

Sleep

And its role as a potentially reversible cause of cognitive and other health problems

Big Sky Conference: North Dakota Academy of Family Physicians
Thursday, January 20, 2022
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Grant/Research Support
Northwestern Memorial Foundation

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"Off-label" uses of medications
I will not be discussing any "off-label" uses of any medications


Unapproved/investigative use of a commercial device
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Objectives

1. Sleep: workup for cognitive and other health problems
2. Screening for sleep disorders
3. Diagnosis and management of sleep disorders



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Sleep: Workup for Cognitive and Other Health Problems





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WHY SCREEN FOR SLEEP?

~\$28 Billion Sleep Market (<https://big.marketresearch.com/top-6-things-to-know-about-the-28-billion-sleep-market>)


- \$15 billion mattress industry (Tempur Sealy and Serta Simmons Bedding)
- \$4.3 billion sleep centers/labs
- \$4.3 billion CPAP (dominated by ResMed and Respirationics)
- \$2.98 energy drinks for 13 weeks that ended on December 23, 2017 (<https://www.statista.com/statistics/558822/us-energy-drink-sales>)
- \$2 billion Medications (\$1.4 billion prescription and \$576 million OTC)
- \$1.6 billion pillow

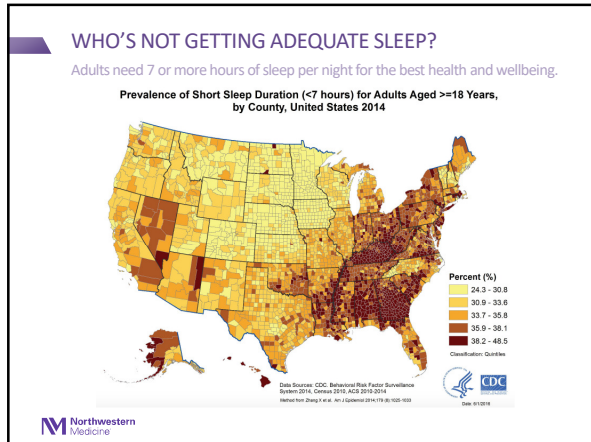
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WHY SCREEN FOR SLEEP?

- **Prevalence:** 60 percent of adults report having sleep problems a few nights a week or more. At least 40 million Americans suffer from sleep disorders
 - U.S. obesity rates are climbing and Americans are aging
 - Stressors related to the pandemic (variants, surges, lockdowns, vaccinations, resignations, overwhelmed health care resources and nonCOVID limited access to healthcare), protests, mass shootings, etc. are all resulting in more sleepless nights.
 - Sleep Disorders and COVID-19
 - Sleep disorders related to COVID-19 (Bhat & Chokroverty, 2021)
 - Greater negative outcomes of sleep-disordered breathing after COVID-19 infection (Orbea et al., 2021)



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WHY SCREEN FOR SLEEP? SOCIETAL BURDEN

- **Economic burden of sleep apnea** (Frost & Sullivan, 2017):
 - (billions) \$86.9 lost productivity, \$26.2 MVA, \$6.5 workplace accidents
- **Disasters:** Fatigue was a major contributor to the Three Mile Island crisis, the Chernobyl meltdown and the Exxon Valdez oil spill.
- **Major Accidents:** NTSB investigators determined the September 29, 2016 New Jersey Transit train crash into the Hoboken terminal and the January 4, 2017 Long Island Rail Road train that crashed into the Atlantic Terminal in Brooklyn was due to obstructive sleep apnea

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FALLING ASLEEP WHILE DRIVING

- Excessive daytime sleepiness occurs in approximately 20-30% of people in the United States
- According to the Bureau of Labor Statistics, approximately 15 million Americas work evening, night, or rotating shifts. Shift workers get an average of 1.5 hour less sleep and are 5 times more likely to be in an automobile accident
- Fatigue contributes to more than 100,000 police-reported highway crashes, causing 71,000 injuries and 1,500 deaths each year in the United States alone

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WHY SCREEN FOR SLEEP? COGNITIVE

- **Potential Disease modifying:**
 - **Dementia/Mild Cognitive Impairment:** potential reversible/modifiable causes for cognitive deficits, especially in the elderly
 - Association of disrupted sleep and cognitive burden Winer et al., JAMA Neurol 2021)
 - Would treatment of disrupted sleep effect beta-amyloid and tau accumulation?
 - **Depression/Anxiety:** both affects sleep and are affected by sleep
 - Depression and anxiety result in cognitive impairments

