Managing Excessive Daytime Sleepiness

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Excessive daytime sleepiness (EDS) is common in clinical practice, with the National Sleep Foundation’s Sleep in America poll finding that about 18% of respondents qualified as excessively sleepy. Negative effects of EDS include decreased quality of life, cognitive impairment, poor work performance, poor medical health, and motor vehicle accidents. To avoid these problems, clinicians must assess patients for EDS and associated conditions and provide appropriate treatment.

ASSESSMENT OF EDS

Due to the negative effects of EDS, clinicians should routinely assess patients’ sleepiness. In the clinical interview, questions must be worded carefully. Simply asking patients if they are tired during the day is not informative because most people experience some daytime tiredness. Better questions to identify clinically relevant sleepiness are “Do you ever unintentionally fall asleep,” “Do you feel fully alert throughout the day,” and “Do you persistently have to fight off sleep at work or school?” To evaluate the severity of patients’ EDS, clinicians may also use patient-report scales and objective tests.

Patient-Report Scales

The Epworth Sleepiness Scale (ESS) is the mostly widely used self-report measure of sleepiness. When completing the ESS, patients are asked to rate the likelihood that they would fall asleep in 8 situations such as reading or waiting in traffic. A score of 10 or above indicates pathological daytime sleepiness.

Other patient-rated scales include the Karolinska Sleepiness Scale, the Stanford Sleepiness Scale, and the Sleep-Wake Activity Inventory. While these tests are not as well validated as the ESS for assessing sleepiness, they can be used to track symptoms over time. Validated patient questionnaires are generally efficient for clinical practice but are subject to errors of patient bias as well as cognitive or memory impairments. These problems can be offset by questioning patients’ family members or friends to obtain another perspective.

Objective Measures

A number of objective measures can be useful for assessing causes of EDS. Polysomnography tests patients for sleep-disordered breathing or abnormal movements during sleep. It typically requires an overnight stay to monitor neurophysiologic and cardiorespiratory variables. Actigraphy is a cost-effective measure of movement and sleep/wake patterns over days or weeks, rather than just overnight, and is useful for diagnosing insomnia, circadian rhythm disorders, or EDS due to insufficient sleep. If obstructive sleep apnea (OSA) is thought to be contributing to EDS, home sleep apnea testing devices can be used to measure breathing during sleep, but they do not provide an objective measure of sleepiness.

The gold standard objective measure of excessive sleepiness is the Multiple Sleep Latency Test (MSLT). The MSLT is conducted in a sleep...
medical and neurologic conditions, and psychiatric disorders (Table 1).3,5,9 By considering these conditions and ruling out medication side effects and behaviors that cause sleep deprivation, clinicians can differentiate what is causing or contributing to EDS, which may be more than one condition.

Sleep Disorders
If the patient's EDS is not caused by poor sleep hygiene, medication side effects, or insufficient sleep time, it may be a symptom of sleep-related breathing disorders, hypersomnias, sleep-related movement disorders, or circadian rhythm sleep disorders.3,10

Medical and Neurologic Conditions
Medical and neurologic disorders are a common cause of EDS. In a community sample of 2,612 individuals without sleep-disordered breathing, narcolepsy, or shift work disorder,9 67% reported a medical disorder, and over 30% of those had EDS. Ulcers, migraines, and depression were independent predictors of EDS. Prevalence rates for EDS were 50% in those with ulcers; close to 40% in those with neurologic disorders, migraines, depression, and heart disease; and 24% and 19% for those with thyroid disorders and cancer, respectively.9 Other conditions associated with EDS are rheumatoid arthritis, fibromyalgia,11 head trauma, encephalitis, stroke,3 multiple sclerosis, epilepsy, Parkinson's disease, and Alzheimer's disease.8

Psychiatric Disorders
Psychiatric disorders are also often associated with EDS.8 An epidemiologic study12 found psychiatric disorders in 47% of individuals with hypersomnia but in only 16% of those without sleep complaints. Depression, bipolar disorder, posttraumatic stress disorder, and alcohol dependency are all associated with sleep/wake impairments, and their treatments may also produce iatrogenic effects on sleep.2,13 Conversely, many sleep disorders can lead to psychiatric symptoms.13 For example, OSA is associated with depression13 and recurrent hypersomnoria with hallucinations, binge eating, and irritability.14 Because sleep disturbances affect outcomes in psychiatric disorders, measuring and treating EDS is a critical part of psychiatric treatment.13

TREATMENT OF EDS AND RELATED CONDITIONS
The goals of treatment should be to reduce EDS and increase alertness, thereby improving psychosocial and occupational functioning and safety. Effective management of EDS typically involves both behavioral and pharmacologic interventions.

