MANAGING SHIFT WORK DISORDER IN PRIMARY CARE

Overcoming Barriers to Improve Patient Outcomes

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Education Partner

INTEGRITAS
COMMUNICATIONS
Session 5: Managing Shift Work Disorder in Primary Care: Overcoming Barriers to Improve Patient Outcomes

Learning Objectives
1. Describe the neurophysiologic mechanisms of circadian rhythms and adverse multisystem consequences of misalignment for patient health and function
2. Evaluate sleep patterns and symptoms of shift work disorder using clinical tools and strategies, such as sleep logs and the Epworth Sleepiness Scale
3. Diagnose shift work disorder based on identified symptoms, patient history and work schedule, and a comprehensive sleep history
4. Tailor therapeutic regimens for shift work disorder that include appropriate combinations of nonpharmacologic and pharmacologic modalities
5. Educate patients on the potential consequences of poorly managed shift work disorder and the fundamentals of sleep hygiene

Faculty

Charles A. Czeisler, MD, PhD, FRCPath – Virtual Professor
Baldino Professor of Sleep Medicine
Harvard Medical School
Senior Physician, Division of Sleep Medicine
Department of Medicine
Brigham and Women’s Hospital
Boston, Massachusetts

Dr Charles Czeisler is the Baldino professor of sleep medicine, director of the division of sleep medicine at Harvard Medical School, and chief of the division of sleep medicine in the department of medicine at Brigham and Women’s Hospital, Boston, Massachusetts. He is an affiliate faculty member in the neuroscience program at Harvard Medical School and the health science and technology program at Harvard Medical School/Massachusetts Institute of Technology.

Dr Czeisler graduated magna cum laude with a degree in biochemistry and molecular biology from Harvard College, where he was inducted into Phi Beta Kappa in 1999. He received his PhD in neuro- and bio-behavioral sciences and his MD from Stanford University. He is a recipient of the Robert R.J. Hilker award in occupational medicine (1991); Aschoff’s rule (2001); the E.H. Ahrens, Jr. lecture award from the Association for Patient Oriented Research (2002); the William C. Dement academic achievement award from the American Academy of Sleep Medicine (2002); the NiOSH director’s award for scientific leadership in occupational safety and health for his research on resident work hours and safety (2005); the National Sleep Foundation 2006 healthy sleep community award (Harvard Work Hours and Health Safety Group); the 10th Annual J. Gerald Reves Duke Heart Center lecture award from Duke Medical Center (2007); the Dorcas Cummings memorial lecture award from Cold Spring Harbor Laboratory (2007); the National Sleep Foundation lifetime achievement award (2008); the Adrian medal from the Royal Society of Medicine, London (2008); and the Sleep Research Society distinguished scientist award (2008). He is a past president of the Sleep Research Society, where he chaired the presidential task force on sleep and public policy; a fellow of the American Society for Clinical Investigation and the Association of American Physicians; a diplomate of the American Board of Sleep Medicine; a fellow of the Royal College of Physicians (London); and an elected member of the American Clinical and Climatological Association.

Dr Czeisler has more than 30 years’ experience in the field of basic and applied research on the physiology of the human circadian timing system and its relationship to the sleep wake cycle. For more than a decade he served as team leader of the human performance factors, sleep and chronobiology team of NASA’s national space biomedical research institute, which is responsible for developing sleep wake schedule guidelines and related countermeasures for use by NASA astronauts and mission control personnel during space exploration. Dr Czeisler has served on and consulted to a number of national and international advisory committees, including the National Institutes of Health, the Institute of Medicine, the National Academy of Sciences, the Sleep Research Society, the Nuclear Regulatory Commission, the Air Force Office of Scientific Research, the Air Transport Association, and the federal motor carrier safety administration of the US Department of Transportation.

Dr Czeisler has published over 120 original reports in peer-reviewed journals, more than 75 review articles, five books/monographs, and numerous research abstracts; he has been a member of the editorial boards of The American Journal of Medicine, Journal of Biological
Rhythms, and Sleep. He has been keynote speaker at annual meetings of the Japanese Society for Sleep Research (1996), the Association of Professional Sleep Societies (1997), the Society for Research on Biological Rhythms (2002), the Patient Safety Research Conference, Agency for Healthcare Research and Quality (2003), the Committee of Interns & Residents (2005), the American Clinical and Climatological Association (2005), the X International Congress, Brazilian Sleep Research Society (2005), and the New Zealand Resident Doctors Association Professional Conference on Safer Working Hours in Medicine (2005). Dr Czeisler has delivered lectures at the World Congress of Chronobiology in Sapporo (2003), the Second International Forum on Sleep Disorders, Sanofi-Aventis, Paris (2004), Distinguished Leader in Medicine Lecture, Dalhousie University, Halifax, Canada (2006), the 5th Congress of the World Federation of Sleep Research and Sleep Medicine Societies in Australia (2007), and the Harvard Medical School Dubai Center Institute for Postgraduate Education & Research, Dubai (2007).

