors

- Sleep
- Diet, Weight
- Exercise, Physical Condition
- Alcohol/Tobacco
- Age
- Other?

Judgment Error: Caused By

- Inadequate background, training, experience?
- Incompetence?
- Fatigue?

Emerging Risk: OSA

- Lack of awareness
- Falling asleep or fatigue-related decrements in performance
- Up to 7-fold increase in risk of motor vehicle accident
- Risk reduced with treatment

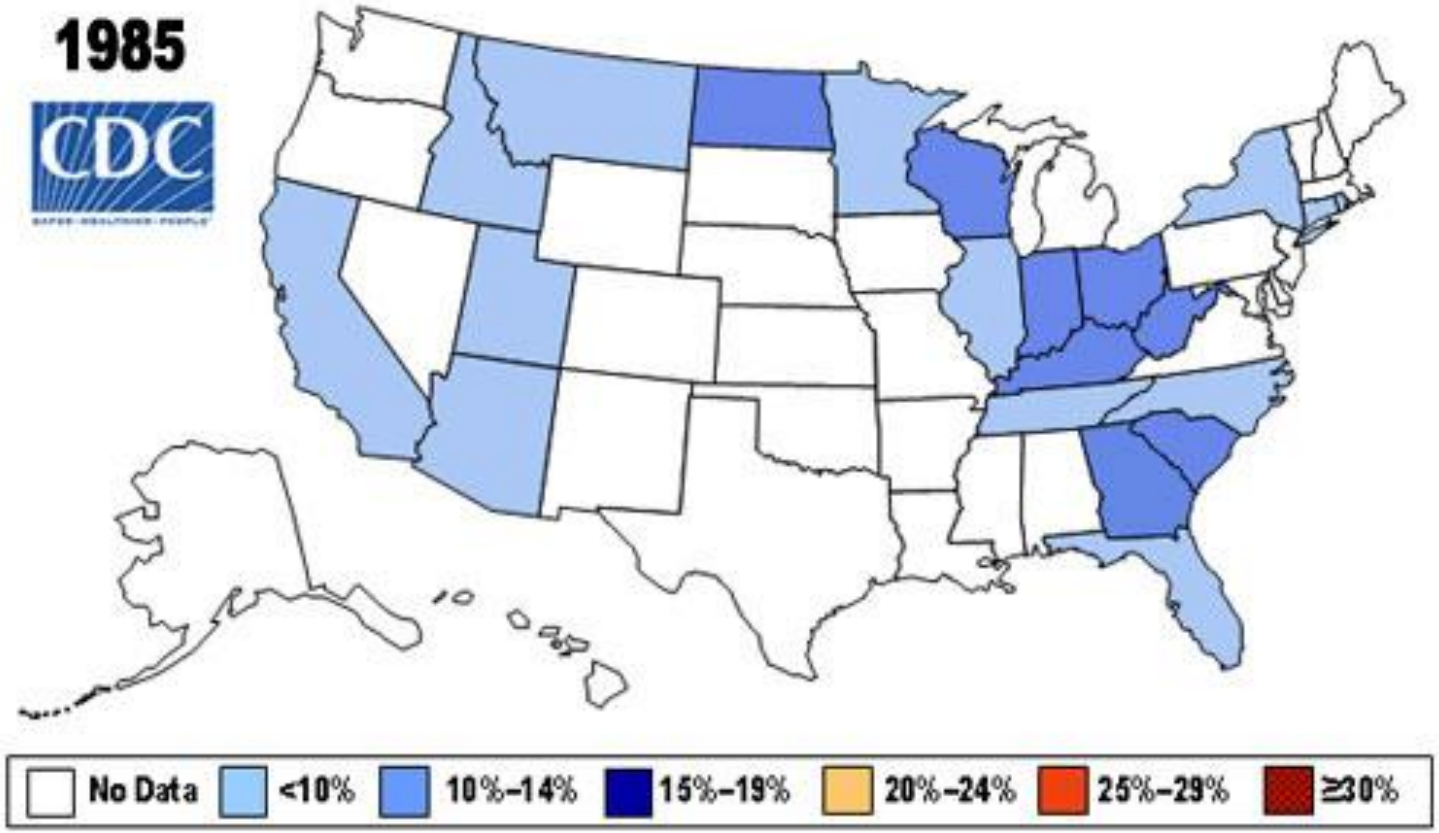
Associations with OSA

- SNORING
- Body mass index (BMI – obesity)
- Neck circumference
- High blood pressure
- Pulmonary hypertension, coronary artery disease, congestive heart failure, etc.

