



Evaluation of the Insomnia Patient

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Insomnia is the most common sleep disorder in the industrialized world, with one third of adults reporting occasional insomnia symptoms (difficulties initiating sleep, maintaining sleep, waking too early, or poor quality sleep), and more than 1 in 10 reporting chronic difficulties that produce daytime consequences [1–3]. When chronic, insomnia is associated with wide-ranging adverse daytime outcomes, including decreased quality of life, increased risk for psychiatric disturbances, increased work absenteeism, and poor interpersonal functioning. Despite its significant economic and personal burden, several reports suggest that insomnia is underrecognized, underdiagnosed, and undertreated [3,4].

Reducing the burden of insomnia requires a sufficient understanding of the ways in which insomnia presents and assessment strategies that inform treatment formulations. Despite general agreement that insomnia is a symptom with etiologic underpinnings ranging along the biopsychosocial spectrum, there has been little consensus on how to define, assess, and manage the condition. Indeed, although the centerpiece of insomnia assessment in clinical settings has and continues to be the sleep history, the lack of a standardized approach probably accounts for less-than-adequate diagnostic agreement among clinicians [5]. Progress in insomnia assessment has been evident in recent years with the publication of practice parameters [6] and research

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diagnostic criteria [7] by the American Academy of Sleep Medicine. The degree to which these measures have been applied across sleep centers remains unclear, however. More standardization in both realms is needed to advance the understanding of the pathophysiology of insomnia and response to treatment among insomnia subtypes.

The goals of this article are (1) to highlight current insomnia definitions and nosologies; (2) to discuss assessment strategies for evaluating the adult patient with insomnia; and (3) to outline the most common differential diagnoses for insomnia. For information on evaluating pediatric sleep disturbances, the reader is referred to *The Principles and Practice of Pediatric Sleep Medicine* [8] and to the article in this issue discussing pediatric insomnia.

Definition of insomnia

Reliable and valid evaluations require consistent operational definitions of the phenomenon being assessed. Unfortunately, there has been considerable heterogeneity among insomnia definitions, and estimates of prevalence vary widely depending upon the definition used [9]. Recent efforts have been made to address this limitation by deriving a consensus definition for insomnia research [7,10]. This definition of an insomnia disorder, shown in **Box 1**, also appears in the most recent edition of the *International Classification of Sleep Disorders*, second edition (ICSD-2) [11], the most widely used nosology by sleep clinicians.

The core of the insomnia diagnosis is a subjective complaint of inadequate sleep quality rather than polysomnographic evidence of poor sleep. The nature of the complaint can manifest in difficulties initiating or maintaining sleep, waking too early in the morning, or consistently waking feeling unrefreshed. These sleep difficulties must persist despite adequate opportunity and circumstances for sleep, and they must produce reported daytime impairment, such as fatigue, mood disturbance, and decreased cognitive functioning. These latter criteria distinguish clinically relevant insomnia from insomnia symptoms with reported absence of daytime impairment or volitional sleep restriction without daytime dysfunction. Absent is a defined quantity of nightly sleep loss, because sleep duration is moderated by factors such as age, prior sleep history, and individual sleep need.

Frequency, severity, and duration are important dimensions of insomnia, but there has been little agreement about what or how cutoffs should be used diagnostically [10]. A recent review found that a preponderance of insomnia behavioral clinical trials defined insomnia as sleep-onset or maintenance symptoms that occurred a minimum

Box 1: General criteria for insomnia

1. A complaint of difficulty initiating sleep, difficulty maintaining sleep, or waking up too early or sleep that is chronically nonrestorative or poor in quality. In children, the sleep difficulty often is reported by the caretaker and may consist of observed bedtime resistance or inability to sleep independently.
2. The sleep difficulty occurs despite adequate opportunity and circumstances for sleep.
3. At least one of the following forms of daytime impairment related to nighttime sleep difficulty is reported by the patient:
 - A. Fatigue or malaise
 - B. Attention, concentration, or memory impairment
 - C. Social or vocational dysfunction or poor school performance
 - D. Mood disturbance or irritability
 - E. Daytime sleepiness
 - F. Motivation, energy, or initiative reduction
 - G. Proneness for errors or accidents at work or while driving
 - H. Tension, headaches, or gastrointestinal symptoms in response to sleep loss
 - I. Concerns or worries about sleep

Adapted from American Academy of Sleep Medicine. The International Classification of Sleep Disorders. 2nd edition. Rochester (MN): American Sleep Disorders Association; 2005.

of 3 nights per week lasting for a minimum of 6 months [10]. Lichstein and colleagues [10] found that a severity criterion of 31 minutes or more for sleep initiation or maintenance in combination with these frequency and duration criteria best differentiated community-dwelling insomnia sufferers from normal sleepers. A more recent study comparing 2 weeks of sleep diaries kept by patients who had primary insomnia (assessed by structured clinical interviews) and age-matched normal sleepers found no optimal combination of frequency and severity criteria to discriminate the groups; instead, the optimal frequency cutoff decreased as the severity criterion increased [12]. More large-scale studies are needed before consensus can be reached regarding frequency, severity, and duration criteria.