Karl Doghramji, MD
Professor of Psychiatry, Neurology, and Medicine
Medical Director, Jefferson Sleep Disorders Center
Program Director, Fellowship in Sleep Medicine
Thomas Jefferson University
Philadelphia, Pennsylvania

Dr Karl Doghramji is professor of psychiatry, neurology, and medicine at Jefferson Medical College of Thomas Jefferson University, Philadelphia, Pennsylvania, and medical director of the Jefferson Sleep Disorders Center at Thomas Jefferson University Hospital, also in Philadelphia. Dr Doghramji is also chair of the Albert M. Biele, MD, memorial lectureship in psychiatry in the department of psychiatry and human behavior at Jefferson Medical College. An active member of many professional organizations, Dr Doghramji has for nearly two decades been the director and lecturer for courses pertaining to sleep disorders at the annual meetings of national organizations including the American Psychiatric Association. He has held numerous committee positions with the American Academy of Sleep Medicine and has served as an examiner for the American Board of Psychiatry and Neurology and the American Board of Sleep Medicine. In 1998, he was elected fellow of the American Academy of Sleep Medicine; in 1994, he was elected to the American College of Psychiatrists; and in 2003 was elected distinguished fellow of the American Psychiatric Association and of the Pennsylvania Psychiatric Society.

Dr Doghramji has been chief editor for the Jefferson Journal of Psychiatry and serves as a reviewer for numerous medical journals, such as Sleep, Sleep Medicine, the Archives of General Psychiatry, The American Journal of Psychiatry, The Journal of Clinical Psychiatry, and the Annals of Internal Medicine. The author of more than 150 journal publications and book chapters, he has edited and written 3 books and received numerous grants. His published works and research focus on a wide variety of sleep disorders, including excessive daytime somnolence, sleep apnea syndrome, and insomnia; as well as depression and anxiety disorders.

Dr Doghramji received his medical degree from Jefferson Medical College and completed his internship in internal medicine at Presbyterian-University of Pennsylvania Medical Center, Philadelphia, his residency in psychiatry at Thomas Jefferson University Hospital, and his clinical research fellowship in sleep disorders medicine and polysomnography at Montefiore Medical Center/Albert Einstein College of Medicine in the Bronx, New York. He is also an academic associate in the adult division of the Institute of the Psychoanalytic Center of Philadelphia.

Paul P. Doghramji, MD
Family Physician
Collegeville Family Practice
Medical Director of Health Services
Ursinus College
Collegeville, Pennsylvania

Dr Paul Doghramji is currently senior family practice physician at Collegeville Family Practice, and the medical director of health services at Ursinus College, both in Collegeville, Pennsylvania. He is also an attending physician in family practice at Pottstown Memorial Medical Center, Pottstown, Pennsylvania. He is past and present cochair of the National Sleep Foundation’s sleep and health safety course and has devoted almost three decades to sleep science and education.

Dr Doghramji received his medical degree from Jefferson Medical College, Philadelphia, Pennsylvania, in 1982. He then completed his residency in family practice at Chestnut Hill Hospital in 1985. A member and fellow of the American Academy of Family Physicians and the Pennsylvania Academy of Family Physicians, he has received the American Medical Association’s physician recognition award eight
times. Dr Doghramji has published over 50 papers in peer reviewed journals, including *The American Journal of Medicine*, *Current Medical Research and Opinion*, and *Postgraduate Medicine*. He is also coauthor of the textbook, *Clinical Management of Insomnia*.

**Faculty Financial Disclosure Statements**
The presenting faculty reported the following:

Charles A. Czeisler, MD, PhD, FRCP, is a consultant for Bombardier, Inc., Teva Pharmaceuticals, Novartis Pharmaceuticals Corporation, Purdue Pharma, Vanda Pharmaceuticals, Inc., and Zeo, Inc.; has also received research support from Cephalon, Inc., Philips Respironics, ResMed Inc.; and is a stockholder of Lifetrac, Inc., Somnus Therapeutics Inc, and Vanda Pharmaceuticals Inc.

