Care of the Patient with a Sleep Disorder

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General Principles

Definition/Background

We each spend 1/3 of our lives in the reversible state of perceptual isolation that we call sleep. Unsurprisingly, disruptions and disorders of this primary physiologic state can lead to declines in quality of life, diminished waking performance, more frequent illness, as well as increases in disease morbidity and mortality. The spectrum of sleep disorders mirrors the clinical population of patients seen in a family medicine practice with most patients with sleep disturbance receiving their medical care in the primary care setting [1]. Despite a high prevalence of sleep disorders, sleep complains are under-addressed by physicians. Recently, high-quality epidemiologic studies have documented the importance of the diagnosis and treatment of sleep disorders in primary care practice in reducing morbidity and mortality, improving comorbid disease processes, and improving patient quality of life [2, 3].

Classification

Sleep Disorders: The Clinical Spectrum

Sleep diagnoses range include those presenting primarily based on patient complaint (e.g., the insomnias) as well as those with strong negative affects morbidity and mortality yet affects on waking performance that may be more difficult

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for the patient to understand and describe (e.g., sleep apnea). The primary sleep diagnoses are divided into six categories: insomnias, sleep-related breathing disorders, hypersomnias, circadian-rhythm sleep disturbance, parasomnias, and sleep-related movement disorders. Sleep disturbance is often secondary, associated with almost all chronic diseases that result in physical or mental discomfort for the patient, and incorporated into most psychiatric disorders as a diagnostic criteria. Pregnancy and menopause, increasing age, and stress induce insomnia and sleep disruption. Pediatric sleep disorders are common.

The Insomnias

Background

Insomnia is a primary care problem. Thirty percent of the general population report symptoms of sleep disruption, and in the primary care clinic more than 50 % of patients have sleep complaints [4]. Diagnostically, over 40 % of American adults occasionally struggle with insomnia, and 11–14 % of the population have an ongoing problem with chronic insomnia [5]. Those most at risk include women and older adults. The insomnias include the complaint of difficulty with sleep initiation, duration, consolidation, or quality, associated with daytime functional impairment. The daytime functional impairment in insomnia includes fatigue, impaired memory or concentration, mood disturbance, daytime sleepiness, reduced motivation or energy, tension, headaches, or gastrointestinal symptoms. In adults, chronic insomnia is associated with impaired social and vocational function and reduced quality of life and in severe cases may be associated with an increased risk of traffic and work site accidents as well as psychiatric disorders. In pediatrics, insomnia is particularly a problem around the age of two when the child first attempts to sleep independently of parents [6].

Individuals with chronic insomnia consistently report lower values of quality of life particularly on somatic/physical scales. Chronic insomniacs have an increased risk of depression and anxiety. Sleepless individuals are more likely to be obese. Chronic insomnia is also associated with increased pain in rheumatic disease with the degree of insomnia on any given night being a predictor of pain intensity the following day [7]. The cost and health-care utilization data calculated for insomnia includes annual direct costs in the United States which include $1.97 billion for medications and 11.96 billion for health-care services. Indirect costs include decreased productivity, higher accident rate, increased absenteeism, and increased comorbidity with total annual cost estimates ranging from $30 to $107.5 billion [8].

Diagnosis

Diagnosing insomnia can be a complex task as the origin of a patient's insomnia is often multifactorial. Life stressors, concomitant illness, family, and social structure can precipitate symptomatic insomnia. The family medicine physician, who often has a more complete knowledge of these factors than the subspecialist, is in an ideal position to define the cause of the sleep–wake disturbance in a patient with insomnia. The diagnosis of the insomnias is primarily based on a sleep history. Evidence-based criteria for the evaluation and treatment of insomnia are summarized in Tables 1, 2, and 3 [9].

Treatment

Insomnia responds well to cognitive behavioral therapies (including sleep hygiene, sleep restriction, and behavioral approaches to treating conditioned insomnia). Physical exam contributes little to the diagnosis or evaluation of insomnia. The newer GABA-specific site hypnotic medications have high efficacy, low toxicity, and minimal addictive potential. For patients with persistent insomnia, chronic use with the newer hypnotics can be justified and is indicated if medication use leads to improvement in waking performance. These newer hypnotic agents are less likely to have deleterious side effects than most OTC treatments for insomnia [11].