Current insomnia nosologies

The three most widely used nosologies for sleep disorders are the *Diagnostic and Statistical Manual of Mental Disorders, fourth edition—text revision* (DSM-IV-TR [13]), the *International Classification of Diseases* (ICD-9-CM [14] and ICD-10 [15]) and the ICSD-2 [11]. The ICSD-2 classification system is used more commonly among sleep centers accredited by the

American Academy of Sleep Medicine [16], but the other two are more likely to be used in psychiatric and primary care settings, respectively, where the substantial proportion of patients who have insomnia are initially identified and managed [3]. Unlike its predecessor, the ICSD-2 now requires that the insomnia complaint be accompanied by daytime dysfunction, making it consistent with the DSM-IV-TR and ICD-9/ICD-10. Moreover, the ICSD-2 insomnia subtypes are now arranged according to the presiding complaint of insomnia rather than by presumed etiology. There continue to be substantially different diagnostic subtypes among the three classification systems, and these differences may result in different treatment approaches depending on the nosology chosen [17]. More empiric studies are needed to compare the reliability and validity of these systems and to determine whether there are distinct mechanisms and treatment implications related to the insomnia subtypes identified in the ICSD-2 that are absent from the other two nosologies.

Conceptual framework for evaluating the patient who has insomnia

The insomnia evaluation can be enhanced by a working model that takes into account the evolution of the insomnia disorder. The model developed by Spielman and colleagues [18,19] shown in Fig. 1 serves as a useful heuristic and has been incorporated into the most recent edition of the ICSD-2.

This model suggests that there are factors that initially predispose an individual to developing insomnia, factors that trigger or precipitate an insomnia episode, and factors that maintain the insomnia once it has developed. Predisposing factors are inherent characteristics or traits that increase individual susceptibility to insomnia. There is substantial evidence, based on a variety of physiologic

outcomes, that hyperarousal is a predisposing factor for insomnia [20–22]. Other purported predisposing factors include a familial history of light or disrupted sleep [23,24] and psychologic characteristics such as a tendency to worry excessively and overconcern with personal well-being [25]. In isolation, predisposing factors do not cause insomnia but may decrease the threshold for its onset. Precipitating factors are events that contribute to the initial development of insomnia. Stressful life experiences associated with family, health, and work/school are the most common precipitants of insomnia [26,27], but chronic health problems, mood disturbances, and environmental factors can also be triggers [28–30]. Once insomnia has been initiated, perpetuating factors can maintain it over time, even after the original precipitating event has disappeared or has been managed. The perpetuating factors that have received most attention include behavioral strategies to compensate for poor sleep (eg, napping, irregular sleep schedules), efforts to deal with the consequences of insomnia (eg, excessive caffeine intake), cognitive arousal before sleep, and negative sleep-related beliefs and attitudes (eg, worry about inability to sleep and daytime consequences as a result of sleep loss, unrealistic sleep expectations) [25,31,32].

Assessment strategies

Insomnia is unique because it can be either a symptom of another disorder or a disorder without other obvious causes. Although the number of presenting complaints is small, primary etiologic factors of insomnia can range along the biopsychosocial spectrum. Fig. 2 provides a conceptual algorithm for evaluating insomnia according to the ICSD-2.

The ICSD-2 now lists 11 disorders (one pediatric) that specifically present with a complaint characterized by repeated difficulties with sleep initiation, duration, maintenance, or quality that result in

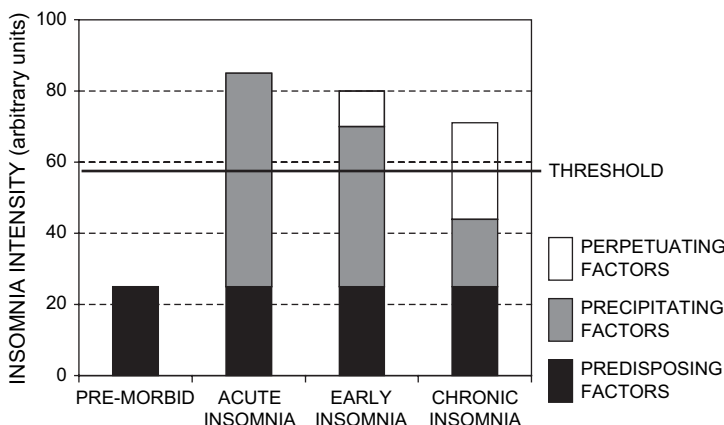


Fig. 1. A model of the evolution of the insomnia disorder. (Adapted from Spielman AJ, Glovinsky PB. The varied nature of insomnia. In: Hauri PJ, editor. Case studies of insomnia. New York: Plenum Press; 1991. p. 12; with permission.)