Karl Doghramji, MD, is a consultant for Aptalis, Jazz Pharmaceuticals plc, and Vanda Pharmaceuticals Inc.; he is also a stockholder of Merck & Co., Inc.

Paul P. Doghramji, MD, is a member of the Speaker’s Bureau and Advisory Board for Teva Pharmaceutical Industries, Ltd.

**Education Partner Financial Disclosure Statements**
The content collaborators at Integritas Communications have reported the following:

Jim Kappler, PhD, has nothing to disclose.

**Suggested Reading List**

International Classification of Sleep Disorders Diagnostic and Coding Manual, Second Edition (ICSD-2)
American Academy of Sleep Medicine. 2005; Westchester, IL.


SEASON 5
2:15–3:30pm
Managing Shift Work Disorder in Primary Care: Overcoming Barriers to Improve Patient Outcomes

SPEAKERS
Karl Doghramji, MD
Paul P. Doghramji, MD
Charles A. Czeisler, MD, PhD, FRCP

Presenter Disclosure Information
The following relationships exist related to this presentation:

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► Charles A. Czeisler, MD, PhD, FRCP, is a consultant for Bombardier, Inc., Teva Pharmaceuticals, Novartis Pharmaceuticals Corporation, Purdue Pharma, Vanda Pharmaceuticals, Inc., and Zeo, Inc.; has also received research support from Cephalon, Inc., Philips Respironics, ResMed Inc.; and is a stockholder of Lifetrac, Inc., Somnus Therapeutics Inc, and Vanda Pharmaceuticals Inc.

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Scientific Insights Into CIRCADIAN RHYTHMS and the Consequences of Misalignment
Charles A. Czeisler, MD, PhD
Baldwin Professor of Sleep Medicine
Director, Division of Sleep Medicine
Harvard Medical School
Chief, Division of Sleep and Circadian Disorders
Departments of Medicine and Neurology
Brigham and Women’s Hospital
Boston, Massachusetts

Medications Discussed in Program
• Medications
  – Triazolam
  – Temazepam
  – Eszopiclone
  – Modafinil
  – Armodafinil
  – Atorvastatin

Presenter Disclosure Information
Off-Label/Investigational Discussion
► In accordance with pmICME policy, faculty have been asked to disclose discussion of unlabeled or unapproved use(s) of drugs or devices during the course of their presentations.
SHIFT WORK AND METABOLIC SYNDROME

- More frequent central obesity and increased weight circumference
- Reduced levels of high-density lipoprotein cholesterol
- Elevated fasting and postprandial plasma glucose concentration
- Higher triglyceride levels

What Are Alternative Work Shifts?

<table>
<thead>
<tr>
<th>Shift Type</th>
<th>Regular Start Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Night</td>
<td>Between 6 PM and 4 AM</td>
</tr>
<tr>
<td>Early Morning</td>
<td>Between 4 AM and 7 AM</td>
</tr>
<tr>
<td>Evening</td>
<td>Between 2 PM and 6 PM</td>
</tr>
<tr>
<td>Rotating/Regular</td>
<td>Periodically changing or varying shift times during days, evenings, nights</td>
</tr>
<tr>
<td>Split</td>
<td>2 distinct work periods each day</td>
</tr>
</tbody>
</table>

In the United States, approximately 21 million individuals work alternative shifts

Scientific Insights Into Circadian Rhythms

Key Points

- Many processes throughout the body exhibit daily cycles
- The suprachiasmatic nucleus in the brain acts as the master circadian pacemaker
- Responds to daily changes in the light/dark cycle
- Entails peripheral circadian clocks throughout the body
- Daily transitions between sleep and wakefulness are controlled by 2 processes
- Circadian signals for alertness and sleep propensity
- Homeostatic drive to sleep
- Circadian dysynchrony: desired sleep/wake cycle misaligned with endogenous circadian rhythm and/or environmental cues

Morbidities Associated With Shift Work

- Cardiovascular disease and stroke
- Gastrointestinal disturbances
- Cancer
- Diabetes and metabolic syndrome
- Depression
- Sleep disorders, including shift work disorder

Key Points

- Complaint of insomnia or excessive sleepiness, accompanied by a reduction of total sleep time, which is associated with a recurring work schedule that overlaps the usual time for sleep
- Symptoms have been present and associated with the shift work schedule for ≥3 months
- Sleep log and actigraphy monitoring (whenever possible and preferably with concurrent light exposure measurement) for ≥14 days (work and free days)
- Demonstrate a disturbed sleep and wake pattern
- Sleep disturbance is not better explained by another current sleep disorder, medical or neurologic disorder, mental disorder, medication use, poor sleep hygiene, or substance use disorder
**Shift Work Disorder**

**Prevalence Among Shift Workers**

- **Night Workers**
  - +SWD: 32.1%
  - -SWD: 67.9%

- **Rotating Workers**
  - +SWD: 26.1%
  - -SWD: 73.9%

N=162 night workers and 337 rotating workers.