Table 1 Evidence-based symptom and diagnostic correlates for chronic insomnia

Chronic insomnia leads to poorer self-rated quality of life	A	Multiple large retrospective cohort studies
Chronic insomnia leads to increased health-care cost for affected patients	A	Multiple large retrospective cohort studies
Chronic insomnia predisposes an individual to mood disorder/depression	B	Large retrospective cohort study, longitudinal prospective study
Chronic insomnia is associated with decreased work productivity and increased time missed from work and/or school	B	Multiple small retrospective studies with consistent findings
Chronic insomnia leads to drug and alcohol abuse	C	Significant associated variables in adult and adolescent populations
Chronic insomnia leads to obesity	C	Small retrospective studies
Chronic insomnia is associated with an increase in automobile accidents	C	Retrospective review
Chronic insomnia is associated with an increase in mortality in geriatric patients	C	One large retrospective study
Chronic insomnia is associated with increased pain complaints in chronic pain patients	C	Retrospective review

Adapted and updated table from Pagel and Pegram [9]
Strength of recommendation based on Ebel et al. [10]

Table 2 Evidence-based recommendations for the diagnosis and treatment of insomnia

The evaluation of chronic insomnia does not require polysomnographic evaluation except when associated with other sleep-associated diseases such as OSA or PLMD	B	Consensus guidelines, usual practice, disease-oriented evidence, prospective diagnostic cohort study
Drug treatment of chronic insomnia leads to improvements in associated sleep states and daytime performance	B	Retrospective cohort and case control studies with good follow-up
Drug treatment of chronic insomnia with newer medications can be maintained long term without loss of efficacy and without negative effects	B	Large prospective study (drug company)
Behavioral treatment of chronic insomnia leads to improvements in associated sleep states and daytime performance	C	Consensus guidelines, usual practice

Adapted and updated table from Pagel and Pegram [9]
Strength of recommendation based on Ebel et al. [10]

The Sleep-Associated Breathing Disorders

Background

Obstructive sleep apnea (OSA) is one of the most physiologically disruptive and dangerous of the sleep diagnoses. Recent epidemiological studies demonstrate that OSA has a strong association with pulmonary, cardiac, endocrine, and cognitive disease [12]. In patients with OSA, continued breathing effort occurs despite obstruction of the airway resulting in inadequate ventilation. OSA is more common among men, those who snore, are overweight, have high blood pressure, or physical abnormalities in their upper airways. Worldwide, more than 700 million individuals now have a BMI $>$ 30 and meet criteria for obesity [9]. This level of obesity and an increasingly aging population have resulted in a situation in which we are currently experiencing an epidemic of this physiologically dangerous diagnosis. The symptoms of OSA include persistent snoring (80 %), daytime sleepiness (22–32 %), and apneas observed by bed partners or caregivers (in adults, the report of observed apnea often indicates the present of severe apnea). OSA is present at high frequency (24–34 %) in the adult primary care clinic population and must be suspected in any patients with comorbid diagnoses known to be associated with apnea [12] (Table 4).

Table 3 Evidence-based criteria for sleep testing

Attended split night attended polysomnography indications		
(a) The diagnosis of sleep-related breathing disorders	A	Standard of care
(b) Positive airway pressure titration	A	Standard of care
(c) Pre- and postoperative evaluation of patients having surgery for obstructive sleep apnea	A	Standard of care
(d) Evaluation of patients being treated for OSA with persistent symptoms	A	High-quality cohort studies
(e) Patients with systolic or diastolic heart failure not responding to optimal medical management	A	Prospective diagnostic cohort studies
(f) Diagnosing restless leg syndrome/ periodic limb movement disorder	C	Disease-oriented evidence
(g) Diagnosing insomnia in patients not responding to behavioral or medical therapy	C	Consensus guidelines
Treatment with PAP systems leads to reduced symptoms of sleepiness, increased quality of life, and lower blood pressure	A	Meta-analysis of retrospective cohort studies (standard of care)
Nonattended limited HST for the diagnosis of sleep-related breathing disorders	B	Retrospective cohort and case control studies with good follow-up (developing as standard of care)
Autotitrating PAP for treating obstructive sleep apnea	B	Case control studies with good follow-up
Multiple sleep latency testing indications (a) Assessing daytime sleepiness (b) Diagnosing narcolepsy	B	Meta- analysis, usual practice, usual practice, and disease-oriented evidence

Adapted table from Pagel and Pegram [9]

Table 4 Clinical diagnoses associated with OSA including the approximate % of adult patients in each category with apnea–hypopnea index (AHI) > 5.0 events per hour

