



**National  
Transportation  
Safety Board**

# Fatigue: Lessons Learned from NTSB Accident Investigations

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# Topics

- NTSB basics
- How NTSB investigations lead to results
- Fatigue successes
- Where we still need to go

# NTSB 101

- Independent federal agency, investigate transportation accidents, all modes
- Determine probable cause(s) and make recommendations to prevent recurrences
- Issue safety studies/special investigation reports
- Primary product: Safety recommendations
  - > 80% favorably received, even though implementation is not mandatory
- ***SINGLE FOCUS IS SAFETY***

# NTSB and Fatigue Research

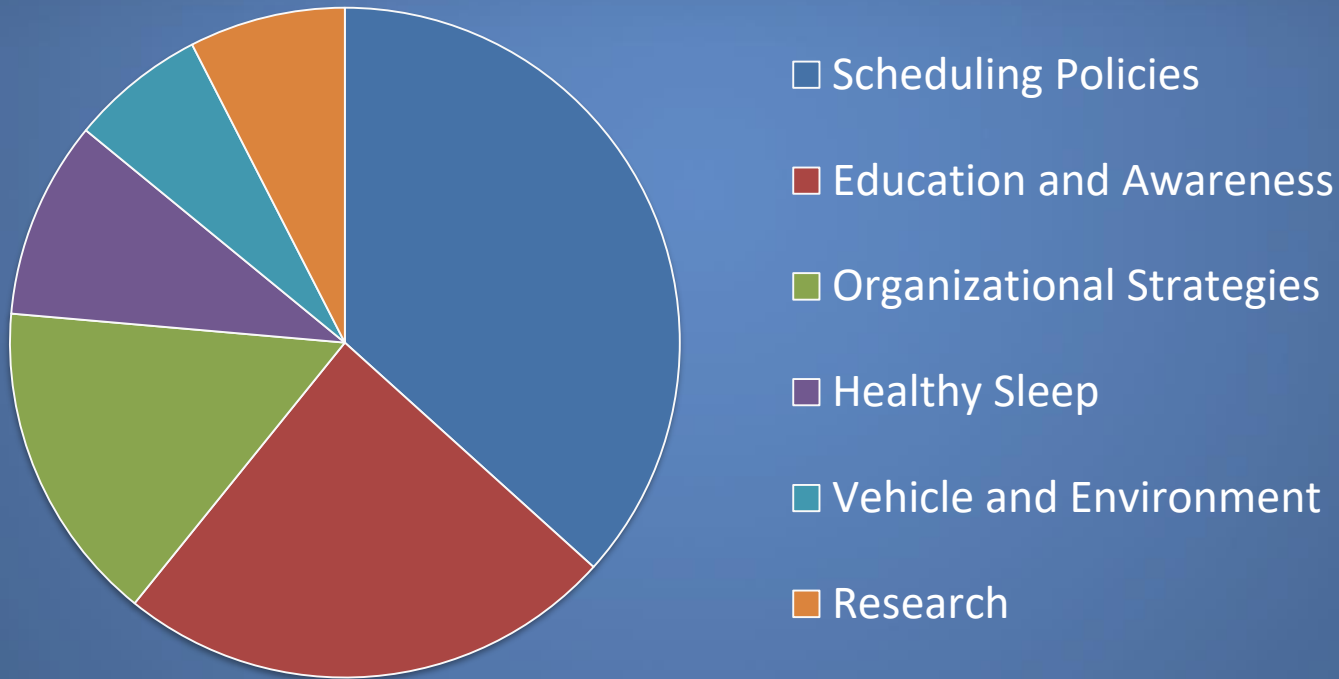


# NTSB Recommendations Regarding Fatigue

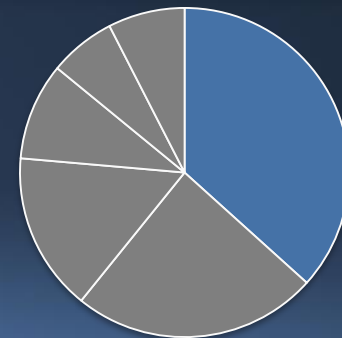
- On 20 out of 26 NTSB Most Wanted Lists
- In 20% of major NTSB investigations, fatigue is a cause, contributing factor, or finding
- >200 recommendations
- **Only 67% recommendation implementation rate**