**-SWD**

**+SWD**

*P*<0.05 compared with individuals who did not experience excessive sleepiness or insomnia.

N=162 night shift workers, 337 rotating shift workers, 1950 day shift workers.


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**Joan**

**Annual PCP Checkup**

- 45-year-old police officer
- Married mother of 12-year-old twin boys
  - Husband works as manager of large condo complex
- Complains of feeling “constantly tired”
- Reports increased irritability at home with her husband and sons
- Has trouble maintaining concentration at work
  - 2 near-miss MVAs in last 3 weeks while driving on patrol
  - Worried about recent write-up for errors on arrest reports

MVA, motor vehicle accident; PCP, primary care physician.

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**Assessing Suspected Shift Work Disorder in Primary Care**

**Sleep-Focused Assessment**

- History and physical exam
- Patient interview
- Symptom severity and functional consequences

**Questionnaires**

- Epworth Sleepiness Scale
- Insomnia Severity Index
- Shift Work Disorder Screening Questionnaire

**Sleep Diary/Log**

**Actigraphy**

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**Joan**

**PCP Workup**

**Medical and Family History**

- Dyslipidemia, diagnosed 3 years ago
  - Treated with atorvastatin 20 mg daily
- Father died of myocardial infarction at age 65
- Mother received diagnosis of type 2 diabetes at age 55

**Laboratory Tests**

- Triglycerides, 145 mg/dL
- Total cholesterol, 205 mg/dL
- HDL cholesterol, 38 mg/dL
- LDL cholesterol, 185 mg/dL
- FPG, 110 mg/dL (prediabetes)
- Creatinine, 0.7 mg/dL
- Gamma GT, normal (35 U/L)
- Chemistry-12, normal

BMI, body mass index; FPG, fasting plasma glucose; GT, glutamyl transpeptidase; HDL, high-density lipoprotein; LDL, low-density lipoprotein.

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**Medical History and Physical Exam**

- Neck size
- Mallampati score
- Sleepiness-related accidents
- Coexisting psychiatric and medical illnesses that may affect sleep
- Prescription and nonprescription medications

Mallampati Score

Class I

Class II

Class III

Class IV

Shift Work Disorder
Diagnostic Criteria

1. Complaint of insomnia or excessive sleepiness, accompanied by a reduction of total sleep time, which is associated with a recurring work schedule that overlaps the usual time for sleep
2. Symptoms have been present and associated with the shift work schedule for ≥3 months
3. Sleep log and actigraphy monitoring for ≥14 days (work and free days) demonstrate a disturbed sleep and wake pattern
4. Sleep disturbance is not better explained by another current sleep disorder, medical or neurologic disorder, mental

Approximately 50% of patients who experience ≥1 sleep problem/week will not proactively discuss their issues with healthcare providers.

Sleep History
Targeted Questions

- Ask about sleep and work schedules at each office visit
  - On average, how much sleep do you get each night?
  - Do you have trouble falling asleep or staying asleep?
  - Do you have trouble waking up?
  - Do you get drowsy during the day or at inappropriate times?
  - What time do you go to bed and wake up each day?
  - Do you have a regular sleep schedule, including during weekends and time off?
  - Do you snore loudly?

- Consider bed partner interview

Joan
Epworth Sleepiness Scale

Rate Your Chance of Dozing Off:
0 = None, 1 = Slight, 2 = Moderate, 3 = High

<table>
<thead>
<tr>
<th>Situation</th>
<th>Chance of Dozing Off</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sitting and meeting</td>
<td></td>
</tr>
<tr>
<td>Watching TV</td>
<td></td>
</tr>
<tr>
<td>Sitting inactive in a public place (e.g., in a theater or at a meeting)</td>
<td>1</td>
</tr>
<tr>
<td>As a passenger in a car for an hour without a break</td>
<td>2</td>
</tr>
<tr>
<td>Lying down to rest in the afternoon when circumstances permit</td>
<td>3</td>
</tr>
<tr>
<td>Sitting and talking to someone</td>
<td>4</td>
</tr>
<tr>
<td>Sitting quietly after a drink without alcohol</td>
<td>5</td>
</tr>
<tr>
<td>In a car while stopped for a few minutes in traffic</td>
<td>6</td>
</tr>
</tbody>
</table>

Total Epworth Sleepiness Scale score ≥ 14

Epworth Sleepiness Scale (Eisen-mont et al., 2011; Barger et al., 2014; Schwartz et al., 2013; Winston et al., 2013).

