Evaluating the Sleepy Patient

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You can’t see what you’re not looking for

- Study of 5 Practice Based Research Networks across the country.

<table>
<thead>
<tr>
<th></th>
<th>Age 30-64 (n=1124)</th>
<th>Age ≥ 65 (n=630)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daytime tiredness</td>
<td>65%</td>
<td>49%</td>
</tr>
<tr>
<td>Falling asleep driving</td>
<td>17%</td>
<td>10%</td>
</tr>
<tr>
<td>Discussed symptoms with PCP</td>
<td>22%</td>
<td>18%</td>
</tr>
</tbody>
</table>

Only 23% of physicians routinely screen for sleep problems (all using the Review of Systems).

Mold JW et al, JABFM 2011; 24:138-45
What is sleepiness?

- Excessive daytime sleepiness (EDS), Hypersomnia, Hypersomnolence:
  - Inability to maintain wakefulness and alertness during normal waking hours
  - Sleep occurring unintentionally or at inappropriate times

- Examples:
  - Difficulty keeping eyes open during boring lectures at work.
  - Falling asleep while at the movies, theater, church.
Timing is Important

Sleepiness can be normal or abnormal depending on time of day. For someone with a typical sleep/wake schedule:

- Falling asleep while reading at 1 am is normal.
- Falling asleep while reading at 10 am is abnormal.
### Quantifying Sleepiness: Epworth Sleepiness Score (ESS)

<table>
<thead>
<tr>
<th>Activity</th>
<th>Would never doze (0)</th>
<th>Slight chance of dozing (1)</th>
<th>Moderate chance of dozing (2)</th>
<th>High chance of dozing (3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sitting and reading</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Watching TV</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sitting inactively in a public place</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Riding as a passenger in a car for 1 hour</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lying down to rest in the afternoon</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sitting and talking to someone</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sitting quietly after lunch</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sitting in a car as the driver, while stopped in traffic</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Epworth Sleepiness Score (ESS) > 10 is considered pathologic or EDS

*Johns MW et al, Sleep 1991; 14:540-5*
Fatigue is not sleepiness

- Fatigue (Lack of physical or mental energy)
  - Inability to initiate activity (feeling of weakness)
  - Inability to maintain activity (easy fatigability)
  - Difficulty with concentration or focus (mental fatigue)

- Patients often use fatigue, tired, sleepy, low energy interchangeably.

- It is vital to distinguish EDS (which has very few etiologies) from fatigue (which has innumerable).
Differential Diagnosis

EDS

- Insufficient Sleep Quantity
- Insufficient Sleep Quality
- Excessive Sleep Need
Sleep history

- “How much sleep do you usually get?”
  - This is an aspirational question – people answer based on their goals.

- “What time do you usually go to bed?” “What time do you usually wake up?”
  - This difference is a more accurate reflection of time set aside for sleep.

People who can’t answer these questions due to highly variable sleep schedules are at much higher risk of being chronically sleep deprived.
Insufficient sleep quantity

- Most commonly due to decisions about how much time to allow for sleep.
  - Commonly unrealistic ideas of what sleep needs are (7-8 hours on average for adults but can be 8-9 hours for some, particularly younger adults).
  - Screen time at night is the most common exchange for sleep.

- Insufficient sleep despite adequate time set aside for sleep.
  - Environmental factors preventing sleep
  - Medical factors preventing sleep
Environmental factors

- Traffic or other noise/light
- Caregiving responsibilities
- Job responsibilities (on call)
- Partner with disruptive behaviors
- Pets
- Institutional rules against sleep (homeless shelter, jail)
Medical conditions causing sleep deprivation

- Chronic pain
- Restless legs syndrome
- Circadian rhythm disorders
  - Shiftwork sleep disorder
  - Delayed sleep phase syndrome
Restless legs syndrome (RLS)

- Uncomfortable urge to move legs
- Symptoms improve immediately upon movement
- Worse when lying still
- Worse in evening/night
- Not leg cramps or habitual foot tapping
Shiftwork sleep disorder

- Lack of alignment between sleep timing and circadian rhythm leads to circadian drive for sleep when patient wants to be awake.

- Rotating shiftwork
  - Constant change in sleep schedule prevents alignment from ever occurring.