# NTSB Fatigue Recommendations



# Scheduling Policies



## – Progress:

- 14 CFR Part 117 flightcrew duty and rest requirements
- Electronic logging device requirement for truck and bus drivers

## – Still Needed:

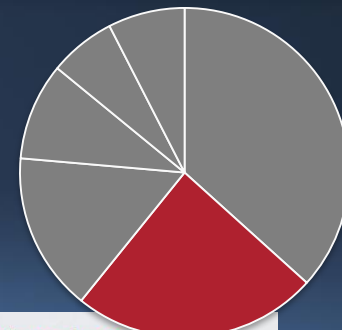
- Science-based duty hours regulations for all safety-sensitive transportation work
- Inclusion of cargo pilots in Part 117

# The Limits of Scheduling Policies/Rules

- New Jersey Turnpike
- Truck driver struck limo-van; had been awake for 28 hours
  - Overnight drive from Georgia to the distribution center at which he was based
- On duty for 13 ½ hours of a 14-hour duty – within rest and duty rules



# Education and Awareness



## – Progress:

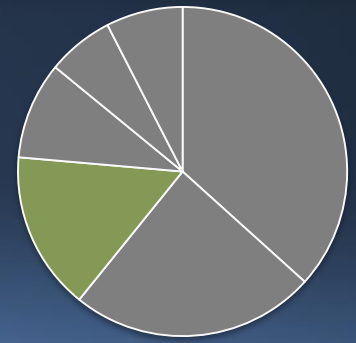
- More resources available
- Greater awareness of fatigue in general and fatigue as a safety issue (evolved from “diet and exercise” to “diet, exercise, and sleep”)

## – Still Needed:

- Improved outreach to high-risk populations



# Organizational Strategies



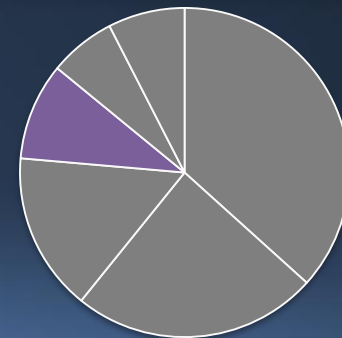
## – Progress:

- More industries/companies adopting fatigue risk management systems (FRMS)
- Non-punitive call-in fatigued policies

## – Still Needed:

- Increased FRMS adoption
- Not just creation but actual implementation

# Healthy Sleep



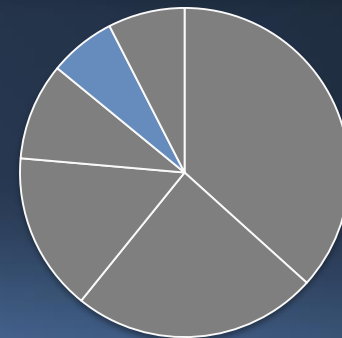
## – Progress:

- Companies with OSA screening and treatment
- Medical examiner requirements

## – Still Needed:

- Better rules and guidance for screening and treating sleep disorders
- Guidance on how drugs affect alertness

# Vehicle and Environment



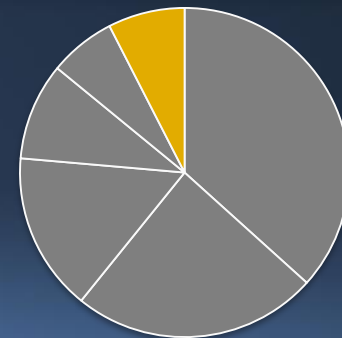
## – Progress:

- Rumble strips, lane departure warning systems, collision avoidance systems, positive train control

## – Still Needed:

- Validation of emerging technologies
- Widespread adoption of technologies that work

# Research



## – Progress:

- Well-developed understanding of the issues regarding sleep and sleep disorders

## – Still Needed:

- More research on the efficacy of various countermeasures
- Better understanding of related issues, e.g., age, weight, diet, exercise, smoking behavior, drinking behavior, stress

# Hoxie: Two Faces of Fatigue

- Both conductor and engineer fell asleep
- Conductor worked the “extra board” at UP, resulting in unpredictable sleep schedules
- Engineer had *diagnosed* moderate OSA
  - But he was not required to report it
  - OSA was inadequately treated (no CPAP with him, no evidence that he had purchased CPAP)

# Hoxie: A Countermeasure Defeated



Horn Sequencer



Alerter

Alerter system, designed to ensure engineer is awake, interpreted automatic horn sequencer as action by engineer

# NTSB Urgent Recommendations

- R-15-4 (Urgent) to FRA
  - In regulations and compliance manual, prohibit automated inputs from resetting alerter
- R-15-5 (Urgent) to FRA
  - Notify railroads of this accident and risk posed by automated inputs that reset alerter cycles. Assess systems to identify and eliminate such resets
- R-15-6 (Urgent) to AAR, ASLRRA, APTA
  - Inform your members of this accident and risks automated inputs that reset alerter cycles. Assess systems to identify and eliminate such resets.