Differential Diagnosis of Excessive Sleepiness

- Insufficient or restricted sleep period
- Obstructive sleep apnea or other cause of sleep fragmentation
- Narcolepsy or other disorders of the CNS
- Mood disorders
- Medications that depress CNS activity
- Substance abuse

Shift Work Disorder
Diagnostic Criteria

1. Complaint of insomnia or excessive sleepiness, accompanied by a reduction of total sleep time, which is associated with a recurring work schedule that overlaps the usual time for sleep
2. Symptoms have been present and associated with the shift work schedule for ≥3 months
3. Sleep log and actigraphy monitoring for ≥14 days (work and free days) demonstrate a disturbed sleep and wake pattern
4. Sleep disturbance is not better explained by another current sleep disorder, medical or neurologic disorder, mental

Highest rates of shift work observed among protective services, food preparers/servers, transportation workers, and healthcare staff.

Structured Approach to the Diagnosis of Shift Work Disorder

- Does the patient work alternative shifts?
- Complaints of insomnia or excessive sleepiness?
- Symptom complaint impairs social/occupational function?
- Complaint temporarily associated with a shift work schedule?
- Sleep disturbance better explained by another medical or mental disorder, medication use, or substance use disorder?
- Consider a differential diagnosis or whether shift work disorder is comorbid with other disorder(s)

Shift Work Disorder Ruled Out
Diagnose Shift Work Disorder

Section 76x100 to 277x570
Screening Shift Workers
4-Item Shiftwork Disorder Screening Questionnaire

1. Problems with waking up too early and not being able to get back to sleep
2. Decreased sense of well-being during time awake
3. Dozing off at work during nonstandard (alternative) shift
4. Dozing off or falling asleep while driving, particularly after days off work

Among shift workers, a higher likelihood or more serious manifestations of these 4 items were predictive of the presence of shift work disorder


Possible log entries
- Timing of getting into bed, falling asleep, waking up
- Sleep interruptions or awakenings
- Symptoms tracker
- Work shifts
- Nap times

Actigraphy

- Records rest/activity cycles (and sometimes light exposure) across time
- Provides estimation of sleep-wake and circadian timing


Joan
Clinical Interview

- Promoted to night supervisor 6 months ago
  - Had problems with sleepiness and concentration almost immediately
- Works four 10-h shifts each week starting at 8:00 PM on Tuesday-Friday
  - First 2 hours are in meeting for roll call and then at desk checking citations and filing reports from previous shifts
  - Next 8 hours are spent driving with her partner on patrol and answering calls
- Drinks 3 to 4 large cups of coffee during each work shift
  - Feels coffee is no longer working

Joan
Sleep/Wake Schedule

<table>
<thead>
<tr>
<th>Days</th>
<th>Time</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tues-Fri</td>
<td>3:00 PM</td>
<td>Wakes to alarm</td>
</tr>
<tr>
<td></td>
<td>4:00 PM</td>
<td>Meets sons at bus on school days</td>
</tr>
<tr>
<td></td>
<td>6:00 PM</td>
<td>Eats dinner with family</td>
</tr>
<tr>
<td></td>
<td>7:00 PM</td>
<td>Gets ready for work</td>
</tr>
<tr>
<td></td>
<td>7:30 PM</td>
<td>Leaves for work</td>
</tr>
<tr>
<td></td>
<td>8:00 PM</td>
<td>Begins work</td>
</tr>
<tr>
<td></td>
<td>6:00 AM</td>
<td>Ends work, drives home</td>
</tr>
<tr>
<td></td>
<td>6:30 AM</td>
<td>Arrives home, eats breakfast</td>
</tr>
<tr>
<td></td>
<td>7:30 AM</td>
<td>Gets sons up and walks them to bus stop on school days</td>
</tr>
<tr>
<td></td>
<td>8:30 AM</td>
<td>Works around house</td>
</tr>
<tr>
<td></td>
<td>9:00 AM</td>
<td>Goes to bed</td>
</tr>
<tr>
<td>Sat-Sun</td>
<td>11:00 PM</td>
<td>Goes to bed</td>
</tr>
</tbody>
</table>

Joan
Sleep Log

Time into bed = X
Time of bedtime sleep = X
Naps = X
Lights out = X
Time out of bed = X

<table>
<thead>
<tr>
<th>Date</th>
<th>Mon</th>
<th>Tue</th>
<th>Wed</th>
<th>Thur</th>
<th>Fri</th>
<th>Sat</th>
<th>Sun</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>yes</td>
<td>no</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>2</td>
<td>no</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>3</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
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<td>4</td>
<td>no</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
</tbody>
</table>

How many times did you wake after falling asleep?

