

Sleep

The Missed Reversible Cause of Cognitive and Other Health Problems

Presented to: Big Sky Conference: North Dakota Academy of Family Physicians
 Presented on: Thursday, January 19, 2017
 Presented by: Michael G. Mercury PhD (Michael.Mercury@nm.org)

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DISCLOSURE OF FINANCIAL RELATIONSHIP

Michael G. Mercury PhD

Employee
 Northwestern Medicine Healthcare, Chicago IL


Academic Appointment
 Health System Clinician, Feinberg School of Medicine, Northwestern University

Grant/Research Support
 Douglas L. Johnson Endowed Chair for Neurosciences, Northwestern Memorial Foundation.

Speaker's Bureau, Consultant, Advisory Board, Major Shareholder
 I have no actual or potential conflict of interest in relation to this program/presentation

"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. Screen for sleep disorders in a primary care practice
2. Review sleep hygiene recommendations
3. Learn when to refer to sleep specialists



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Screen for sleep disorders in a primary care practice

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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 volatile stock market, terrorism, mass shootings, health care, student debt, and protests against politicians are all resulting in more sleepless nights.
- ~\$28 Billion Sleep Market (<https://blog.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/558022/us-energy-drink-sales/>)
- \$2 billion Medications (\$1.4 billion prescription and \$576 million OTC)
- \$1.6 billion pillow




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SLEEP: ONE OF THE NEW SLEEP SPECIALTIES

Sleep medicine was recognized as a specialty by the American Medical Association in 1996

Nathaniel Kleitman PhD (physiologist)


- at the University of Chicago identified rapid eye movement (REM) sleep.
- regarded as the father of American sleep research
- began his work in the 1920s examining sleep and wakefulness and the nature of a circadian rhythm.

William Dement MD Ph.D. (internist)

- a graduate student and Dr. Kleitman established the cyclical nature of EEG recordings the association between REM sleep and dreaming (1957)

Dr Jerome Holland


- In 1972, all night sleep studies involving EEG, EMG, and oximetry were performed at Stanford University, coined the term 'polysomnography'.



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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:* both affects sleep and is affected by sleep
- **Surgery Clearance:** anesthesiology and sleep apnea risk so that a CPAP can be at hand

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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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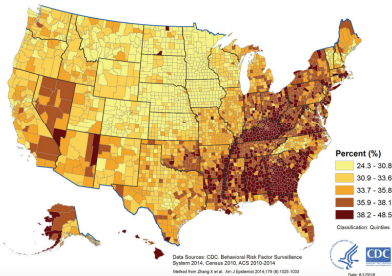
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WHO'S NOT GETTING ADEQUATE SLEEP?

Adults need 7 or more hours of sleep per night for the best health and wellbeing.

Prevalence of Short Sleep Duration (<7 hours) for Adults Aged >=18 Years, by County, United States 2014



Percent (%)

- 24.3 - 30.8
- 30.9 - 33.6
- 33.7 - 35.8
- 35.9 - 38.1
- 38.2 - 48.6

Classification: Quintiles

Data Source: CDC Behavioral Risk Factor Surveillance System 2014, Census 2010, ACS 2010-2014

Method: Zhang, et al. Am J Epidemiol 2014;179:1033-1039

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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 Americans 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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FATIGUE IN MEDICAL TRAINEES

- Barger (N. Eng. J. Med. 2005; 352: 125-34) found a work shift greater than 24 hours was 2.3 times as likely for a motor vehicle crash and 5.9 times for a near-miss. Every extended shift in the month is estimated to increase the crash risk 9.1% and near-miss risk by 16.2%
- West (Mayo Clin. Proc. 2012;87:1138-44) collected self-reports of 340 first-year Mayo Clinic internal medicine residents and found 11/3% reported a motor vehicle crash and 43.3% near misses. Each 1-point increase in fatigue or Epworth Sleepiness Scale was associated with a 52% and 12% respective increase in a motor vehicle crash.
- The Accreditation Council for Graduate Medical Education (ACGME, June 2014) stipulates "Duty periods of PGY-1 residents must not exceed 16 hours in duration, for PGY-2 and above "a maximum of 24 hours of continuous duty in the hospital."