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WHY SCREEN FOR SLEEP? MEDICAL

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WHY SCREEN FOR SLEEP? MEDICAL

- **Patient Education:**
 - Misconception
 - *I don't have a sleep problem, I could fall asleep right now!*
 - Misinformed self-treatment
 - OTC anticholinergics, energy drinks
- **Prodromal Sign:** Dream enactment for Parkinson's Disease, Lewy Body Dementia
- **Symptom of Disease:** cancer, MS, depression, chronic pain, Parkinson's Disease, Alzheimer's Disease (Eldadah, AGS, 2008)
- **Potential Disease modifying:**
 - **Dementia:** potential reversible cause for cognitive deficits, especially in the elderly
 - **Vascular Disease:** sleep apnea and death, stroke, hypertension, diabetes
 - **Depression/Anxiety:** both affect sleep and are affected by sleep
- **Surgery Clearance:** anesthesiology and sleep apnea risk so that a CPAP can be at hand

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Screening for Sleep Disorders




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SLEEP WAKE DISORDERS

- Sleep Hygiene
- Insomnia
- Parasomnia
 - REM Behavior Disorder
 - Periodic Limb Movement Disorder
 - Restless Legs syndrome
 - Narcolepsy
- Sleep apnea and Snoring



HOW CAN YOU SCREEN FOR THESE DISORDERS?

<https://www.sleephealth.org/sleep-health/the-state-of-sleephealth-in-america/>

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INSOMNIA

- Perception or complaint of inadequate or poor sleep
- More than half of adults in the U.S. said they experienced insomnia at least a few nights a week during the past year
- Nearly one-third said they had insomnia nearly every night
- Ninety percent of those diagnosed with depression report insomnia
- Increases with age
- The most frequent health complaint after pain
- Twice as common in women as in men

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INSOMNIA

- Sleep Initiation
- Sleep Maintenance—awakening
 - Difficulty returning to sleep
- Waking up too early
- Unrefreshing sleep
- Daytime drowsiness
- Daytime anxiety, irritability
- Forgetful, with difficulty concentrating
- Greater risk for accidents

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INSOMNIA: CAUSES

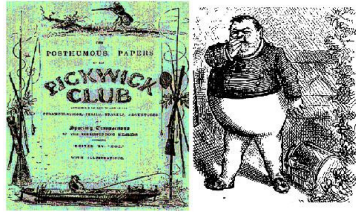
- Environmental
 - Poor sleep habits
 - Shift work
- Medical Conditions
 - Pain
 - Heart, Thyroid, Lung, Kidney, Diabetes, Menopause
 - Psychiatric (Depression, Anxiety, Bipolar, Schizophrenia)
 - Other Sleep Disorders (Circadian Rhythm, RLS, PLMD)
- Drugs
 - OTC (Alcohol, Caffeine, Tobacco)
 - Prescription (antidepressants)
 - Alternative

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SLEEP APNEA

William Osler MD observed the association between obesity and hypersomnolence and in 1918 he coined the term 'Pickwickian syndrome based on Charles' Dickens' 1836 Description of an overweight boy who snored and had right-sided heart failure



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BRIEF SLEEP SCREEN (GENERAL QUESTIONS)

- Have you ever had a sleep study?
- Have you ever seen a sleep doctor?
- Do you routinely get less than 6 hours or more than 9 hours of sleep per night?
- Do you feel rested after a good night's sleep?
- How often do you have a good night's sleep?
- Trouble falling asleep?
- Trouble staying asleep?



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BRIEF SLEEP SCREEN (DISORDER SPECIFIC)

- Has anyone ever said that you are acting out your dreams? (counsel re safety)
- Snoring?
- Has anyone ever said you are so quiet when sleeping that they have to check to see you are still breathing?
- Sleeping more than 2 hours daytime?
- Periodic Limb movement Disorder (PLMD)?
- Cramps in the legs that wake you up at night?
- Restless Leg Syndrome (RLS)?
- Are you using over the counter sleep aids?



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STOPBang (<https://www.mdcalc.com/stop-bang-score-obstructive-sleep-apnea>)

1. Do you **SNORE** loudly (louder than talking or loud enough to be heard through closed doors)?
2. Do you often feel **TIRED**, fatigued, or sleepy during daytime?
3. Has anyone **OBSERVED** you stop breathing during your sleep?
4. Do you have or are you being treated for high blood **PRESSURE**?
5. Is **BMI** more than 35?
6. Patients age is over 50 years old?
7. **NECK** circumference > 15.75 inches?
8. Male **GENDER**?