Obesity – 40–75 %
Morbid obesity >80 %
Excessive daytime sleepiness – 60–80 %
Hypertension – 40–80 %
Myocardial infarction (CAD) – 60–70 %
Cerebral vascular accident – 60–70 %
Atrial fibrillation – 60–80 %
Chronic pain treated with opiates – 70–80 %
Congestive failure (right and left sided) – 70–80 %
Metabolic syndrome – 80 %
Diabetes – 40–60 %
Posttraumatic stress disorder – 60–95 %

Adult OSA has a clear association of daytime cognitive impairment (i.e., daytime sleepiness) that leads to a significant increase in motor vehicular accidents in untreated patients [13]. Recent epidemiological studies have cross-matched sleep apnea evaluation with long-term prospective cardiovascular risk, pointing out the consistent and strong association between OSA and essential hypertension, increased mortality, congestive heart failure (both right and left sided), myocardial infarction, and cerebral vascular accidents [12]. Recent studies have emphasized the clinical significance of the association between atrial fibrillation and untreated OSA [14]. OSA can contribute to insulin resistance and metabolic syndrome [15] (Table 5).

Diagnosis and Treatment

OSA most often requires polysomnography (PSG) testing for diagnosis and treatment. PSG is the recording of multiple physiological signals during sleep including channels of electroencephalography (EEG), electrooculogram (EOG), and chin electromyogram (EMG) that are required for sleep staging as well as recordings of respiratory effort, airflow, pulse oximetry, snoring, sleep position, ECG, leg EMG, and video monitoring. Additional channels are sometimes utilized including end-tidal or transcutaneous CO_2 and additional EEG channels if potential nocturnal seizure

Table 5 Evidence-based associations of obstructive sleep apnea (OSA)

Adult OSA	Obesity	A – consistent systemic meta-analyses
	Cognitive impairment (daytime sleepiness)	A – consistent systemic meta-analyses
	Motor vehicular accidents	A – consistent systemic meta-analyses
	Hypertension	A– cross-sectional analysis of prospective cohort studies, consistent systemic meta-analyses
	Increased mortality	B – retrospective cohort studies
	Congestive heart failure (right and left sided)	B – cross-sectional analysis of prospective cohort studies, inconsistent systemic meta-analyses
	Coronary artery disease	B – cross-sectional analysis of prospective cohort studies, retrospective diagnostic cohort study
	Cerebral vascular accidents	B – cross-sectional analysis of prospective cohort studies, retrospective cohort study
	Metabolic syndrome	B – cross-sectional analysis of prospective cohort studies, retrospective cohort studies
	Atrial fibrillation	B – multiple retrospective cohort studies and treatment follow-up studies
	Diabetes	C – retrospective cohort studies
	Other cardiac arrhythmias	C – case series, usual practice
Pediatric OSA	Poor school performance	B – multiple retrospective cohort studies
	Enuresis	C – retrospective cohort studies
	Failure to thrive	C – case series, usual practice
	Learning disability	C – retrospective cohort studies
	Obesity	C – retrospective cohort studies
	Attention deficit/ hyperactivity disorder	C – inconsistent retrospective cohort studies

Adapted table from Pagel and Pegram [9]
Strength of recommendation based on Ebel et al. [10]

disorders are being evaluated. The clinical indications for PGG are summarized in Table 3.

OSA is most often treated with devices that act as a pulmonary splint keeping the airway open during sleep by utilizing positive airway pressure (PAP). This treatment is well tolerated by most OSA patients with few side effects and documented reductions in morbidity, hospitalization, and health-care utilization [16]. In evaluating OSA, a split night protocol is often utilized in which a therapeutic treatment or "titration" portion of the PSG is added after a period of diagnostic sleep time. A PSG interpretation should include data as to sleep architecture, respiratory parameters (number and index of apneas [episodes of complete respiratory cessation], hypopneas [episodes of reduced respiratory drive and hypoxia], and respiratory-related arousals), periodic limb movements, a description of any parasomnia or seizure activity, EKG abnormalities, and the results and appropriate setting of any treatment attempted during the night of study.

Sleep laboratory testing can be expensive, and alternative approaches are now often utilized. OSA is now commonly initially evaluated using home screening tests (HSTs), an approach that has been shown to be particularly useful in younger patients without comorbid diagnoses [17]. These studies have limitations. They cannot determine whether the patient is actually asleep during the recording, and in patients with insomnia and those with ongoing psychiatric problems, the number of respiratory events (apneas and hypopneas) per hour will be lower than actually present due to the large amount of recording time that will be in

wake. Periodic limb movements and arousals from events such as parasomnias are not recorded by HSTs. Most home screeners differentiate poorly between obstructive and central apneas. Central sleep apnea (CSA) includes nonobstructive apneas in which respiratory efforts do not occur. CSA is present most often in patients with a history of CHF; post-ICU patients; those with a history of significant cardiovascular, pulmonary, or CNS disease; development abnormalities; opiate use; the extreme elderly; and those living at elevations above 6500 f. [18, 19]. Treatment includes oxygen or systems that incorporated backup rates in addition to PAP.