Obesity* Among U.S. Adults

Behavioral Risk Factor Surveillance System, 1985

(*BMI ≥30, or ~ 30 lbs. overweight for 5’ 4” person)



OSA Is Treatable

- Treatment with CPAP (titration)
  - Many cognitive deficits reversible
  - Canadian study → reduced risk of accident

- Operational experience
  - Large trucking company
  - Instituted screening/diagnosis/treatment
  - Reported reduced accidents, reduced health care costs, increased driver retention

Highway Accident

- Jackson, TN – 2000
- Tractor-trailer approached worksite at 65 mph
- Struck stopped highway patrol vehicle (lights flashing)
- Fatally injured officer inside patrol vehicle, seriously injured driver of second vehicle

Highway Accident (con't)

- Hospital admission 4 years prior:
  - 5'11", 358 lbs (BMI 49.9); "history c/w sleep apnea," "significant desaturation"; needed "sleep study, but in need of return to employment"
- Accident 3 years prior – 'blackout'
  - Sleep study: "severe OSA," no improvement with CPAP
- ENT surgery, follow-up study not done
- Exam 1 year prior to accident – diagnosed as hypothyroidism, not OSA

NTSB Accident Report

- Conclusion
  - The driver's 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

- Probable Cause
  - The driver's incapacitation, owing to the failure of the medical certification process to detect and remove a medically unfit driver from service

Another Highway Accident

- Miami, OK – 2009
- Vehicle queue after minor accident on interstate

- Tractor-trailer hit queue at 69 mph, no brakes applied
- Overran several vehicles, 10 fatalities
- Continued 270 feet after initial impact

Another Accident (con't)

- Truck driver
  - Age 76
  - Just below typical OSA screens
  - Typical driving shift was nocturnal
  - Transition back to diurnal during weeks off
  - This trip was first return, after weeks off, to early morning shift
  - Acute sleep deprivation previous evening

- Probable Cause
  - The driver's acute sleep loss, circadian disruption associated with his shift work schedule, and mild sleep apnea

Transit

- Newton, MA – 2008
- MBTA train disregarded signal, struck another train at 38 mph
- Operator of striking train killed, one passenger seriously injured
- Struck train visible more than 1000 ft away
- Train operator: 5’5½”, 243 lbs (BMI 38.6)

NTSB Report

- Report noted that the operator was “at a high risk for having undiagnosed sleep apnea, and she may have been chronically fatigued as a result of the condition.”

- Probable cause
  - Failure of the operator of the striking train to comply with the controlling signal indication, likely as a result of becoming disengaged from her environment consistent with experiencing an episode of micro-sleep

Other Modes: Marine

- Inside Passage, AK – 1995
- Ran aground well-known charted rock
- Pilot (local mariner): 6'1", 310 lbs. (BMI 40.9)
- Long history of sleepiness, 8-9 hrs sleep/night
- Polysomnography: RDI 68.1; with CPAP, RDI 1.1
- Probable Cause
  - Pilot's poor performance, which may have been exacerbated by chronic fatigue from sleep apnea

Rail

- Clarkston, MI – 2001
- Train proceeded through stop signal, collided with oncoming train; 2 crew killed; 2 injured
- OSA was diagnosed or suspected in engineer and conductor of striking train
- Probable cause
  - The crewmembers' fatigue, primarily due to the engineer's untreated and the conductor's insufficiently treated obstructive sleep apnea

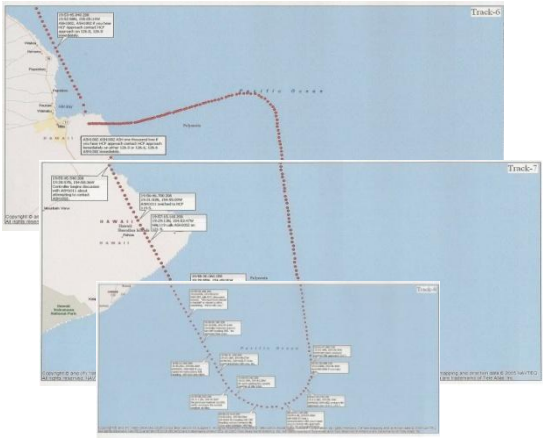
Aviation

– Honolulu to Hilo – 2008

– 50 minute flight

– Overflew destination by 26 miles

– Captain
  - 6’2”, 250 lbs (BMI 32.1)
  - Prior cockpit napping (> once/week)
  - Sleep study: severe OSA – RDI 68.5