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LIBBY ZION 1984

How One Man's Rage Over His Daughter's Death Sped Reform of Doctor Training

By Barton M. Lerner
Special to The Washington Post
Tuesday, November 28, 2006; Page H01

Many people have vowed to avenge the untimely death of a relative. Lawyer and journalist Sidney Zion actually did so – to the benefit of patients and doctors-in-training nationwide.


After his 18-year-old daughter Libby died within 24 hours of an emergency hospital admission in 1984, Zion learned that her chief doctors had been medical residents covering dozens of patients and receiving relatively little supervision. His anger set in motion a series of reforms, most notably a series of work hour limitations instituted by the Accreditation Council on Graduate Medical Education (ACGME), that have revolutionized modern medical education.

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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

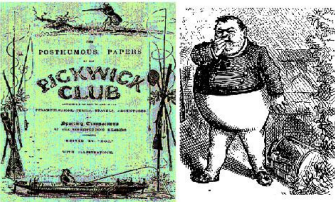
- Environmental
 - Poor sleep habits
 - Shift work
- Medical Conditions
 - Pain
 - Heart, Thyroid, Lung, Kidney, Diabetes, Menopause
 - Psychiatric (Depression, Bipolar, Schizophrenia)
 - Other Sleep Disorders (Circadian Rhythm, RLS, PLMD)
- Drugs
 - OTC (Alcohol, Caffeine, Tobacco)
 - Prescription (antidepressants)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



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BRIEF SLEEP SCREEN (Epic SmartPhrases included)

- Has anyone every said that you are acting out your dreams? {YES/NO/WILD CARDS:18581}. If yes, for how long? {GEN YES/NO/NOT APPLICABLE/SCHEDULED SINGLE:23505}
- Sleeping more than 2 hours daytime? {YES/NO/WILD CARDS:18581}
- Have you ever had a sleep study? {YES/NO/WILD CARDS:18581}
- Do you feel rested after a good night's sleep? {YES/NO/WILD CARDS:18581}
- How often do you have a good night's sleep? {NUMBERS:16364} days of the week
- Trouble falling asleep? {RESPONSES; YES/NO CAPITAL:18887}
- Trouble staying asleep? {RESPONSES; YES/NO CAPITAL:18887}

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BRIEF SLEEP SCREEN (cont., Epic SmartPhrases included)

STOPBang <https://www.mskcc.com/stopbang-screen-obstructive-sleep-apnea/>

- Do you **SNORE** loudly (louder than talking or loud enough to be heard through closed doors)? {YES/NO/WILD CARDS:18581}
- Do you often feel **TIRED**, fatigued, or sleepy during daytime? {YES/NO/WILD CARDS:18581}
- Has anyone **OBSERVED** you stop breathing during your sleep? {YES/NO/WILD CARDS:18581}
- Do you have or are you being treated for high blood **PRESSURE**? {YES/NO/WILD CARDS:18581}
- @BMIE@ Is **BMI** more than 35? {YES/NO/WILD CARDS:18581}
- Patients age is ..@AGE@. Is **AGE** over 50 years old? {YES/NO/WILD CARDS:18581}
- NECK** circumference > 15.75 inches? {YES/NO/WILD CARDS:18581}
- Male **GENDER**? ..@SEX@. {YES/NO/WILD CARDS:18581}

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


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STOPBang NEXT STEPS

Refer and Medical FYI in Epic

- Have bed partner present to confirm answers
- Has anyone **OBSERVED** you stop breathing during your sleep? {YES/NO/WILD CARDS:18581}
 - Holding their breath
 - Hear snorting,
 - Dream under water
 - Wake up trying to catch your breath
- Asians may not have the BMI
- For obstructive sleep apnea, not central sleep apnea.