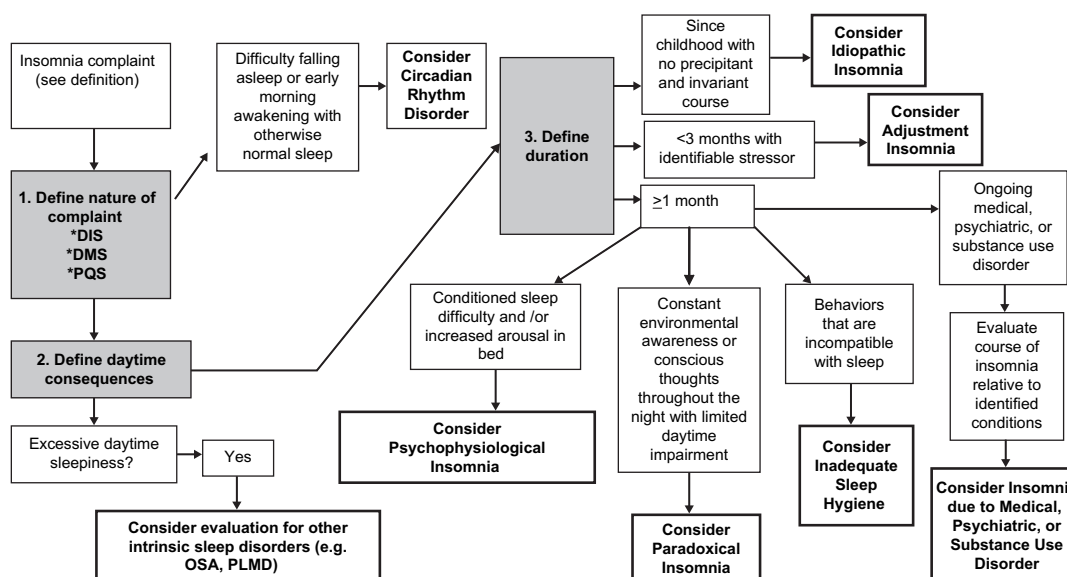


Fig. 2. Algorithm for evaluating insomnia according to the International *Classification of Sleep Disorders*, second edition. DIS, difficulty initiating sleep; DMS, difficulty maintaining sleep; OSA, obstructive sleep apnea; PLMD, periodic limb movement disorder; PQS, poor quality sleep.

daytime impairment [11]. Patients suffering from a circadian rhythm sleep disorder, some sleep-related movement disorders (eg, restless legs syndrome [RLS]), sleep-related breathing disorders (eg, central sleep apnea syndrome), and numerous underlying medical and psychiatric disorders often present with complaints of insomnia. As a result, the insomnia evaluation requires breadth of scope and systematic inquiry into all potential causes of complaints. Multiple contributing factors for the same insomnia complaint can manifest over time. For example, insomnia complaints may be related initially to an acute pain disorder, but over time the individual may spend excessive amounts of time in bed or worry excessively about sleep. Whether or not the pain disorder resolves, the perpetuation of these behavioral and cognitive factors may produce persistent sleep problems. Thus, a systematic, organized, and comprehensive evaluation is required to formulate differential diagnoses and a treatment plan.

Preliminary assessment

The clinician should begin to evaluate the insomnia complaint before the initial clinical visit. Patients can complete a number of self-report questionnaires and instruments addressing the potential causes and consequences of insomnia before or at the initial visit and alert the clinician to potential contributing factors. At a minimum, the following domains should be assessed with potential measures included as references: sleep quality [33,34], insomnia severity [25,35], sleep-related cognitions

[25], sleep habits [36], daytime sleepiness [37], fatigue [38], and mood disturbances (in particular depression and anxiety) [39–41]. Most of these scales demonstrate sound psychometric properties, can discriminate between good and poor sleepers and between pathology and normal functioning, and demonstrate changes with treatment. Although these instruments are clinically useful, there has been no systematic study into which combination of instruments best differentiates insomniacs from normal sleepers or among insomnia subtypes or which most strongly relates to treatment outcome. As a result, there is little uniformity among clinicians as to the scales selected for routine use.

The sleep history

A variety of semistructured [25,42] and structured [43,44] interviews for sleep disorders and insomnia are available to standardize the insomnia evaluation. These instruments generally have not penetrated clinical settings, where reliance on the unstructured clinical interview remains standard. The primary advantage of the unstructured interview is that it enables the clinician to be flexible in approach, thereby fostering the clinician-patient relationship. This flexibility, however, comes at the expense of comparatively lower interrater reliability when compared with more structured assessments [5,43]. For the experienced sleep specialist, the clinical interview can yield a comprehensive differential diagnosis list and a reasoned treatment plan. In both more structured and less structured evaluations, there are common areas of inquiry

that comprise a comprehensive insomnia evaluation. The content areas for the unstructured clinical interview are outlined here. The reader should consult other references for more information about the semistructured and structured sleep disorders interview [25,42–44].