1. Yes
2. No
3. Yes
4. No

Wake up to alarm clock?

1. Yes
2. No

Joan
Sleep Log/Diary

Possible log entries
- Timing of getting into bed, falling asleep, waking up
- Sleep interruptions or awakenings
- Symptoms tracker
- Work shifts
- Nap times

Joan
Overview of Sleep Evaluation

• Time in bed
  – 6 h/d on workdays
  – 9 h/d on Saturday and Sunday
  – 5 h/d on Monday
• Falls asleep quickly on nonwork days
• Has trouble falling asleep before work shifts
  – Occasionally watches television in bed
  – Difficulty staying asleep
• Denies snoring
• Receives a diagnosis of shift work disorder

Joan
Treating Shift Work Disorder

General Treatment Goals
  • Align circadian rhythms
  • Increase alertness during wake time
  • Reduce insomnia during sleep time

Overall Management Recommendations
  • Regular follow-up with focus on sleep and common comorbid risks
  – eg, cardiometabolic or psychiatric issues
  • Change work schedule, if possible
  • Address functional issues


Managing Shift Work Disorder
Good Sleep Hygiene

Recommendation Practical Advice
Sleep in dark room, especially during daylight
  – Use well-fitted curtains
  – Install blackout blinds on all windows
Ensure a constant bedroom temperature
  – Aim for room temperature around 68°F (20°C)
  – Avoid wearing too many clothes to bed
Reduce noise
  – Avoid television, computer work, and loud music immediately before desired sleep period
  – If possible, use room isolated from outside noise
  – Consider earplugs if the ambient noise is intrusive
  – Turn off telephone ringer
  – Ask family members to limit noise
Avoid large meals, caffeine, smoking, and alcohol before bedtime
  – Schedule main meal of the day during or before work shifts
  – Consider warm, milky drink before sleep period


AASM Treatment Recommendations for Shift Work Disorder

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planned sleep schedules</td>
<td>Standard</td>
</tr>
<tr>
<td>Timed light exposure</td>
<td>Guideline</td>
</tr>
<tr>
<td>Timed melatonin administration</td>
<td>Guideline</td>
</tr>
<tr>
<td>Hypnotics</td>
<td>Guideline</td>
</tr>
<tr>
<td>Alerting agents</td>
<td>Guideline</td>
</tr>
<tr>
<td>Stimulants/Caffeine</td>
<td>Option</td>
</tr>
</tbody>
</table>

AASM, American Academy of Sleep Medicine.

Joan
Behavioral Management
Optimizing Alertness

Scheduled naps
  Appropriately timed light

Adequate sleep time


Bright Light Exposure and Light Attenuation in Night Shift Workers

Blue and orange lines in sleep efficiency and total sleep time graphs represent the upper and lower quartiles, respectively. Light-colored bars were assigned to right Y-axis.

*P<0.05 vs RL; **P<0.01 vs RL; ***P<0.001 vs RL.
*Number of subjects varies across time blocks (n=10-19) and varied significantly across time blocks (n=10-19).

Timed Light to Phase Shift Circadian Rhythms

Circadian Time

Phase Advance

Reset Clock Earlier

Circadian Time

Phase Delay

Reset Clock Later

Endogenous Melatonin Levels

Melatonin Timing Is Key

Approximate Clock Time

MEL, melatonin; PRC, phase response curve.

Melatonin

Reset Clock Earlier

Release

Phase Advance

Circadian Time

Phase Delay

Reset Clock Later

Endogenous Melatonin Levels

Timing Is Key

Melatonin1-4

Sleep onset & maintenance

Circadian phase change

- No FDA indications
- Range of doses studied (3.5-10 mg), mostly lower doses (1.0-3 mg)
- Hypnotic effect dependent on circadian phase
- Little effect when endogenous levels are high

Dizziness, headache, irritability

Caffeine1,3,5

Alertness

- No FDA indications
- Diuresis, insomnia, irritability, tachycardia, headache, nausea, GI disturbances, increased blood pressure

Prescription Pharmacotherapy

AASM Recommendations

Agent

Use

Clinical Insights

Most Common Adverse Events

Hypnotics

Sleep onset and maintenance

- May improve daytime sleep but do not improve subsequent nighttime sleepiness
- Short-acting hypnotics least helpful to night-shift workers (sleep maintenance issues more prominent than poor sleep quality)