Score: *** (≥3 yes answers: High-risk for OSA)



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STOPBang CLARIFICATION

- Have bed partner present to confirm answers
- #3. Has anyone **OBSERVED** you stop breathing during your sleep?
 - Holding their breath
 - Hear snorting
 - Dream under water
 - Wake up trying to catch your breath
- Some populations (e.g. Asians) may not have the BMI > 35 (#5)
- For obstructive sleep apnea, not central sleep apnea.



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EXCESSIVE DAYTIME SLEEPINESS



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EXCESSIVE DAYTIME SLEEPINESS

- Sleepy?
- Fatigued?
- Decreased concentration?

My own personal approach is to also ask the following:

1. When driving, have you ever wondered how you got from one street to another street that is four blocks away and you have no memory of it?
2. Are you asleep before your head hits the pillow? It should take about 10 - 15 minutes to fall asleep after going to bed. If patient is asleep in less than 5 minutes it could be sign of excessive sleepiness.




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EPWORTH SLEEPINESS SCALE

Johns (1991)

- (0=never, 1=slight chance, 2=moderate chance, 3=high chance)
- 1. Sitting and reading:
- 2. Watching television:
- 3. Sitting, inactive in a public place (theater or meeting):
- 4. As a passenger in a car for an hour without a break:
- 5. Lying down to rest in the afternoon when circumstances permit:
- 6. Sitting and talking to someone:
- 7. Sitting quietly after lunch without alcohol:
- 8. In a car, while stopped for a few minutes in traffic:


- Total Score: ***/24 (10/24 cutoff))



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EPWORTH CLARIFICATION

- My own personal approach
 - Ask patient to answer question first, this is the score you must use
 - Then ask bed partner to give their opinion
 - Justify second opinion by saying falling asleep includes a "head nod" that patient may not even notice
 - Use this qualitatively as there are no norms for this
 - Especially useful in with patients with reduced insight



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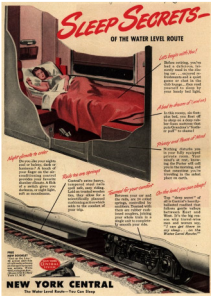

Diagnosis and Management of Sleep Disorders

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SLEEP HYGIENE

- For all individuals having sleep problems, begin with education about behaviors that can help with or interfere with sleep
- Can help with insomnia
- For individuals refusing to have a sleep test
- This is particularly important when working with a caregiver of someone with dementia as this can help the caregiver help the patient avoid behaviors that would interfere with sleep





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SLEEP HYGIENE INSTRUCTIONS

Homeostatic Drive for Sleep (related to time from previous sleep)

- Go to bed only when sleepy
- Avoid naps, except for a brief 10-15 minutes nap eight hours after arising; but check with your physician first, because in some sleep disorders naps can be beneficial.
- Restrict sleep period to average number of hours you have actually slept per night in the preceding week. Quality of sleep is important. Too much time in bed can decrease quality of subsequent nights.
- Get regular exercise each day, preferable 40 minutes each day or an activity that causes sweating. It is best to finish exercise at least six hours before bedtime.
- Take a hot bath to raise your temperature within two hours before bedtime. A hot drink may help you relax as well as warm you.




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SLEEP HYGIENE INSTRUCTIONS

Circadian Factors (related to "internal clock")

- Keep a regular time out of bed 7 days a week
- Do not expose yourself to bright light if you have to get up at night.
- Get at least one half hour of sunlight within 30 minutes of your out-of-bed time.

Sleep specialists can use light therapy to treat people who are phase shifted to the point that it is interfering with daily life (e.g. holding a job)



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SLEEP HYGIENE INSTRUCTIONS

Drug Effects

Smoking


- Do not smoke to get yourself back to sleep.
- Do not smoke after 7:00 pm, or give up smoking entirely.

Caffeine

- Avoid caffeine entirely for a four-week trial period; limit caffeine use to no more than three cups no later than 10:00 am.

Alcohol

- Light to moderate use of alcoholic beverages; alcohol can fragment sleep over the second half of the sleep period.