Behavioral Strategies
Focusing on patients' sleep hygiene is an important first step to improving EDS. Patients should adhere to a consistent sleep/wake schedule, exercise regularly (but not within 3 hours of bedtime), maintain a comfortable bedroom environment,
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Table 2. Recommended Sleep Duration in Hours by Age Group*

<table>
<thead>
<tr>
<th>Age, y</th>
<th>Recommended</th>
<th>Not Recommended</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teenager, 14–17</td>
<td>8–10</td>
<td>&lt; 7 or &gt; 11</td>
</tr>
<tr>
<td>Young adults, 18–25</td>
<td>7–9</td>
<td>&lt; 6 or &gt; 11</td>
</tr>
<tr>
<td>Adults, 26–64</td>
<td>7–9</td>
<td>&lt; 6 or &gt; 10</td>
</tr>
<tr>
<td>Older adults, ≥65</td>
<td>7–8</td>
<td>&lt; 5 or &gt; 9</td>
</tr>
</tbody>
</table>

*B Based on Hirshkowitz et al.†

Patients may be experiencing negative effects from EDS that influence their safety, work performance, and overall health.
Clinicians should collect a thorough history during the patient interview and use patient report and objective tests to assess for EDS and associated conditions.
Treatment for EDS varies depending on the underlying cause, but behavioral strategies and pharmacologic treatments are available to improve patients’ symptoms.

and avoid heavy meals, alcohol, caffeine, and smoking before bedtime. Individuals must also ensure they are allowing themselves enough sleep time within the recommended range for their age group (Table 2).†

Disorder-Specific Pharmacologic Treatments

Practice guidelines and US Food and Drug Administration (FDA)-approved treatments are available for many, but not all, of the disorders associated with EDS. Best practices for managing EDS vary depending on the underlying disorder.

Narcolepsy. In most cases, individuals with narcolepsy, particularly those who experience cataplexy, require lifelong treatment because the orexin deficiency underlying this disorder is permanent.† In addition to adhering to good sleep hygiene, patients with narcolepsy require pharmacotherapy. Several agents are available for the treatment of EDS and cataplexy associated with narcolepsy.

Sodium oxybate may be considered a first-line treatment option because it is the only agent with strong evidence of efficacy for both EDS and cataplexy and is FDA-approved for these indications.† It also may improve disturbed nocturnal sleep, sleep paralysis, and hypnagogic hallucinations.† However, this agent has a short half-life and brief duration of action, requiring the patient to take it at bedtime and to set an alarm for a second dose.† Sodium oxybate also can cause severe withdrawal symptoms and be fatal in overdose, but usually this occurs only when other agents are also being used.† Symptoms of anxiety or depression may occur,† and all patients should be questioned about current or past suicidal ideation or behavior.† Finally, sodium oxybate has been abused because of its rapid sedative properties, and therefore its use is restricted.† Both prescribers and patients must go through registration and training,† and all prescriptions are filled through a central pharmacy.† Despite these limitations, sodium oxybate is a safe and effective agent for narcolepsy when prescribed and taken correctly.†

The wakefulness-promoting agents modafinil and armodafinil are also approved for treating EDS associated with narcolepsy. When cataplexy is not present, modafinil or armodafinil can be considered a first-line option.† Both modafinil and armodafinil are well tolerated, but clinicians should educate female patients about potentially reduced effectiveness of some oral contraceptives.† Patients should also be warned to immediately report rashes or allergic reactions.† The stimulant methylphenidate and several amphetamines are FDA-approved for treating EDS, but because of their abuse potential, side effect profiles, and limited evidence, they should be considered only if sodium oxybate or modafinil/armodafinil have not resulted in desired outcomes.‡,†

Treatments for cataplexy include not only sodium oxybate but also off-label antidepressants. The greatest evidence exists for the use of norepinephrine reuptake inhibitors, particularly venlafaxine and duloxetine, but selective serotonin reuptake inhibitors and tricyclic antidepressants are sometimes used.‡ These agents may improve cataplexy, but whether they also improve sleep paralysis and hypnagogic hallucinations is uncertain,‡ and they do not improve EDS. Individual taking antidepressants may experience sexual dysfunction, gastrointestinal upset, and dry mouth.‡,†

Atomoxetine, a norepinephrine reuptake inhibitor that is used to treat attention-deficit/hyperactivity disorder, is also used for cataplexy and may alleviate EDS via stimulant effects.‡,§

Idiopathic hypersonnia. No FDA-approved treatments are available for idiopathic hypersonnia, but the treatment of EDS associated with idiopathic hypersonnia is similar to that of narcolepsy. Practice guidelines‡ suggest the use of modafinil and methylphenidate or other stimulants. Most patients are able to benefit from monotherapy with one of these drugs.‡ A novel approach to idiopathic hypersonnia is to administer drugs that inhibit γ-aminobutyric acid (GABA) production.‡ Studies examining these compounds in the population are underway.

Obstructive sleep apnea. Combating EDS associated with OSA should begin with attempts to improve the quality of nighttime sleep by addressing the upper airway obstruction. In some individuals, weight loss and position training can lead to improvement.§ Other individuals will require treatment with a positive airway pressure device or an oral appliance.‡ Some patients continue to experience EDS despite receiving treatment for OSA and may benefit from an adjunctive agent during the day; modafinil and armodafinil are approved for treating EDS associated with OSA.

Shift work disorder. Shift work disorder occurs in individuals who must be awake and alert when their body’s circadian clock says they should be asleep, and vice versa.‡ Night shift workers are vulnerable to this disorder as well as individuals who rotate shifts frequently. Behavioral interventions include improving sleep hygiene, using timed light exposure, and scheduling naps.‡ Sedative hypnotics or melatonin may be used to combat insomnia and ensure individuals get a sufficient amount of sleep.‡ If sleepiness persists during working hours, stimulants may be used. Modafinil and armodafinil are both approved for the treatment
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