- Night shiftwork
  - Morning light on commute home and shifting to night sleep on days off prevent alignment from occurring.
Night shiftwork

- 11pm - Actually sleepy - Need to be alert
- 7am - Opportunity to sleep
- 11pm - Actually sleepy - Need to be alert
- 7am - Opportunity to sleep
Delayed Sleep Phase Syndrome

- Actually sleepy: 11pm to 7am
- Opportunity to sleep: 11pm to 7am
- Need to be alert: 7am to 11pm

Sleepiness vs. Time graph
Insomnia does not cause sleepiness
Insomnia

- Characterized by hyperarousal where one can’t turn off brain to fall asleep
- The hyperarousal typically is present day and night
- Daytime symptoms include **fatigue** but not actual sleepiness
Sleep Testing

- **Sleep Diaries**
  - Complete questions about bedtime/waketime upon awakening for 1-2 weeks
  - Helpful for those with irregular schedules or poor historians

- **Actigraphy**
  - Use accelerometry on wrist to impute sleep/wake
  - Validated devices exist but no billing codes
  - Many people using commercial devices already (Fitbit, AppleWatch, etc)
Insufficient sleep quality

- We don’t know exactly what aspects of sleep are restorative.

- Slow wave or delta wave frequency sleep
  - Reflects homeostatic drive for sleep
  - Increasing slow wave sleep sometimes (but not always) increases function

- Obstructive sleep apnea (OSA) is the most common disease to produce EDS
  - Fragments sleep through multiple arousals at night
  - Produces hypoxemia which may impact neuronal function
OSA risk factors

- Obesity
- Male gender (2:1 male:female)
- Increasing Age
- Menopause
- Enlarged tonsils/adenoids
- Excess soft tissue in airway (Mallampati score)
- Retrognathia
- Alcohol use
OSA signs/symptoms

- Snoring (loud, nightly)
- Witnessed apnea
- Waking choking/gasping
- Unexplained awakenings
- Nocturia
- Hypertension
- Excessive daytime sleepiness
OSA and sleepiness

Gottlieb DJ et al, AJRCCM 1999; 159:502-7
Laboratory vs. Home Sleep Apnea Testing
# RCTs of Lab versus Home Strategies

Impact at 90 days on usage, sleepiness, and quality of life outcomes

<table>
<thead>
<tr>
<th>Study</th>
<th>N</th>
<th>CPAP Usage</th>
<th>Δ Epworth</th>
<th>Δ Quality of Life</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Lab</td>
<td>Home</td>
<td>Lab</td>
</tr>
<tr>
<td>Mulgrew</td>
<td>68</td>
<td>5.4 hrs</td>
<td>6.0 hrs</td>
<td>-10.0</td>
</tr>
<tr>
<td>Kuna</td>
<td>296</td>
<td>2.9 hrs</td>
<td>3.5 hrs</td>
<td>-2.9</td>
</tr>
<tr>
<td>Rosen</td>
<td>373</td>
<td>3.7 hrs</td>
<td>4.7 hrs</td>
<td>-7.4</td>
</tr>
<tr>
<td>Hui</td>
<td>172</td>
<td>3.1 hrs</td>
<td>3.6 hrs</td>
<td>-2.2</td>
</tr>
<tr>
<td>Corral</td>
<td>430</td>
<td>5.3 hrs</td>
<td>5.1 hrs</td>
<td>-4.9</td>
</tr>
</tbody>
</table>

Two shorter term trials also found no benefit of lab versus home-based evaluation and treatment.

Advantages of Home Sleep Apnea Testing

- Lower costs
- Patient preference
- Quicker time to diagnosis
- Better access
  - Rural populations
  - Those without transportation
  - Those with caregiver responsibilities
- Facilitates management by PCP
OSA treatment options

- Continuous positive airway pressure (CPAP)
  - Auto-titrating CPAP (APAP) allows initiation in the home
- Oral appliances
- Positional therapy (avoid sleeping on back)
- Weight loss
- Surgical options
CPAP

- Prescribe auto-titrating CPAP 5-20 cm H2O with mask.
- Send order to a durable medical equipment (DME) provider.
- All devices now send usage data to the cloud.
- Either get the DME provider to give you a login or send you reports.
- All devices have apps to allow patients to track usage.
Questionable causes of EDS

- Central Sleep Apnea (CSA)
- Periodic Limb Movement Disorder (PLMD)

- Epidemiologic data show no association with EDS.
- No clinical trials have ever shown improvement in EDS with treatment of these conditions.
Excessive sleep need

EDS despite adequate sleep quantity and quality.

