SLEEP DEPRIVATION IN THE WORKPLACE

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Definitions

- **Sleep Deprivation**
  - Condition of not having enough sleep
    - Acute
    - Chronic

- **Excessive Sleepiness (ES)**
  - The inability to consistently achieve the level of wakefulness needed to accomplish the tasks of daily living
Physiological Effects of Lack of Sleep

- Fatigue and daytime sleepiness
- Irritability
- Headaches
- Severe yawning
- Increased heart rate
- Increased blood pressure
- Decreased body temperature
- Cognitive impairment (ability to think and reason)
- Memory lapses or loss
- Aching muscles
- Growth suppression
Physiological Effects of Lack of Sleep

- Decreased reaction time and accuracy
- Deficits in attention and working memory
  - missing ingredients
  - Car/truck accidents
  - Industrial disasters
- Hand tremors
- Clumsiness
Physiological Effects of Lack of Sleep

- Nystagmus (rapid involuntary eye movements)
- Impaired immune system
- Hallucinations
- Impaired moral judgment
- Temper tantrums in children
- May resemble being under the influence of drugs or alcohol
Physiological Effects of Lack of Sleep

Can increase the risk of:

- Heart disease
- Stroke (especially in men)
- Type 2 diabetes
- Obesity
- Fibromyalgia
- Mental illness (including psychosis and bipolar disorder)
Sleep Deprivation

- ACUTEALLY sleep deprived usually aware of the degree of impairment

- CHRONICALLY sleep deprived build up fatigue / attention lapses over time, so are equal in number and severity to lapses from acute sleep deprivation

- Chronics may falsely conclude they are able to perform tasks that require constant attention when their abilities are actually impaired
1 in 5 serious motor vehicle injuries related to driver fatigue
80,000 drivers falling asleep behind the wheel daily
250,000 accidents each year related to sleep
Studies in Australia and New Zealand

- Drivers awake 17-19 hours performed worse than those with a .05% blood alcohol level
- Performance degrades after 16 hours awake
- 21 hours awake equivalent to a blood alcohol .08%
  - (Level of ‘drunk’ driving in U.S, Canada, and U.K.)
Warning Signs of Dangerous Fatigue

- Trouble keeping eyes open
- Head nodding
- Day Dreaming
- Drifting out of lane while driving
- Rolling down car windows to stay awake
- Turning radio volume up
- Slapping own cheeks

At particular risk are drivers between the hours of midnight and 6 a.m.
2004 Study

- Medical residents with <4 hours of sleep committed more than twice as many errors than residents with >7 hours of sleep

- Now have rules regulating how many hours they can work
Micro-Sleep

- Occur with significant sleep deprivation
- Brain shuts down inducing sleep state from 1-30 seconds
- Person falls asleep no matter what they are doing
- Similar to blackouts – person not aware it occurred
Circadian Rhythm

- Humans and most animals and plants have it

- A biological rhythm, controlled by biological clock and works on a daily time scale (cycle of about 24 hours)

- Affects body temperature, alertness, appetite, hormone secretion and sleep timing

- Internal “clock” is set by exposure to sunlight

- Makes us feel sleepy or alert at regular times during day
“Normal” Circadian Rhythm Continuum

“LARKS”
“Morning People”
Prefer to sleep and wake early

“OWLS”
“Evening People”
Prefer to sleep and wake up at late times

- In either case:
  - Can wake in time for what they need to do in the a.m.
  - Fall asleep at night in time to get enough sleep before having to get up
  - Can sleep and wake at the same time every day if they want to
  - If start a new routine requiring earlier wake-up, will start to fall asleep at night earlier within a few days
“Normal” Circadian Rhythm Continuum

Example:

- Usually go to sleep at 1:00 a.m., wake up at 9:00 a.m.

- Start new job on Monday, needs to wake at 6:00 a.m.