Characterization of the insomnia complaint

The sleep history should begin by having the patient state the chief complaint. Specific patient statements may vary widely, but the nature of the complaint falls within a circumscribed number of dimensions: inability to fall asleep, inability to stay asleep, waking too early in the morning (or a combination of these complaints), poor-quality sleep, too little sleep, work or lifestyle interferes with sleep, or inability to sleep without medications [45]. Initially it also is important to define the frequency of the complaint as well as the perceived severity of both the sleep problem per se and its effects on next-day functioning. A simple Likert scale ranging from 1 (no severity) to 10 (maximum severity) can aid in this assessment. It is common for patients to report that the insomnia problem occurs nightly only to find out upon further assessment that the sleep pattern is more variable, with evidence for good and bad nights. Although patients seeking treatment for insomnia commonly rate it as very severe, there are also patients who express less concern because they have accommodated to the expectation of poor sleep.

An important line of inquiry involves identifying an obvious precipitant for the initiation of the sleep problem. For many, the onset of the insomnia problem is linked intimately with a specific event; for others the precipitant is less identifiable. When an obvious demarcation can be elicited, the clinician has the opportunity to explore premorbid sleep to identify potential predisposing factors. Commonly, patients report being “light sleepers” before the onset of a more extended bout of insomnia. Previous episodes of transient insomnia may serve as a precipitant to more chronic insomnia, although few studies have evaluated this possibility empirically. Recent evidence, however, does suggest that transient insomnia can be elicited in vulnerable individuals [46].

Current/past treatments and treatment response

The most common form of insomnia treatment is prescription hypnotic medication. Up to 15% of the population has used alcohol as a sleep aid [47], and patients who have insomnia commonly initiate self-help treatments before seeking more formal treatment from a sleep specialist [48]. The evaluation of current and past treatments therefore

must include any over-the-counter remedies, nonmedication strategies, and alcohol in addition to any sleep-related prescription medications. Current and past treatments should be assessed for type, dosage, frequency of use, time of administration, typical response, and the conditions surrounding deviations from this pattern. It is important to establish in each case if the specific treatment was given a fair trial, because past failures can result from suboptimal treatment as well as partial or no response. It also is important to gauge the patient's acceptance of pharmacologic and nonpharmacologic therapies, because these attitudes probably will influence adherence with recommendations and ultimately treatment outcome [49]. A thorough evaluation of all treatment efforts should enable the clinician to suggest modifications to previously attempted treatments while providing a plausible rationale to the patient for the initial poor response.

Current sleep pattern and daytime consequences

The following information about the patient's typical sleep pattern should be elicited early in the interview: bedtime; rise time; time to fall asleep (sleep latency); number and duration of awakenings during the night; final wake-up time; frequency and duration of daytime naps; estimated total sleep time; perceived sleep quality, and morning restfulness. It is important to determine how this typical pattern differs on weekdays and workdays versus weekends and nonworkdays, with and without sleep medication, and on good nights versus bad nights. The clinician also should inquire about presleep activity, perceived causes for awakenings during the night, and factors that improve or exacerbate sleep. It is common for many patients who have insomnia to perceive that their sleep is invariable and to provide little insight into mitigating circumstances, but the patient should be encouraged to attempt to differentiate bad nights from good nights.

Integral to the consensus definition of insomnia is the presence of reported daytime impairments related to the insomnia complaints. Most patients report insomnia-related daytime consequences, most commonly in the domains of daytime fatigue, mood disturbances, cognitive deficits, and physical illness [25,50,51]. Although objective findings of impairment among patients who have insomnia have been mixed [52], it is important to remember that the perceived degree of impairment from insomnia is usually what prompts patients to seek treatment.

Sleep-incompatible thoughts and behaviors and sleep hygiene

Patients who have insomnia often engage in patterns of behavior and thinking that precipitate

or perpetuate the insomnia condition [19,25]. Moreover, there are many daily activities that interfere with nighttime sleep. A careful assessment of compensatory strategies used to increase nighttime sleep (eg, variable bedtimes and rise times, spending excessive amounts of time in bed awake) or to deal with the daytime consequences of poor sleep (eg, napping, increased caffeine intake), as well as a thorough evaluation of all sleep hygiene behaviors, will uncover maladaptive behaviors. Patients who have insomnia may exhibit more adverse sleep hygiene practices than do matched good sleepers [53], but most treatment-seeking patients who have insomnia have attempted to remedy some of these practices before seeking treatment. Many patients, however, fail to understand that altering only a few of these behaviors is likely to have little benefit on their sleep. The patient must be convinced that good sleep hygiene practices need to be implemented over an extended period of time before conclusions can be drawn about their relative impact on sleep.

Evaluation of comorbid conditions

A significant portion of the clinical interview should focus on the evaluation of medical disorders, psychiatric conditions, other sleep disorders, and substance use that are commonly comorbid with insomnia [54,55]. The general approach to this part of the evaluation is to establish whether the identified condition is a predisposing, precipitating, or perpetuating factor in the insomnia complaint; this determination frequently is a diagnostic challenge [54]. It should not be assumed, however, that any condition that seems to be primary to the insomnia complaint should be the sole focus of treatment [56]. Indeed, insomnia frequently remains after resolution of other conditions and requires independent treatment [57]. There also is limited understanding of the mechanistic pathways in insomnia to determine direction of causality. For these reasons, the term “comorbid insomnia” is now preferred to describe what was previously termed “secondary insomnia” [58].