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SLEEP HYGIENE INSTRUCTIONS

Arousal in the Sleep Setting Part 1

- Keep clock face turned away, and do not find out what time it is when you wake up at night.
- Avoid strenuous exercise after 6:00 pm.
- Do not eat or drink heavily for three hours before bedtime. A light bedtime snack may help.
- If you have trouble with regurgitation, be especially careful to avoid heavy meals and spices in the evening. Do not retire too hungry or too full. Head of bed may need to be raised.
- Keep your room dark, quiet, well ventilated, and at a comfortable temperature throughout the night. Earplugs and eyeshades are OK.
- Use a bedtime ritual. Reading before lights-out may be helpful if not occupationally related.




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SLEEP HYGIENE INSTRUCTIONS

Arousal in Sleep Setting Part 2

- Learn simple relaxation techniques to use if you wake at night. Do not try too hard to sleep; instead, concentrate on the pleasant feeling of relaxation.
- Use stress management in the daytime.
- Avoid unfamiliar sleep environments
- Be sure mattress is not too soft or too firm, pillow is right height and firmness.
- Do not take sleep medications or aids unless specifically recommended by your doctor
- Use bedroom only for sleep or sex; do not work or do other activities that lead to prolonged arousal.
- If possible, make arrangement for care-giving activities (children, other, pets) to be assumed by someone else.




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SLEEP HYGIENE INSTRUCTIONS

Designate Worry Time

Often, our days are so complicated that the only time we have to think about all that is going down is when we lay down to go to sleep. This activity will help you restructure your thought process prior to bedtime and free your mind of these intrusive thoughts as you lay in bed.

- Take time in the late afternoon, early evening, sit in a quiet and relaxing atmosphere.
- Get some 3 X 5 cards
- Write down your thoughts, concerns, plans – one item on a separate card.
- For each thought, write possible solutions on the back of the card
- There may not be a solution for each problem and that is okay. Remember, you have made some progress by just thinking about it and writing something down.
- Tell yourself that you will not think about these thoughts until tomorrow. Put the cards in a designated drawer.
- The idea behind this activity is twofold. One, you give yourself some time to think about concerns etc. during the day. Second, your mind, if it is not dwelling on these thoughts, will relax and allow you to fall asleep. An added bonus is that you may come up with new, possibly more creative solutions while you are asleep.

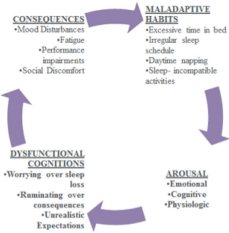


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Cycle of Persistent Insomnia

(From Davis 2006, Behavior Treatment for Sleep Disorders)



Treatment

- Behavioral (should be first treatment)
 - Sleep Hygiene (habits, environment etc.)
 - CBT
- Medications (most frequent treatment)
 - OTC
 - Alternative
 - Melatonin
 - Prescription




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PLMD AND RLS

- Periodic Limb movement Disorder (PLMD)—Repetitive (every 20-40 sec) cramping or jerking of the legs during sleep.
- Restless Leg Syndrome (RLS)—Unpleasant sensation in your legs with an **urge** to move or stretch your legs to make them feel better. At least 80% of people with restless legs syndrome have PLMD, but the reverse is not true

Iron supplementation: Serum ferritin levels are <45 micrograms/L (the normal range for adults is 20-300 micrograms/L for men and 20-150 micrograms/L for women. A significant improvement in RLS symptoms has also been demonstrated in RLS patients (Epocrates 2018)




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SLEEP APNEA

More than 5 events of breathing cessation per hour places the individual at risk of high blood pressure, diabetes, and coronary artery disease.

<p>APNEA/HYPOPNEA</p> <ul style="list-style-type: none"> Apnea : Cessation of airflow for greater than 10 seconds with continued chest and abdominal effort. Hypopnea : Decrease in amount of air breathed (some say by 50%) with a desaturation of at least 3%. 	<p>APNEA/HYPOPNEA INDEX</p> <ul style="list-style-type: none"> Normal: less than 5 events per hour Mild: 5 - 15 events per hour Moderate: 16 - 30 events per hour Moderately severe: 31 - 39 events per hour Severe: over 40 events per hour
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SLEEP APNEA: TREATMENT





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"SELLING" CPAP






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Summary

1. Sleep: workup for cognitive and other health problems
2. Screening for sleep disorders
3. Diagnosis and management of sleep disorders




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QUESTIONS



<http://primarycare.com/wp-content/uploads/2011/04/skier-sleeping.jpg>

<https://www.dailymail.co.uk/news/article-2121134/Boy-falls-asleep-ski-video-Little-Bodys-snow-sleepy-nods-learning-ski.html>



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