By coupling HST with autotitration treatment, patients with OSA can avoid any form of full PSG testing. Autotitrating pap systems are tolerated well by some patients; however, these systems have minimal diagnostic capacity and can report inappropriate settings for misdiagnosed patients and patients with central apnea and/or nasal congestion or mouth leaks on pap therapy [20].

The pathophysiology and clinical presentation differ for pediatric OSA. In pediatric patients, OSA is most clearly associated with tonsillar hypertrophy. OSA can contribute to poor school performance [21]. Studies also support the association of pediatric OSA with failure to thrive, obesity, enuresis, attention deficit/hyperactivity disorder, and learning disability. The treatment of pediatric OSA is most often surgical – (T&A).

Excessive Daytime Sleepiness (Other Hypersomnias)

The National Health and Safety Administration (NHTSA) in 1999 estimated that 1.5 % of police-reported crashes and 4 % of all traffic crash fatalities involved drowsiness and fatigue as principal causes. Beyond the personal and social loss associated with these accidents, the cost of untreated daytime sleepiness was estimated at $12.5 billion based on workplace loss and loss of productivity [22]. The most common causes of daytime sleepiness are sleep deprivation and the use of prescription and nonprescription agents as well as drugs of abuse that induce daytime sleepiness (daytime sleepiness is among the most common of medication side effects) [23]. The next most common cause is untreated OSA. The other sleep disorders that induce daytime sleepiness occur at a much lower frequency. The hypersomnias generally require both PSG and multiple sleep latency testing (MSLT) for diagnostic evaluation and assessment of daytime sleepiness. The MSLT includes four to five opportunities to nap in the sleep laboratory after a full-night PSG with EEG, EOG, and EMG monitored, so that sleep and REMS onset can be determined. MSLT reports should include average or mean latency to sleep and the number of sleep onset REMS periods recorded (a diagnostic criteria for narcolepsy). Narcolepsy is the most common of the neurological diseases inducing severe daytime sleepiness, present in 1-2/1000 of the general population. Medications that are used in somnolent patients to induce alertness include the amphetamines (medications with high abuse potential) and newer alerting agents (e.g., modafinil) that have a lower potential for abuse and negative side effects.

Circadian-Rhythm Sleep Disorders

The biological clock for sleeping is based in part on the circadian rhythm of sleep and wake propensity. Chronic sleep disturbance can result from disruptions in this system or from misalignments between an individual's circadian rhythm and the 24-h social or physical environment. Delayed sleep-phase syndrome in which individuals go to bed and rise later than the general population is symptomatic in 7–16 % of adolescents. Shift work disrupts normal sleep patterns for approx 20 % of the population. At least 10 % of individuals evaluated in sleep laboratories for chronic insomnia have a definite circadian component to their disorder [8]. Melatonin is the photoneuroendocrine transducer that conveys information controlling sleep–wake cycles and circadian rhythms in the central nervous system (CNS). Low doses coupled with bright-light therapy are useful in treating these disorders [24]. Jet lag and shift work disorders can also be effectively treated

with repetitive short-term use of sedative/hypnotics [25].

Parasomnias

Parasomnias are undesirable physical events or experiences that occur during entry into sleep, within sleep, or during arousals from sleep. Parasomnias encompass sleep-related movements, autonomic motor system functioning, behaviors, perceptions, emotions, and dreaming – sleep-related behaviors and experiences in which the sleeper has no conscious deliberate control. Parasomnias become clinical diagnoses when associated with sleep disruption, nocturnal injuries, waking psychosocial effects, and adverse health effects. Parasomnias are classified based on sleep stage of origin. Recurrent nightmares (the most common of the parasomnias) occur in 15–40 % of normal adolescents. Recurrent, disturbing nightmares are the most common symptom of posttraumatic stress disorder (PTSD). REM behavior disorder (RBD) in which individuals lose the motor block that usually prevents the acting out of dreams is most common in late-middle-age males and in patients with progressive neurological disease (e.g., Parkinson's disease). RBD occurs in 0.38–0.5 % of the population [1]. The arousal disorders of somnambulism (sleep walking), night terrors, and confusional arousals are reported by 4 % of pediatric patients. Enuresis is present in 15–20 % of 5-year-old children declining to 1–2 % in young adulthood.