– Probable cause:
  - The captain and first officer inadvertently falling asleep during the cruise phase of flight. Contributing to the incident were the captain's undiagnosed obstructive sleep apnea and the flight crew’s recent work schedules

NTSB Recommendations (all modes)

- NTSB made recommendations separately to all modal transportation administrations (FAA, FMCSA, FRA, FTA, plus USCG), starting 2001

- NTSB generally recommended:
  - Identify diagnosis or risk factors for OSA
  - Screening programs and treatment
  - Guidance for operators, employers and physicians
  - Emphasize that employees who are treated routinely return to work

Responses

- Some regulators more responsive than others, and none have refused
- FMCSA (trucking and motor carriers)
  - Convened industry conference to discuss OSA and promised more concrete actions in near future
- FTA (transit)
  - Working with FRA to develop options to address NTSB recommendations
  - Some transit operators have
    - Revised medical history and examination forms to elicit specific information about past diagnosis of or risk factors for OSA
    - Identified and treated operators at high risk for OSA

Conclusions

- Accidents have demonstrated that undetected sleep apnea can be a major transportation safety hazard
- The hazard can be mitigated if identified and treated
- Success stories demonstrate not only improved safety, but also
  - Increased driver productivity
  - Reduced health care costs, and
  - Increased driver retention

Another Emerging Risk: Personal Electronic Devices

- Rapidly becoming much more widespread
- Difficult to detect or prevent
- Decision not to use PEDs while driving ultimately depends upon professionalism and/or personal responsibility
- Potential problem in all modes
- Installed electronic devices also becoming a problem

Washington, DC, 2002

- Ford Explorer flipped over the guardrail on the Beltway
- Caused a collision that resulted in five fatalities
- NTSB determined that the inexperienced driver of the Ford Explorer was distracted by the use of a cellphone at the time of the accident
- NTSB recommended that states prohibit the use of interactive wireless communication devices by young, novice drivers

GW Parkway, 2004

- Experienced motorcoach driver on hands-free cellphone
- Driver failed to notice
  - Low-clearance warning signs
  - Motorcoach he was following had changed lanes to a lane in which the clearance was adequate
- Struck the underside of an arch bridge, injuring eleven of the 27 high school students on the bus
- NTSB recommended that states ban the use of cell-phones by commercial driver's license holders with a passenger-carrying or school-bus endorsement

I-65, Kentucky, 2010

- Truck-tractor and trailer crossed the median and collided with a 15-passenger van traveling in the opposite direction
- Crash was fatal to the truck driver and 10 in the van
- Cellphone records revealed that the driver was on his cellphone when the crash occurred
- NTSB expanded its previous recommendation (from the 2004 crash) and asked states to ban the use of cell-phones, handheld or hands-free, by all commercial motor vehicle drivers

I-44, Missouri, 2010

- Pickup truck ran into the back of a truck-tractor that had slowed for a construction zone
- Pickup truck was struck from behind by two school buses, resulting in two fatalities and 38 injuries

- Pickup truck driver sent and received 11 text messages in the 11 minutes preceding the accident
- NTSB recommended a complete ban against the nonemergency use of all portable electronic devices (other than those designed to support the driving task) for all drivers

NTSB Forum, March 27

- Attentive Driving: Countermeasures for Distraction
- Forum will address
  - Attention to non-driving tasks
  - Distracted driving laws and enforcement
  - Changing attitudes and behavior
  - Technology and design countermeasures
- Panelists will include
  - Federal and state government
  - Law enforcement
  - Researchers
  - Industry groups

Also a Problem in Other Modes

- Rail
  - Chatsworth, CA – 2008
  - Engineer was texting
  - Collided with oncoming freight train, 25 fatalities

- Aviation
  - Minneapolis overflight – 2009
  - Using personal computers?

- Marine
  - Philadelphia, Delaware River – 2010
  - Tugboat operator on cellphone, laptop
  - Overran “Duck”, 2 fatalities

Conclusions

- Accidents have demonstrated that PEDs can be dangerously distracting
- Numerous studies conducted by several academic and government institutions, both domestically and internationally, have reached the same conclusion
- Obtaining “PED-free” safe driving behavior will require a cultural shift
- Past safety campaigns have shown that laws aimed at changing behavior are much more likely to succeed if combined with
  - High visibility enforcement, and
  - Public information campaigns

Thank You!!!

Questions?