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BRIEF SLEEP SCREEN (Epic SmartPhrases included)

Bonus Questions


- Periodic Limb movement Disorder (PLMD) {RESPONSES; YES/NO CAPITAL:18887} (Repetitive (every 20-40 sec) cramping or jerking of the legs during sleep).
- Restless Leg Syndrome (RLS) {RESPONSES; YES/NO CAPITAL:18887} (an 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 (Eprocates 2018)

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EXCESSIVE DAYTIME SLEEPINESS



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BRIEF SLEEP SCREEN (Optional Sleepiness Screen)

Symptoms of Excessive Daytime Sleepiness:

Sleepy? {YES/NO:63}.
 Fatigued? {YES/NO:63}.
 Decreased concentration? {YES/NO:63}.
 How long does it take you to fall asleep when you go to bed? ***

- It should take about 10 - 15 minutes to fall asleep after going to bed. If patient is asleep in less than 5 minutes (e.g. before their head hits the pillow), it could be sign of excessive sleepiness.
- If yes, consider administering the Epworth Sleepiness Scale (<http://epworthsleepinesscale.com/>)
- 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
 - Especially useful in with patients with reduced insight

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EPWORTH SLEEPINESS SCALE

Likelihood of falling asleep
 (0=never, 1=slight chance, 2=moderate chance, 3=high chance)

1. Sitting and reading: {0-3:60949}
2. Watching television: {0-3:60949}
3. Sitting, inactive in a public place (theater or meeting): {0-3:60949}
4. As a passenger in a car for an hour without a break: {0-3:60949}
5. Lying down to rest in the afternoon when circumstances permit: {0-3:60949}
6. Sitting and talking to someone: {0-3:60949}
7. Sitting quietly after lunch without alcohol: {0-3:60949}
8. In a car, while stopped for a few minutes in traffic: {0-3:60949}

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

0-5 Lower Normal Daytime Sleepiness
6-10 Higher Normal Daytime Sleepiness
11-12 Mild Excessive Daytime Sleepiness
13-15 Moderate Excessive Daytime Sleepiness
16-24 Severe Excessive Daytime Sleepiness

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Review Sleep Hygiene Recommendations



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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

- Do not smoke to get yourself back to sleep.
- Do not smoke after 7:00 pm, or give up smoking entirely.
- Avoid caffeine entirely for a four-week trial period; limit caffeine use to no more than three cups no later than 10:00 am.
- 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 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

- List problems and one-sentence next steps for the following day. Set aside a worry time. Forgive yourself and others (see Designate Worry Time)
- 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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LEARN WHEN TO REFER TO SLEEP SPECIALISTS

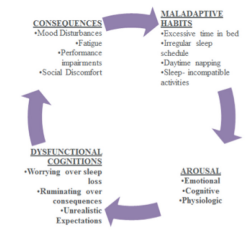


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Cycle of Persistent Insomnia

(From Davis 2006, Behavior Treatment for Sleep Disorders)



CONSEQUENCES

- Mood Disturbances
- Fatigue
- Performance Impairments
- Social Discomfort

MALADAPTIVE HABITS

- Excessive time in bed
- Irregular sleep schedule
- Daytime napping
- Sleep-incompatible activities

AROUSAL

- Emotional
- Cognitive
- Physiologic

DYSFUNCTIONAL COGNITIONS

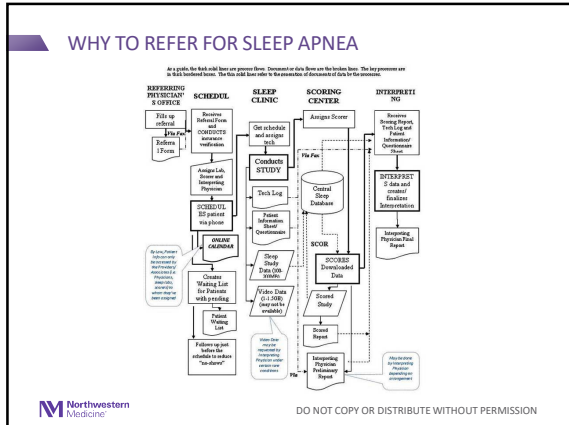
- Worrying over sleep loss
- Ruminating over consequences
- Unrealistic Expectations

Treatment

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

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Summary

1. Screen for sleep disorders in a primary care practice
2. Review sleep hygiene recommendations
3. Learn when to refer to sleep specialists

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QUESTIONS

Sleep: The Missed Reversible Cause of Cognitive and Other Health Problems

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

<https://www.dailymail.co.uk/news/article-211134/Boy-4-8-asleep-ski-video-Little-Bodies-snow-sleepy-nods-learning-ski.html>

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