Family and psychosocial history

Recent surveys suggest that patients who have insomnia have a higher incidence of first-degree relatives with sleep disturbances than do controls, with the mother being the relative most commonly affected [23,24]. Specific inquiry should be made regarding a family history of insomnia as well as psychiatric disorders to provide insight into potential predisposing factors for the insomnia disorder. Assessing the patient’s psychosocial history, including occupational or school performance, perceived quantity and quality of interpersonal support, and

presence of psychosocial stressors also can elicit perpetuating factors that can be treatment targets.

Significant-other report

A patient’s significant other often is a source of valuable information for the insomnia evaluation and should be included whenever possible. This person can provide collateral information about the nature of the insomnia disorder, including symptom frequency, severity, and duration, and about the nature and degree of daytime impairment. No studies have compared patient and partner reports of insomnia, but in other sleep disorders partner reports have been found to be both congruent [59] and incongruent [60] with patient reports, depending on the aspects of the sleep problem being assessed. Clinical experience suggests that discrepancies in the insomnia evaluation can be important and useful therapeutically. Perhaps more important to the evaluation process, the significant other can provide insight into important differential diagnoses, such as the presence of symptoms of sleep disordered breathing, periodic limb movements in sleep (PLMS), or parasomnias.

Case formulation

At the conclusion of the clinical interview the clinician should have generated a list of potential differential diagnoses based on a synthesis of the information at hand. These initial diagnostic impressions should be discussed with the patient in the context of the previously outlined theoretical model, emphasizing that they are working hypotheses and are subject to change. Preliminary treatment options should be outlined and decided upon with patient input, including a discussion of referrals for further assessment or treatment of other identified conditions. It is critically important to emphasize a collaborative approach with the patient as the evaluation continues and treatment strategies are initiated. At the conclusion of this initial evaluation, further assessment is often required to rule out potential contributors on the differential diagnosis list or to clarify existing diagnoses.

Postinterview assessments

Sleep diaries

Subjective sleep diaries the most commonly used tools in the assessment of insomnia in clinical settings [6] and are the most commonly used outcome measures in insomnia treatment trials [61]. A number of sleep diaries have been published with formats ranging from quantitative [25] to visual analogue [62] to nominal [63]. Whatever the format, the content of sleep diaries is generally

consistent, including a quantitative and qualitative evaluation of nighttime sleep and daytime behaviors that influence sleep. An example of a sleep diary is shown in Fig. 3. Sleep efficiency, defined as the ratio of total sleep time to time devoted to sleep multiplied by 100, is a commonly derived sleep parameter that is a critical outcome in clinical practice and insomnia treatment trials [61].

Sleep diaries are simple, straightforward, and offer an economical method for evaluating sleeping and waking behavior over an extended period of time. Sleep efficiency can be used as a primary end point of treatment progress. Sleep diaries are less influenced by self-report biases than retrospective recall, and they can reliably differentiate patients who have insomnia from healthy sleepers [64,65]. A minimum of 1 to 2 weeks' duration is recommended for stability of measurement [66,67]. Although they generally reflect reliable and valid measures of the insomnia experience, they demonstrate modest to low correlations with overnight polysomnography (PSG) [68] or with actigraphy [69], another objective sleep measure (see later discussion). In comparison with PSG, for example, patients who have insomnia reliably overestimate sleep latency and time awake during the night but underestimate total sleep time [70,71]. In the extreme case of subjective sleep complaints in the absence of any objective findings, the patient may receive a diagnosis of paradoxical insomnia

(sleep-state misperception). Despite its lack of objective validation, the primacy of the subjective complaint as the foundation for the insomnia disorder warrants use of the sleep diary as the primary assessment tool and outcome measure.

Actigraphy

Actigraphs are small motion-sensor detectors about the size of a wristwatch that can be worn continuously for days to months. Actigraphy is not indicated for the routine diagnosis of insomnia but may be a useful adjunct to the sleep history or other sleep assessment (eg, a sleep diary), particularly for the evaluation of circadian rhythm sleep disorders or perhaps paradoxical insomnia [72,73]. Actigraphy does not measure sleep per se but rather the level of activity, which is highly correlated with sleep. Sleep can be identified reliably when low activity occurs in the presence of other indicators of sleep, such as self-report sleep diaries [69,74,75]. One advantage of these devices is that they are cost-effective and reliable measures of 24-hour activity in the patient's natural environment. Dedicated software provides summary measures of behavioral sleep/wake activity and circadian rhythm parameters. Reliability is higher in healthy sleepers than in individuals who have sleep disorders. A variety of actigraph devices are available, and each uses a different automated algorithm to score summary parameters.