Sleep-Related Movement Disorders

More than 12 million people in this country experience unpleasant, tingling, creeping feelings in their legs during sleep or inactivity as a symptom of a disorder called restless legs syndrome. This disorder causes an uncontrollable urge to move and to relieve the sensations in the legs. Sleep is often disrupted by periodic limb movements occurring in the extremities during sleep that can be detected by PSG. Low dosages of dopamine precursors and dopamine receptor agonists at bedtime have been demonstrated to be efficacious in these disorders [26].

The Family Physician and Sleep Medicine

Up to 90 % of adult patients visiting their primary care physician on any given day are experiencing sleep-related symptoms, and at least 1/3 are likely to have OSA. Currently, despite the known increases in morbidity and mortality associated with this diagnosis, only 2–4 % of the individuals likely to have OSA have been tested. Approximately 14 % of the general population suffer from chronic insomnia. Payers, concerned with the potential cost of evaluating and treating this large number of patients, are pushing sleep medicine diagnosis and treatment into the primary care setting where family physicians and physician extenders are expected to make correct diagnoses and monitor appropriate treatment. While sleep medicine consultation for difficult patients is available in many communities, the same standard of care is expected even when diagnosis is limited by screening questionnaires with low sensitivity and efficacy, diagnostic tests with debatable sensitivity, and treatment approaches with limited efficacy.

Currently, few primary care physicians address sleep complaints or screen for OSA. Questionnaires can be an excellent tool for obtaining information about sleep disorders, but even when sleep complaint questionnaires are highlighted on patient charts, patients at high risk for are infrequently evaluated. Studies from outside the USA indicate the potential for primary care sleep medicine. In Queensland and New South Wales, Australia, when family doctors were asked to conduct limited HSTs in their patients with BMI > 30, type 2 diabetes, treated hypertension, and ischemic heart disease, 71 % were found to meet at least minimal criteria for OSA (apnea–hypopnea index (AHI) > 5.0) and 16 % were found to have severe OSA (AHI > 30) [18]. Primary care physicians with limited training in sleep medicine were shown to provide a level of care for patients with suspected OSA in

South Australia comparable to that provided in the University sleep medicine center in Adelaide [27].

There are a huge number of patients with sleep-associated diagnoses affecting their mortality and morbidity. The current care system has been able to diagnose and treat OSA for only a small percentage of the affected individuals. Sleep-associated diagnoses negatively affect the medical and psychiatric disorders most often seen in family medicine: hypertension, obesity, cardiovascular disease, arrhythmias, mood disorder/depression, and anxiety. The associated personal and medical costs of untreated sleep disorders are staggering. Associated daytime sleepiness negatively affects driving and work performance and when untreated contributes to a large number of motor vehicular accidents, injuries, and deaths. Sleep medicine care is migrating from the sleep laboratory into the primary care office where the HST is beginning to be incorporated becoming a clinical test as commonly utilized as the EKG and pulmonary function test.

The overwhelming majority of individuals that suffer from disorders of sleep and wakefulness are undiagnosed and untreated. Primary care physicians have access to this large grouping of at-risk patients as well as training and experience in the full extent of medical and psychiatric illness affecting patients with sleep disorders. Family physicians often have close relationships with their patients and an awareness and understanding of the biopsychosocial context. These are advantages that the primary care physician has over the specialist in the diagnosis and management of patients with sleep disorders.

Prevention

Sleep disorders are extremely common yet rarely addressed in most primary care practices. A spectrum of poor sleep hygiene practices can contribute to insomnia, especially in high-risk populations such as adolescents and the elderly. Sleep apnea is a primary risk factor for some of the most common chronic illnesses addressed in primary care practice. Due to the significant morbidity and mortality associated with the diagnosis and the difficulty in making the diagnosis using screening tests, the family physician needs to have a high sensitivity to OSA as a potential diagnosis.

Family and Community Issues

Sleep disorders, including the common diagnoses of OSA and insomnia, are commonly found in family members based on both genetic and social factors. Daytime sleepiness in pediatric age groupings is clearly associated with poor school performance. In adults daytime sleepiness whether based on OSA, sedating medication use, sleep disruption, or neurological disease is associated with a significantly higher level of motor vehicular and work-related accidents. This is a particular problem for shift workers and those who must drive for a living.

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