- By Friday, has begun to fall asleep at 10:00 p.m. and can awake at 6:00 a.m. feeling well rested

- This adaptation called “advancing the sleep phase”

- Healthy people can advance their sleep phase by about one hour each day
Causes of Excessive Sleepiness

Types of Sleep Disorders:

1. Environmental Sleep Disorder
2. Circadian Sleep Disorders (e.g. Shift Work Sleep Disorder / SWSD)
3. Mental Illness
4. School
5. Obstructive Sleep Apnea (OSA)
6. Restless Leg Syndrome (RLS)
7. Narcolepsy
8. Behaviorally Induced Sleep Syndrome
9. Psychological Insomnia
10. Central Sleep Apnea
11. Psycho-stimulant Drugs (e.g. methamphetamines)
12. Working two (or more) jobs
13. And many others…
Environmental Sleep Disorder

- Occurs when conditions in surrounding environment disturb sleep
  - Noise
    - Barking dogs, snoring bed partner, crying baby
  - Bed motion
    - Bed partner tosses/turns, pets jumping into bed
  - Light / Temperature
    - Too much light, room too hot or too cold
  - Other factors
    - Anything that affects physical condition of the bedroom

- Treatment
  - Eliminate / change the causes of the disturbance
    - Blackout curtains, ear plugs, move to a quieter sleep location, exclude pets from bedroom
Circadian Sleep Disorders

- Extrinsic
  - Jet lag
  - Shift Work Sleep Disorders

- Intrinsic
  - Delayed Sleep Phase Syndrome (DSPS)
  - Advanced Sleep Phase Syndrome (ASPS)
  - Non-24-Hour Sleep-Wake Syndrome (Non-24)
  - Irregular Sleep-Wake Rhythm
Jet lag

- Occurs in people who cross several time zones
- Go to sleep 1 hour earlier day before leaving
- Eat breakfast / lunch / dinner according to appropriate destination time
- Try to stay awake all day on arrival day
- Take melatonin supplement evenings first few days there
- If long night trip, ask PCP for sleeping pill to use on plane (Rx Ambien)
- For short west-coast trips – stay well hydrated, try to stay awake until usual bedtime here (usually no problems)
Circadian Sleep Disorders
Extrinsic

Shift Work Sleep Disorders (SWSD)

- **Due to work schedule taking place during normal sleep period**
  - Work when body wants to sleep
  - Have to sleep when body expects to be awake
- **Doesn’t jive with what the internal body clock expects**
- **Types of Shift Work Schedules**
  - Night shifts / Early morning shifts / Rotating shifts
  - One study estimates 10% of these workers have severe difficulties with shift work
Circadian Sleep Disorders
Extrinsic

Shift Work Sleep Disorder (SWSD)

- Often sleep 1-4 hours less than average
- Feel quality of sleep is poor
- Do not feel refreshed when wake up
- Less alert
- Hinders performance at work
- Usually resolves when sleep normal again
- Length and severity varies person to person
- A once in a while night shift ---- Brief problem
- Regular night shift ---- Problem ongoing
- Working more than average # hours adds to fatigue and problems
Circadian Sleep Disorders
Extrinsic

Shift Work Sleep Disorder (SWSD)

Other Associated problems:
- Tend to sleep normal nighttime hours on weekends and days off
  - Makes it even harder to adjust to unusual work hours

- Affects life away from the job
  - Major portions of free time to catch up on sleep has negative impact on social and family life
  - Increased risk of drowsy driving
    - (Accident on the way home from work)
  - Can make other medical problems worse
    - (More sick time away from work)
  - Using drugs or alcohol to try to improve sleep
    - (substance abuse)
Circadian Sleep Disorders
Extrinsic

Shift Work Sleep Disorders (SWSD)

- How do I know if I have it???
  - Trouble sleeping or severely tired?
  - Are you working when you would normally be asleep?
  - Problem exist for at least one month?
  - Problem hurt your family, social or work life?
Shift Work Sleep Disorders (SWSD)

- Do I need to see a specialist?
  - YES! --- If you have unusual work hours for long periods of time
  - Could provide methods to help body adjust and improve sleep
  - Take sleep diary (2 weeks)
  - Rate your own sleep with ESS (take to the specialist)
Shift Work Sleep Disorders (SWSD)

- **Treatment (General Approach)**
  - Optimize day sleep
  - Rule out primary sleep disorder (sleep specialist)

- **Consider medication in severely affected or in those whose ability to maintain wakefulness is critical**
  - **Medications:**
    - Amphetamines
    - Methylphenidate (Ritalin, Concertra)
    - Modafinil (Provigil)
Circadian Sleep Disorders
Extrinsic

Shift Work Sleep Disorders (SWSD)