Start Date: ____/____/____
(mm/dd/yy)

End Date: ____/____/____
(mm/dd/yy)

Next Session: ____/____/____ @ ____am/pm
(mm/dd/yy)

Fatigue	0	25	50	75	100
Rating	extremely	moderately	mildly	somewhat	very
Scale	fatigued	fatigued	fatigued	energetic	energetic

COMPLETE AT NIGHT in reference to today

COMPLETE IN MORNING in reference to previous night

Day and Date	Fatigue rating	Naps (Start and end times)	Sleep meds or alcohol (Name & dose)	Time you went to bed and turned out the lights	How long it took you to fall asleep for the first time	Number of times you woke up after falling asleep	How long you were awake during the night	Time you woke up this morning for the last time	Time you got up for good	Total sleep time	Quality rating: 1=very poor 2=poor 3=fair 4=good 5=excellent	Restfulness rating: 1=not at all 2=slightly 3=somewhat 4=rested 5=well rested
Mon 9/14	68	2–4 pm	Ambien 10 mg	12:00	1 hr	3	60 min	7:00	8:00	5 hrs	3	2

E.G. turned lights out at 12:00 am and woke up at 7:00 am. She got out of bed at 8:00 am. It took her 1 hour to fall asleep, she woke up 3 times between 12:00 and 7:00 for a total of 60 minutes.

Fig. 3. Example of a “quantitative” sleep diary in which the patient enters primarily numerical information for each day.

Polysomnography

The use of PSG is not indicated for routine evaluation of transient or chronic insomnia or of insomnia associated with psychiatric disorders [76]. It is used only to rule out the presence of sleep-disordered breathing or PLMS or when the diagnosis is unclear, treatment fails, or there are “precipitous arousals that occur with violent or injurious behavior” [76]. Because of the varied nature of insomnia, a small proportion of patients who have insomnia may, paradoxically, sleep better in the laboratory environment on the first night, the so-called “reverse first-night effect” [77,78]. Frequently it is necessary to obtain PSG in patients suspected of paradoxical insomnia as evidence that they can, in fact, sleep. One night of PSG, however, may be insufficient to characterize the problem adequately in patients whose sleep problems do not occur nightly.

Multiple Sleep Latency test

The Multiple Sleep Latency test is the standard assessment tool for objectively measuring daytime sleepiness [79]. It is used primarily as part of the diagnostic work-up for narcolepsy or unexplained excessive daytime sleepiness and is not indicated for the evaluation of sleepiness in insomnia [80]. Although patients who have insomnia frequently complain of daytime consequences such as fatigue, sleepiness, or performance impairments, research studies suggest that these impairments are not caused by sleepiness per se. Patients who have insomnia consistently show longer sleep latencies on the Multiple Sleep Latency test than do normal controls. This increased sleep latency is attributed to heightened physiologic arousal [20,81].

Other psychologic assessments

Several studies have found that patients who have insomnia score higher than healthy controls on one or more scales of the Minnesota Multiphasic Personality Inventory (MMPI) [82–84], most commonly on the depression, hypochondriasis, hysteria, and psychasthenia scales. These findings probably reflect a particular psychologic profile that serves as a predisposing or perpetuating factor in the insomnia disorder. Although the MMPI is computerized and self-administered, it requires an excessive amount of time to complete and specific expertise to be interpreted properly. Therefore its routine use in the insomnia evaluation is not recommended.

Neurobehavioral testing

Experimental studies have used neurobehavioral and cognitive test batteries to measure the daytime impairment associated with insomnia. Some have found limited impairments compared with controls in specific cognitive and behavioral domains such as vigilance [85] and psychomotor functioning [86]. Many have found no objectively measured daytime deficits (reviewed in [87]). One must consider issues of sensitivity and specificity when selecting tests for the daytime sequelae of insomnia. In the absence of a neurobehavioral and cognitive battery that is sensitive and specific for insomnia, neurobehavioral and cognitive test batteries are not recommended for routine use in the insomnia evaluation.

Medical assessments

The physical examination and review of systems can elicit physical evidence suggestive of sleep-disordered breathing (eg, neck circumference greater than 17 inches) or of a specific medical condition that contributes to the insomnia complaint. There is no physical symptom that is pathognomic for insomnia. If there is clinical suspicion of an endocrine disorder, such as hyperthyroidism or menopause, blood tests to evaluate thyroid-stimulating hormone (or T3 and T4 directly) and estrogen, respectively, can be performed to confirm these diagnoses. Serum blood ferritin levels can be used as collateral evidence for RLS. In men, prostate-specific antigens can be assessed to rule out prostate disease if there is evidence of frequent nighttime arousals to void. Although medical tests are not part of the routine evaluation, they may provide important information when there is extensive diagnostic uncertainty or when usual treatment efforts fail.

Differential diagnoses of insomnia

Medical conditions and medications/substances

Medical comorbidity is high in insomnia disorders. Common medical conditions that are comorbid with insomnia include pulmonary (eg, asthma), cardiovascular (eg, heart disease), neurologic (eg, seizure disorder), gastrointestinal (eg, reflux disorder), musculoskeletal (eg, chronic pain), and endocrine (eg, hyperthyroidism) disorders. Medical comorbidity is discussed in more detail in another article in this issue.