Tardive dyskinesia, Drowsiness, Headache, Dizziness

Modafinil/armodafinil1,2,8

Alertness

- Approved for excessive sleepiness associated with shift work disorder

- Generally well-tolerated
- Headache most frequently reported adverse event
- Warming for serious rash, including Stevens-Johnson Syndrome

Armodafinil or Modafinil in Shift Work Disorder

Reduced Sleepiness and Illness Severity

Sleepiness

CGI-C Improvement

Armoflin (n=193)

Placebo (n=190)

Placebo (n=190)

200 mg Modafinil (n=11)

300 mg Modafinil (n=11)

400 mg Modafinil (n=11)

Placebo (n=11)

Placebo (n=11)

Armoflin (n=11)

Armoflin (n=11)

Armoflin (n=11)

Placebo (n=11)

Placebo (n=11)

Placebo (n=11)

Placebo (n=11)

Placebo (n=11)

Armoflin (n=11)

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Joan
Treatment

• Maximize light exposure during night shifts
• Minimize light in morning after shift
  – Sunglasses after sun comes up
• Keep regular sleep schedule on nonwork days
• Adhere to good sleep hygiene
  – Scheduled naps
  – Avoid large meal and television before bedtime
  – Avoid caffeine during second half of night shift
• Recognize sleepiness when driving


Joan
1-Month Follow-up

• FBG levels improved (95 mg/dL)
• Reduced irritability with sons and husband
• Less time in bed before sleep onset
• Sleepiness moderately reduced
  – ESS of 11/24 from a previous score of 14/24
• Dozed off twice over last month while sitting in patrol car

Would you restructure Joan’s treatment?

When to Consider a Sleep Consultation and/or Referral

• Chronic sleep/wake complaints cannot be explained or remedied fully
• Suspicion of narcolepsy or obstructive sleep apnea
• Unusual behaviors during sleep, with or without sleepiness


Scientific Insights
Into CIRCADIAN RHYTHMS and the Consequences of Misalignment

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Build-a-Case
Katie: Background

• 52-year-old emergency services nurse
• Married with two sons at college
• Husband recently lost job (4 months ago)
  – Katie picked up extra shifts at hospital
• Work schedule
  – Usual shifts: 9:00 AM-6:00 PM Mon, Wed, and Fri
  – New shifts: 4:00 AM-1:00 PM on Thurs and Sat
  – Fights with husband about financial issues and time away from home

Build-a-Case
Katie: PCP visit

• Current complaints
  – Lethargy and irritability
  – Tiredness and trouble concentrating during work shifts
  – Incorrect dose for at least 1 patient has caused additional distress
  – Trouble falling and staying asleep
• BMI, 28.1 kg/m²
  – Gained 8 lbs in last 6 months
• BP, 137/88 mm Hg
• Heart rate, 70 beats/min
• Respiratory rate, 16 breaths/min
• Family history
  – Mother hypertensive and died from a myocardial infarction at age 61

BMI: body mass index; BP: blood pressure.
How does the fact that Katie has high levels of job-related stress affect your approach to patient assessment?

Considerations in Shift Workers
High Stress Levels

• Stress can contribute to chronic sleep problems, including insomnia and sleep apnea
  – Shift workers may be especially vulnerable to work-related stress
• Stress and poor sleep may be pathologically connected through HPA axis
  – HPA axis increases circulating cortisol levels in response to stress
  – Increased cortisol levels may exacerbate circadian rhythm disturbances, including insomnia and aberrant sleep-wake cycles
• Reducing stress in these patients can improve outcomes for sleep disturbances
  – Exercise, changes in routine, relaxation techniques, and other psychosocial therapies

HPA, hypothalamic-pituitary-adrenal.

How does the fact that Katie has mild cognitive impairment affect your approach to patient assessment?

Considerations in Shift Workers
Mild Cognitive Impairment

• Sleep and circadian rhythm disturbances are common manifestations of neurodegenerative disorders
• New classification criteria for Alzheimer's disease describe period of mild cognitive impairment before dementia
  – Symptoms overlap with cognitive consequences of inadequate sleep, complicating the differential diagnosis
  – However, consider Katie's relatively young age and the temporal relationship between symptom onset and her new shift schedule
• Monitor cognitive complaints over time with screening tools, such as the Montreal Cognitive Assessment test
• Consider tests of vitamin B12 and TSH to rule out other potential causes of cognitive complaints

TSH, thyroid-stimulating hormone.

