Fatigue and Accidents
Objective(s)

- Explain How Sleep Cycles, Hours and Circadian Rhythm Disturbances Can Develop Into Short-Term, Cumulative and Chronic Effects on Performance and contribute to accidents.
Why Should We Care?

- 31% of All Drivers Have Fallen Asleep at the Wheel Sometime During Their Lifetime
- 56% of Shift Workers Have Fallen Asleep on the Job
- 55% of Adults Stated They Experienced Daytime Drowsiness.
The Human Toll

- 100,000 Fatigue Related Collisions Per Year
- 1,544 Fatigue Related Deaths Per Year
- Imagine:
  - A Boeing 727 Crashing Every Six Weeks
  - Or the Titanic Sinking Once a Year
  - Or an Oklahoma City Bombing Every Month and a Half.
Who Pays the Costs?
Where Are We Now?

- In the Past 20 Years: 158 Hours Added Annually to Our Schedule
- Since 1969: 241 Hours Added Yearly to Working Mothers’ Schedule
What is Fatigue?

- Fatigue is a complex state characterized by a lack of alertness and reduced mental and physical performance, often accompanied by drowsiness.

- **Misconception:** Fatigue is *not* just falling asleep.
Fatigue Signs and Symptoms

- Forgetfulness
- Poor Communication
- Impaired Decision - Making Skills
- Lack of Alertness
- Slow Reaction Time
- Microsleep.
Fatigue Signs and Symptoms (cont’d)

- Withdrawn Behavior
- Depressed
- Moody
- Quick to Anger
- No Sense of Humor
- Lack of Interest
- Always Tired.
Factors That Affect Fatigue

- Time of Day/Circadian Effects
- Sleep Disorders
- Environmental Conditions
- Nutrition
- Physical Fitness
- Drugs
- Health
- Age.
Mental Fatigue

- Tired and Drowsy Due to Loss of Sleep
- Loss of Concentration And/Or Alertness
- Diminished Levels of Creativity and Logic.
Physical Fatigue

- A Decrease in Physical Performance
- A Feeling of Muscle Discomfort or Soreness
- Lack of Energy.
SLEEP

- A Highly Complex Physiological Process During Which the Brain and Body Alternate Between Periods of Extreme Activity and Quiet, but Are Never Shut off.
What Do We Know?

- Sleep Is a Vital Need
- One-third of Our Life *SHOULD BE* Spent Asleep
- The Average Person Needs at Least 8 Hours of Uninterrupted Sleep
- Some People Mistakenly Feel They Don’t Need a Full Night’s Sleep.
Accumulating a Sleep Debt

- Sleep Loss Is Cumulative and Builds a Debt
- Most People Get 1 to 1.5 Hours Less Sleep Per Night Than They Need
- People whose sleep was restricted to 4 to 5 hours per night for one week needed two full nights sleep to recover vigilance, performance, and normal mood

How Do You Get Out of Sleep Debt?
SLEEP!.
The Two States of Sleep

**State I**
- Non-REM Sleep
  - Physical and Mental Activities Slow
  - Physical Restoration Occurs

**State II**
- REM: Rapid Eye Movement
  - Extreme Mental Activity
  - Mental Restoration
  - Major Muscles Are Paralyzed
States and Stages of Sleep

SLEEP CYCLES ARE ROUGHLY 90 MINUTES IN DURATION

ENTERING SLEEP

STAGE 1

STAGE 2

STAGE 3

STAGE 4

REM SLEEP

DEEP SLEEP

REM sleep increases during the later cycles
Effects of Alcohol on Sleep

- Breaks Down Into Sugar and Will Disrupt Sleep
- Eliminates All REM Sleep in First Half of Sleep Period
- Can Lead to Balancing Act.
Sleep Disorders

- Chronic Insomnia
- Narcolepsy
- Sleep Apnea
- Restless Leg Syndrome
- Periodic Limb Movement Disorder.
Driving Drowsy Affects Performance Like Driving Drunk

- 19 Hours Without Sleep Is Similar to a BAC of .05%
- 24 Hours Without Sleep Is Similar to a BAC of .10%.
Who is Most at Risk?

- Sleep Loss
- Working/Operating/Driving Patterns
  - Midnight Till 0600am
  - Mid-afternoon
  - Many Miles
  - Many Hours
  - Monotony.
Who is Most at Risk? (cont’d)

- Use of Sedating Medications
- Untreated Use of Sedating Medications
- Unrecognized Sleep Disorders
- Consumption of Alcohol.
Internal Body Clock (Circadian Rhythms)

- All Animals Have It
- It Runs on About a 24 Hour Cycle
- All Human Functions Are Controlled by It.
Daily Sleepiness and Performance Rhythms

- Two Times of Peak Sleepiness Each Day
  - About 3 to 5 A.M.
  - About 3 to 5 P.M.
Biological and Social Effects on Shift Workers

- 60 to 80% Have Chronic Sleep Problems
- 4 to 5 Times More Likely to Have Stomach Disorders
- 80% Affected by Chronic Fatigue
- 5 to 15 Times More Likely to Suffer From Mood Swings and Depression
- Divorce and Spousal Abuse Rates Higher
- Drug and Alcohol Abuse Rates Higher.
Incidents Related to Circadian Disruption

- Chernobyl 1:23am
- Bhopal 12:40am
- Three Mile Island 4:00am
- Exxon Valdez 12:04am.
Incidents Related to Circadian Disruption (cont’d)

- Most Mistakes by Rail Employees 3-5am
- Most Mistakes by Omission 3-5am
  - Surgeons
  - Nurses
  - Postal Workers
  - Telephone Operators.
What to Expect if You Don’t Sleep

- Behavioral Problems
- Performance
- Mood Swings
- Eventually You **WILL** Sleep.
What are the costs of fatigue?
Where Do You Go to Find the Costs?

- Examine Crash Data, Incident Logs
- Review Workers’ Compensation Claims, Sick Leave, and OSHA 300 Log For Data
- Review Overtime, or On-call Status.
The Costs? (cont’d)

- Consider Fatigue As a Possible Contributing or Causal Factor in All Investigations
What is your Company Policy?

- Overtime, On-call
- Outside Employment for Employees
- Prescription/Non-prescription Medication Policy
- Napping
- Technology.
What is the Company Policy? (cont’d)

- Screening Employees for Sleep Disorders
- Employee Fatigue Awareness Training
- Corporate Culture:
  - Supervisor/Dispatcher/Employee Authority/Latitude to Confront Fatigue Issues
  - Priority of Safety Concerns.
Supervision of Employees

- Are You Empowered to Approach Management With Fatigue Issues in the Workplace?
Keys to Change

- Knowledge of Fatigue
- Awareness of Fatigue’s Effect on Safe Operations
- Understanding of Your Workplace Safety Culture.