The insomnia evaluation should include a thorough inquiry into current medical conditions, their status vis à vis treatment, and their temporal relationship and clinical course in relation to the

insomnia disorder. Evaluation of specific medical conditions can be accomplished during the course of the clinical interview, through the use of self-report questionnaires, or in some cases with physical examinations and laboratory testing. The clinician should determine if a referral is required for better management of any identified condition or if further work-up is necessary to rule out the presence of specific acute medical conditions (eg, hyperthyroidism) that often are associated with insomnia and could interfere with the management of the insomnia.

A wide variety of medications and substances can contribute to complaints of insomnia and its daytime consequences. A thorough assessment of prescription and nonprescription medications and herbal remedies, as well as licit substances (caffeine, nicotine, and alcohol) can determine their role in precipitating and perpetuating the insomnia disorder. The assessment should include type, dosage, frequency, and timing of use. This information can be collected during the course of the clinical interview or with locally developed checklists. Patients also can be asked to bring an updated list of their current medications to the initial evaluation. The clinical evaluation must consider the timing of the insomnia disorder relative to the initiation of medications/substances and alterations in sleep as a function of use, extended exposure, and discontinuation.

Psychiatric conditions

Like medical conditions, insomnia commonly is associated with psychiatric disorders. In the Epidemiological Catchment Area study sponsored by the National Institutes of Mental Health, Ford and Kammerow [1] found that more than 40% of patients who complained of persistent insomnia symptoms also met diagnostic criteria for a psychiatric condition. It is important to assess for an untreated or inadequately treated psychiatric condition that may produce the insomnia complaint. Because psychiatric comorbidity is considered in detail in another article in this issue, it is considered only briefly here.

Of the mood disorders, sleep has been best characterized in major depressive disorder. As many as 65% of outpatients who have major depressive disorder and more than 90% of inpatients self-report insomnia symptoms [88,89], and up to 30% report suffering from hypersomnia (sleeping too much with difficulty awakening in the morning). To diagnose major depressive disorder, these complaints must be accompanied by depressed mood or anhedonia along with other symptoms such as poor concentration, changes in appetite, psychomotor retardation, feelings of guilt or worthlessness, and thoughts of death or suicide. Patients in a hypomanic or manic phase may present with complaints

of intermittent insomnia. When insomnia reports are accompanied by elevated mood, increased productivity, talkativeness, or racing thoughts, a mood component may be at play [90].

Complaints of insomnia also are common in patients who have panic disorder, generalized anxiety disorder, and posttraumatic stress disorder; they are less likely to be significant features of social phobia, obsessive-compulsive disorder, or simple phobias [91]. Differentiating an anxiety disorder from an insomnia disorder can present a diagnostic challenge because patients who have insomnia are frequently anxious. Focusing on the content of the worry can help distinguish, for example, psychophysiologic insomnia from generalized anxiety disorder. Patients afflicted with generalized anxiety disorder describe worry that extends beyond sleep-focused worry to encompass multiple daily events and activities. Individuals suffering from posttraumatic stress disorder have persistent symptoms of increased arousal during the daytime, often with difficulty falling or staying asleep. They also frequently experience recurrent distressing dreams of the traumatic event, leading to further anxiety about falling sleep.

One third to more than three quarters of patients who have a substance use disorder complain of insomnia [92–94]. Subjective sleep complaints in alcoholic patients continue for a minimum of several weeks after withdrawal [95], but sleep abnormalities can persist much longer [96–98]. Complaints of insomnia are also strong predictors of relapse to alcohol use during early abstinence after controlling for other confounding variables [94,99,100]. Consideration needs to be given to the pattern of substance use to determine if the substance use is restricted to the sleep period or extends into the daytime with attendant adverse consequences to daily functioning. In addition to alcohol, specific attention should be given to licit prescription substances that may be abused (eg, methylphenidate) and to illicit stimulants (eg, cocaine or 3,4-methylenedioxymethamphetamine [MDMA, “ecstasy”]) and depressants (eg, *Cannabis*, opioids) [101].

Other sleep disorders

Insufficient sleep

Although the consensus definition of an insomnia disorder in ICSD-2 renders the diagnosis of “insufficient sleep” obsolete, it bears mentioning that the clinician must be convinced that the patient complaining of poor sleep quality and daytime fatigue is allowing “adequate opportunity and circumstances for sleep” [11] appropriate for the patient’s age and developmental status. In the event that this is not the case, the clinician can recommend

a reassessment of the insomnia complaints after a documented period (eg, 1 month) during which sleep opportunity is extended.

Circadian rhythm sleep disorders

Complaints of insomnia with daytime sleepiness may reflect a circadian rhythm sleep disorder. Circadian rhythm sleep disorders occur when there is a misalignment between the patient's endogenous circadian rhythm and the external environment. Making the distinction between psychophysiologic insomnia and a circadian rhythm sleep disorder requires a basic understanding of the circadian system and careful questioning by the clinician.