Medications
- All have potential side effects
  - (Chest pains, dizziness, difficulty breathing, heart palpitations, irregular (or fast) heart beat, increased blood pressure, tremors / shaking, anxiety, nervousness, rapid mood changes, blurred vision, …)
- May interact with other medications, nutritional supplements, alcohol and caffeine
- Requires careful supervision
  - Monitor for at least 6 weeks
  - Should not drive, operate machinery or do any activity requiring mental alertness, until it is known how it will affect the individual
  - Treating physician should document its effectiveness in preventing daytime somnolence and any untoward side effects
Shift Work Sleep Disorders (SWSD)

- If the worker is “released to return to work” Ask for a letter from the treating physician stating:

  “(worker’s name )’s condition is stable and shows no sign of daytime sleepiness, and the medication(s) have not shown any side effects that would pose a threat to the safe operation of a commercial motor vehicle / powered industrial truck / tow motor / safety-sensitive equipment / etc.”
Other Causes of Excess Sleepiness

Mental Illness

- Depression
- Bipolar disorder (manic depression)
  - ER case – manic male had not slept for 3 days per family; very paranoid, aggressive – did not look tired at all, but had to be…

School

- Sleep deprivation common in college students, especially freshmen trying to adjust to stress and social activities of college life.
Obstructive Sleep Apnea (OSA)

- Definition:
  - Sleep related breathing disorder
  - Causes body to stop breathing during sleep
  - Tissues in the back of the throat collapse and block airway
  - Prevent air from getting into lungs
Obstructive Sleep Apnea (OSA)

Who gets it?

- Can affect anyone, male or female
- Most common in obese, middle-aged men
- Even children with large tonsils
Obstructive Sleep Apnea (OSA)

How do I know if I have it?

- Unintentionally falling asleep during the day
- General daytime sleepiness
- Un-refreshing sleep
- Fatigue
- Insomnia
- Wake from sleep with choking sound / gasping for air
- Bed partner notices you snore loudly or stop breathing during sleep
Obstructive Sleep Apnea (OSA)

- Almost all people with OSA snore loudly
- About half the people who snore loudly have OSA
- Snoring is a sign that the airway is partially blocked
Obstructive Sleep Apnea (OSA)

- When stop breathing, the body wakes up
- Happens so quickly, you may not be aware of it
- Disrupts the sleep process
- Can stop breathing hundreds of times each night
- Can become very tired the next day
Obstructive Sleep Apnea (OSA)

Studies have shown that OSA is associated with:

- Hypertension
- Increased risk of heart attack
- Increased risk of stroke (especially in men)
- Increased risk of death from any cause
Obstructive Sleep Apnea (OSA)

Do I need to see a Sleep Specialist???

- Yes (if you have symptoms of OSA)
Obstructive Sleep Apnea (OSA)

Keep Diary for 2 weeks:

- What time you went to bed each night
- What time you got up each morning
- Number of times you woke up during the night
- Whether you felt rested when you woke up
- If you took any naps during the day
- Whether you felt sleepy or rested throughout the day
Obstructive Sleep Apnea (OSA)

Sleep Specialist will:

- Review your history and symptoms
- Review your sleep diary
- Order an overnight sleep study (polysomnogram) if needed
  - Monitors brain waves, heart beat, breathing, arm and leg movement while you sleep
- If positive for OSA
  - Second sleep study with CPAP
Obstructive Sleep Apnea (OSA)

- Sleep Specialist may use other tests:
  - **Multiple Sleep Latency Test (MSLT)**
    - Measures how quickly you can fall asleep in the dark (done in daytime; at least 4 naps)
    - Measures what kind of sleep you have napping
  - **Maintenance of Wakefulness Test (MWT)**
    - Measures how long you can stay awake in the dark
Obstructive Sleep Apnea (OSA)

Treatment:

- **CPAP (Continuous Positive Airway Pressure) or BiPAP**
  - Keeps airways open so can keep breathing while sleeping
  - Amount of pressure needed varies with each individual
  - The 2nd sleep study with CPAP will determine best pressure and can also try different masks / nasal pillow for comfort
Obstructive Sleep Apnea (OSA)
Obstructive Sleep Apnea (OSA)

Controlled studies with CPAP show:

- Improves symptoms
- Improves quality of life
- Reduces subjective and objective sleepiness
- Improves cognitive function (thinking and reasoning)
- Improves psychological well being
Obstructive Sleep Apnea (OSA)

CPAP problems:

• Patient acceptability
• Cost if no health insurance
Obstructive Sleep Apnea (OSA)

Treatment:

- Weight loss (sometimes enough to stop symptoms)
- Sleeping position (stay off back)
- Avoid Alcohol, sedatives before bedtime
- Oral Appliances (Thrusts lower jaw & tongue forward)
- Surgery
  - Remove Uvula
  - Laser soft palate to make it less floppy
  - Tonsillectomy / Adenoidectomy
Obstructive Sleep Apnea (OSA)
Screening Criteria used for DOT Medical Exams

1. **Sleep history suggestive of OSA** (snoring, EDS (excessive daytime sleepiness), witnessed apnea)

2. **Two or more of the following:**
   a) BMI ≥ 35 (BMI = weight in pounds x 703 / height in inches²)
   b) Neck circumference > 17” in men, >16” in women
   c) Hypertension (HTN) (New, uncontrolled, or need ≥ 2 medications to control)

3. **Epworth Sleepiness Scale (EES) >10**

4. **History of MVC likely related to sleep disturbances** (run off road, at-fault, rear-end collision)

5. **Found sleeping in exam or waiting room**

Any one of the items above is reason to request sleep lab study prior to DOT certification
Sleep Deprivation
Impact on the Workplace

Studies reported in JOEM (Jan 2010, Feb 2010, May 2010) on productivity losses and cost related to sleep disturbances

- ↓ Productivity performance / functioning
  - Decreased energy, motivation, social interaction

- ↑ Absenteeism

- ↑ Presenteeism
  - Impairment at work
  - Risk for major error

- ↑ Risk of accident or injury to self or others

- ↑ Risk of developing other medical conditions or worsening of current medical conditions
  - Hypertension, Diabetes, Heart disease, stroke, anxiety, depression, etc...

- ↑ Economic burden on employers
  - In-patient and out-patient medical care
  - Pharmacy
  - Absenteeism
  - Loss of productivity
  - Accidents / Injuries (possible litigation, disability costs, increased insurance coverage costs)
Sleep Deprivation
Impact on the Workplace

Study reported in JOEM (May 2010)

- The mean estimated annual cost of sleep disturbance related to at-work productivity loss ranged from $2,531 to $3,980 per employee
Sleep Deprivation
Impact on the Workplace

Solutions: What can YOU, the employer do?

- Offer education to workers about:
  - Importance of sleep
  - How to effectively manage sleep loss / fatigue
    - Naps
    - Regular exercise
    - Basics of good sleep habits
    - Avoid alcohol and caffeine before bedtime
    - Relaxation techniques
Sleep Deprivation
Impact on the Workplace

Solutions: What can YOU, the employer do?

- Consider Safety / Wellness program
  - Health screenings
    - Vision, blood pressure, sugar, cholesterol, sleep assessment questionnaire
  - Adopt policy for Powered industrial Truck drivers
    - Vision, hearing, blood pressure, medication, epilepsy, heart disease, diabetes, and OSA guidelines
Sleep Deprivation Impact on the Workplace

Solutions: What can **YOU**, the employer do?

- Help shift workers stay better rested
- Reduce the number of times workers change shifts
- Change shifts forward in time instead of backwards
- Give workers regular rest periods
- Offer workers options of exercise breaks
- Use bright light to imitate sunlight
- Allow for more flexible work start times and end times
Sleep Deprivation Impact on the Workplace

Solutions: What can YOU, the employer do?

- If you suspect a work performance problem, consider that it may be related to sleep deprivation
- Find the cause
  - Refer to a Primary Care Physician (PCP)
  - May need help of a sleep specialist
  - If have “reasonable suspicion” and a drug testing policy, send for a urine drug screen and a breath alcohol test
    - If positive and have a 2nd chance program, send to SAP or EAP for counseling and/or detox
    - Still may have underlying sleep disorder or other medical conditions needing diagnosis and treatment, so it is still good to involve the PCP
Sleep Deprivation Impact on the Workplace

Solutions:

- Once a diagnosis is made, can develop a treatment plan
  - Sleep hygiene
    - Get up at the same time every day
    - Avoid alcohol and caffeine before bedtime
  - Behavioral therapy
    - Relaxation exercises / relaxing tapes
    - Breathing exercises
  - Medications
    - Melatonin, sleeping pills, hypnotics, antidepressants, stimulants
    - Some individuals try alcohol → No Good → Interrupted sleep
  - CPAP for OSA
  - Treat drug or alcohol abuse / addiction
  - If associated with an underlying medical condition or mental condition, treat that and often EDS will improve
References:

- www.SleepEducation.com
- CDME Review
- The DOT Medical Examination
QUESTIONS????????

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