How does the fact that Katie is perimenopausal affect your approach to patient assessment?

Considerations in Shift Workers
Perimenopause

• 12-month period immediately following a woman’s last menstrual cycle
  – 2/3 of women transitioning from perimenopause to postmenopause will experience disturbed sleep
• Patients with perimenopause or shift work disorder may present with fatigue, depression, memory problems, or anxiety
• Monitoring menstrual cycles and specific symptom trackers can help differentiate between menopause and sleep disorders

**Build-a-Case**  
**Katie: Additional Symptoms**

- Nodded off 2 or 3 times during early morning shifts  
- Work performance has suffered  
- Near miss MVA  
- Sleep schedule  
  - Before regular shifts, gets into bed just after 12:00 AM  
  - Before early morning shifts, gets into bed at 10:00 PM and rises at 3:00 AM  
- Drinking red wine to get to sleep more quickly  
- Reports that she does not snore

**Build-a-Case**  
**Katie: PCP Sleep Workup**

- TSH and vitamin B12 levels normal  
- Sleep log  
  - Conventional shifts  
    - Into bed around 12:00 AM  
    - Wakes with an alarm at 7:30 AM  
    - At work by 9:00 AM  
  - Early morning shifts  
    - Into bed around 10:00 PM  
    - Rarly falls asleep before 11:30 PM; watches television  
    - Wakes with an alarm at 3:00 AM  
    - At work by 4:00 AM  
- Mallampati score, 2  
- Epworth Sleepiness Scale score, 15  
- Receives a diagnosis of shift work disorder

**Considerations In Shift Work Disorder**  
**Irritable Bowel Syndrome**

- Shift work is a strong risk factor for IBS, which can by itself disturb sleep
- Chronic circadian dyssynchrony can disrupt colonic motility, visceral sensitivity, and other gastrointestinal functions
- Guideline recommendations for IBS include dietary changes, antispasmodic agents with anticholinergic properties, and antidepressants
  - Anticholinergic agents and antidepressants may further interfere with sleep in patients with shift work disorder
- 1 study showed that melatonin improved IBS symptoms by decreasing pain without affecting colonic motility

**Considerations In Shift Work Disorder**  
**Asthma**

- Asthma symptoms commonly disturb sleep quality and duration
- Normal circadian fluctuations in airway resistance and function may contribute to asthma-induced sleep problems
  - Co-occurring asthma and circadian rhythm disorders may create a feedback loop in these fluctuations
  - Disturbed sleep worsens asthma symptoms and vice versa
- Asthma treatments include inhaled corticosteroids, long-acting β-agonists, and leukotriene modifiers
  - β-agonists can exacerbate insomnia
How does the fact that Katie is obese affect your approach to treatment?

Considerations in Shift Work Disorder Obesity

- Compared with the general population, shift workers are more likely to be overweight or obese \(^1,2\)
  - Increased food intake, later last daily meals, and reduced exercise
- Education on exercise, healthy eating habits, scheduled meals, and avoiding meals and snacks close to bedtime is essential \(^3\)
- Aligning circadian rhythms and addressing residual excessive sleepiness may increase wake-time physical activity
- Little data on new anti-obesity drugs in shift workers \(^4\)
  - Clinicians should consider dosing and side effects, particularly risks for cognitive decline, insomnia, and cardiometabolic abnormalities


Build-a-Case
Katie: Initial Treatment

- Katie is unable to change her shift schedule
- PCP recommends improved sleep hygiene
  - Keep regular bedtime between 7:00 PM and 8:00 PM each night
  - Avoid large meals, caffeine, and television before bed
  - Wear sunglasses after regular shifts during summer
- Prescribed melatonin 0.5 mg to be taken 1 hour before desired sleep time
- More exercise on her time off
- Dietary changes before work

Build-a-Case
Katie: 2-Month Follow-up

- Irritability has greatly resolved
- Energy has increased
- Katie is exercising regularly
- Keeping to the new sleep schedule
  - Finds it hard to get to bed on time before her early morning shifts
- Dozed off twice at work just after dawn

Concluding Comments

- Shift work has been linked to various medical and psychiatric complications, including shift work disorder, cardiometabolic abnormalities, and depression
- Shift work disorder is characterized by excessive sleepiness or insomnia associated with an alternative work shift schedule for at least 1 month
- A diagnosis of shift work disorder can usually be made based on a clinical interview, sleep history, and sleep log
- Combinations of behavioral and pharmacologic therapies may be needed to realign rhythms, address excessive sleepiness or insomnia, and improve alertness

Question & Answer