The most common type of circadian rhythm sleep disorder is delayed sleep phase syndrome (DSPS), which is seen in up to 10% of patients who have chronic insomnia [11]. This syndrome occurs when the major sleep period is delayed so that habitual sleep-onset and wake-up times are delayed relative to desired times. The disorder is usually seen in children, adolescents, and young adults [102,103]. Terminal insomnia complaints (ie, waking up earlier than planned wake-up time) and evening sleepiness may reflect advanced sleep phase syndrome, in which habitual sleep-onset times and wake-up times are advanced relative to conventional and desired times [104,105]. Advanced sleep phase syndrome may occur in about 1% of middle-aged adults but increases with age. When patients who have DSPS and advanced sleep phase syndrome are allowed to choose their preferred bedtime, sleep is usually normal in quality and duration for their age. In the evaluation of DSPS, the clinician should inquire about difficulty falling asleep at night and daytime sleepiness in the morning to mid-afternoon. Patients who have advanced sleep phase syndrome should be asked about difficulty maintaining sleep at night and late afternoon to early evening sleepiness. DSPS patients commonly report getting a "second wind" in the evening and feeling at their peak rhythm during evening hours. It is particularly helpful to assess whether their complaints disappear when patients are able to choose their own schedule, such as on weekends or vacation [103]. In schoolchildren and adolescents, questions regarding sleepiness in early morning classes or underperformance in school may support the differential diagnosis of DSPS. Evaluating circadian preference before the initial visit with an instrument such as the Circadian Rhythm Questionnaire [106] can assist with this differential diagnosis.

Up to 10% of patients who have insomnia and who are employed as shift workers may suffer from shift work sleep disorder [107]. These patients complain of difficulty falling asleep, short sleep time, and sleepiness [108] related to sleeping at an

unusual circadian phase. Although re-entrainment to allow daytime sleep and nighttime alertness is possible, it is rarely achieved by night workers, because they are exposed to phase-advancing light in the mornings on their way home from work or on their days off [105]. The clinician should evaluate the relationship between the occurrence of poor sleep and work-hour distribution (with a work diary) when making a differential diagnosis.

Restless legs syndrome

RLS is a disorder based on history only and is characterized by a complaint of a strong, irresistible urge to move the legs usually accompanied by abnormal sensations. The symptoms are aggravated at rest, are relieved with movement or activity, and are worse in the evening [109]. The disorder is chronic and can be primary or secondary to other conditions such as iron deficiency, uremia, and pregnancy [110]. Patients who have RLS can present with insomnia complaints because the symptoms become worse in the evening and can profoundly disturb a patient's ability to fall asleep or return to sleep after awakening. Therefore, careful attention should be paid to reports of an urge to move legs in the evening that can be relieved only by movement. A blood serum ferritin level of less than 50 µg/L is also supportive of an RLS diagnosis.

Periodic limb movement disorder

PLMS are repetitive, highly stereotyped movements of the lower extremities. Approximately 80% to 90% of patients who have RLS also have PLMS [111], and PLMS may occur in up to 15% of patients who have insomnia [11]. Given the high association with RLS, evaluation of periodic limb movement disorder should include inquiry about additional RLS symptoms. The frequent nighttime limb movements often are disruptive of the bedpartner's sleep, highlighting the importance of including the significant other in the evaluation. Polysomnography is required to make the diagnosis of periodic limb movement disorder.

Sleep-disordered breathing

Forty-two percent of patients who have obstructive sleep apnea have at least one insomnia symptom [112], and insomnia symptoms are more likely to be reported by women who have obstructive sleep apnea [113]. Men who have obstructive sleep apnea are more likely to report snoring, gasping during sleep, and excessive daytime sleepiness. Patients who have comorbid obstructive sleep apnea and insomnia report sustained awakenings in the night with difficulty returning to sleep. Central sleep apnea syndromes also can be accompanied by insomnia and sleepiness complaints because of the

recurrent cessation and resumption of breathing. Snoring and gasping may or may not be reported or witnessed in central sleep apnea, and therefore careful documentation by PSG is necessary.

Summary and future directions

Insomnia is a complex and heterogeneous sleep disorder that requires a thorough and comprehensive assessment in a range of clinical areas to derive comprehensive differential diagnoses and to formulate a reasoned treatment plan. Although the sleep history is the centerpiece of the evaluation process, the insomnia clinician has several modes of assessment available to arrive at a more conclusive diagnosis. In the clinical setting, there is a definite need to standardize assessment instruments, definitions and diagnoses, and evaluation strategies, much along the lines of what has been recently accomplished in the research milieu [7,114]. A more standardized approach would permit a more careful study of insomnia subtypes and differential treatment responses, which could lead to more focused and diversified insomnia treatments. Moreover, the development of a standardized clinical assessment battery that could be used as a collateral of treatment outcome could help convince third-party payers of the efficacy of insomnia treatments, perhaps leading to more reimbursement for the disorder. Finally, the initial identification and management of insomnia in primary care settings would be greatly enhanced by the development and validation of brief assessment tools, outcome measures, and algorithms for treatment.

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