1. Long sleeper (feels fine if just gets 8.5-9 hours sleep regularly)
2. Narcolepsy
3. Idiopathic hypersomnia
4. Atypical depression
5. Neurologic disease (TBI, infection, stroke, tumor, neurodegenerative disease)
6. Medications
Narcolepsy

- Characterized by destruction of the orexin neurons in the hypothalamus.
- Results in state instability and difficulty remaining in wake with easy transitions to REM sleep.
- Likely autoimmune due to cross-reactivity with antigens exposed from upper respiratory infections.
- Symptoms typically begin in adolescence but can take 10-20 years for clinical presentation.
REM phenomena

- Cataplexy – loss of muscle tone in wake associated with emotion

- Sleep paralysis – waking from sleep with persistent muscle atonia causing paralysis sensation; resolves instantaneously

- Hypnagogic hallucinations – visual, auditory, or tactile hallucinations occurring as one is going to sleep reflecting dreaming at sleep onset.
Multiple Sleep Latency Test (MSLT)

- Following 2 week sleep diary, overnight sleep study (PSG), and urine tox screen, patient given 5 nap opportunities during the day.
- Quantify how quickly they can fall asleep when put to bed and asked to go to sleep.
- Also evaluate whether one goes into REM sleep during naps.

**MSLT outputs**
- Mean sleep latency (≤ 8 minutes pathologic)
- Number of sleep onset REM periods (≥ 2/5 naps suggests narcolepsy)
Hypersomnia categories

- **Type 1 Narcolepsy**
  - Early REM sleep on testing
  - Cataplexy and low orexin levels in the CSF

- **Type 2 Narcolepsy**
  - Early REM sleep on testing
  - No cataplexy and normal orexin levels

- **Idiopathic hypersomnia**
  - No early REM sleep
  - No cataplexy and normal orexin levels
Hypersomnia treatments

- Stimulants
  - Modafinil/armodafinil (Provigil, Nuvigil)
  - Solriamfetol (Sunosi)
  - Methylphenidate (Ritalin, Concerta, etc)
  - Amphetamines (Adderall, Vyvanse, etc)

- Narcolepsy only
  - Pitolisant (Wakix)
  - Sodium oxybate (Xyrem)
Indications for stimulant therapy

- Narcolepsy or Idiopathic Hypersomnia
- Obstructive sleep apnea on CPAP with persistent EDS
- Shiftwork sleep disorder
Medications causing hypersomnia

- Anything that crosses the blood-brain barrier can cause EDS
- Timing of dosing can exacerbate the problem

<table>
<thead>
<tr>
<th>Medications that cause sleepiness</th>
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<tbody>
<tr>
<td><strong>Benzodiazepines/BDRAs</strong></td>
</tr>
<tr>
<td>Opiates/Tramadol</td>
</tr>
<tr>
<td>Gabapentin/Pregabalin</td>
</tr>
<tr>
<td><strong>Antidepressants (including SSRIs)</strong></td>
</tr>
<tr>
<td>Muscle relaxants (tizanidine, cyclobenzaprine)</td>
</tr>
<tr>
<td>Anticonvulsants (phenytoin, levetiracetam)</td>
</tr>
<tr>
<td><strong>Antipsychotics (olanzapine, quetiapine)</strong></td>
</tr>
<tr>
<td>Antihistamines (hydroxyzine, cetirizine)</td>
</tr>
<tr>
<td>Lipophilic beta blockers (metoprolol, propranolol)</td>
</tr>
<tr>
<td><strong>Barbiturates</strong></td>
</tr>
<tr>
<td>Dopamine agonists (ropinirole, pramipexole)</td>
</tr>
<tr>
<td>Anti-emetics (meclizine, prochlorperazine)</td>
</tr>
<tr>
<td><strong>Alpha blockers</strong></td>
</tr>
<tr>
<td>Clonidine</td>
</tr>
<tr>
<td>Melatonin</td>
</tr>
</tbody>
</table>
EDS

History and consider sleep diaries

Increase sleep time, stop offending meds

Low OSA risk

Mod – High OSA risk

Home sleep test

PSG/MSLT

HSAT negative

HSAT positive

Prescribe APAP 5-20 cm H2O
Drowsy driving

- 2.5% of all fatal motor vehicle crashes involve drowsy driving according to National Highway Traffic Safety Administration.

- AAA estimates drowsy driving contributes to 15-33% of fatal crashes.

- 4.2% of adults in the US report having fallen asleep behind the wheel in the past 30 days according to CDC.

- Predictors of drowsy driving: young age, male, minority race

CDC, MMWR 2013; 61:1033-7
Drowsy driving countermeasures

- Have someone else drive
- Take a nap
- Use caffeine

Do not rely on:
  - Roll down window
  - Turn up radio
  - Talk on phone
  - Eat/chew gum
**Reporting requirements**

- PennDOT requires reporting of any individual who in the provider’s viewpoint is unsafe to drive.

- Among categories of reporting are lapses in concentration or attention for any reason.