# New Recommendations to FRA

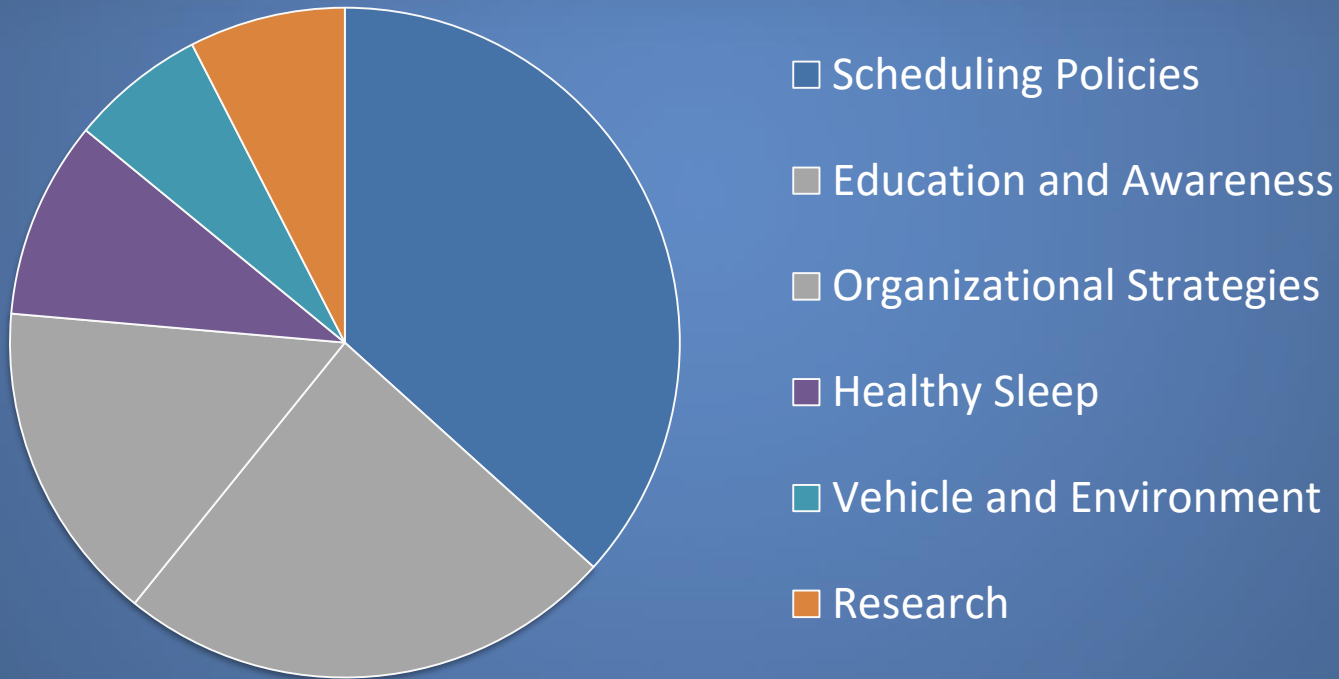
- (R-16-043, R-16-044) Require freight railroads to use validated biomathematical fatigue models to develop work schedules
- (R-16-044) Develop/enforce medical standards that railroad employees with sleep disorders must meet to be considered fit for duty

# “Where Have I Seen This Before?”



Recommendation R-06-14 to the FRA: Require railroads to use scientifically based principles when assigning work schedules for train crewmembers.... To reduce the effects of fatigue

# NTSB Fatigue Recommendations (Hoxie)



# Conclusion

- Fatigue: A complex problem in every mode of transportation
- Action on NTSB recommendations is making a difference... although it might take time
- The research community's work helps us to recommend solutions
- More research on the problem, and especially ***more research on solutions!***

# Thank You!!



## *Questions?*



# National Transportation Safety Board