Fatigue in Transit Operations

Transportation Research Board

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Fatigue is a major Safety issue for all transit employees today!!
Fatigue - Operational Definition

DOT Human Factors Coordinating Committee, 1998

- Fatigue is a complex state characterized by a lack of alertness and reduced mental and physical performance, often accompanied by drowsiness.
- Fatigue is more than sleepiness and its effects are more than falling asleep.
SAFTE Model
Sleep, Activity, Fatigue, and Task Effectiveness Model

- Biomathematical model based on 12 years of modeling experience and investment by US DOD and DOT
- Validated against laboratory and simulator measures of fatigue.
- Used by the US DOD as the common warfighter fatigue model.
- Independently compared to six models from around the world and judged to be at least as good as any other model available (*Fatigue and Performance Workshop, Seattle, 2002*).
- Only model that considers the long-term effects of sleep restriction.
Ways to mitigate fatigue

• Adequate advance notice – Operator scheduling
• Predictable schedules and defined break periods based on human physiology
• Predictable time off with assigned Work/Rest Schedules
• Employee education utilizing medical science
Building Blocks of Human Performance

Human Performance

- Human Capabilities/Competencies
  - Human-Machine Interface Design, procedures and aids
  - Knowledge, Skills and Abilities
- Human Workload
  - Work Distribution over Crew
- Human Fitness for Duty
  - Human is qualified, rested, motivated, vigilant and healthy

Human Systems Integration

Human Factors Engineering
Personnel
Training
Manpower
Safety & Health
Habitability & QOL
Personnel Survivability

From Nancy Dolan 5/05
NTSB

Has made many recommendations on Human Fatigue and the relationship to operational safety
What is the issue?

- Airplanes, trains, trucks, buses, and ships are complex machines that require the full attention of the operator, maintenance person, and other individuals performing safety-critical functions.
- Consequently, the cognitive impairments to these individuals that result from fatigue due to insufficient or poor quality sleep are critical factors to consider in improving transportation safety.
• Operators of transportation vehicles need to have sufficient off-duty time to obtain sufficient sleep.
• But duty schedules are only part of the equation. Even when an individual has enough time to get rest, medical conditions, living environment, and personal choices can affect the ability to obtain quality sleep.
• Over the years, the NTSB has investigated many accidents, in all transportation modes, in which fatigue was cited as the probable cause or a contributing factor.

• Human fatigue is subtle; at any given point, the traveling public could be at risk because the professional pilots, vessel captains, motorcoach drivers, or truck drivers with whom, or near whom, they are travelling—or the individuals responsible for maintaining vehicles—do not realize until it is too late that they cannot safely complete their duties because of fatigue.

• To make matters worse, people frequently are not aware of, or may deny, ability impairments caused by fatigue. Just because a driver is not yawning or falling asleep does not necessarily mean that he or she is not fatigued.
What can be done . . .

• Since its creation, the NTSB has issued more than 180 separate safety recommendations to address the problem of human fatigue in all modes of transportation.
• Continued research on the manifestations of fatigue will help in further identifying mechanisms that can counter, and ultimately eliminate, fatigue.

• Such research needs to recognize the unique aspects of fatigue associated with each mode of transportation, such as the effect of crossing multiple time zones on international flights or being required to work during periods of the day when circadian rhythms increase the risk of fatigue.
• Fatigue-countering mechanisms must include science-based, data-driven hours-of-service limits, particularly for professional drivers, pilots, mechanics, and air traffic controllers.

• The medical oversight system must recognize the dangers of sleep-related medical impairments, such as obstructive sleep apnea, and incorporate mechanisms for identifying and treating affected individuals.
Employers should also (1) establish science-based fatigue management systems that involve all parties (employees, management, interest groups) in developing environments to help identify the factors that cause fatigue, and (2) monitor operations to detect the presence of fatigue before it becomes a problem. Because “powering through” fatigue is simply not an acceptable option, fatigue management systems need to allow individuals to acknowledge fatigue without jeopardizing their employment.
Without FTA Oversight
The biggest concentration of lights (from top to bottom) are the cities of Boston, New York, Philadelphia and Washington.

Still daylight in California.
Over 90% of Passenger Operations Use Freight Track
Fair Labor Standards Act

- Many employees work long hours by choice because they are not eligible for overtime
Motivation = $$$
Why Bus Drivers Try To Work Long Hours

• Employer demands
• To make more money
• Instability of work force – large number of immigrant Americans, concerned for their jobs
Partnerships Start Here
Questions??

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