# Classification of Sleep Disorders

**Michael Thorpy**

**Abstract** The *International Classification of Sleep Disorders* (ICSD-3) produced by the American Academy of Sleep Medicine is a major revision of the prior classification and was published in 2014. It is a major advance over previous versions but it is unfortunate that some of the diagnostic criteria differ from that of the American Psychiatric Association's revised version of the *Diagnostic and Statistical Manual of Mental Disorders fifth edition (DSM-V)* published in 2013 which includes a smaller section entitled "Sleep Wake Disorders." The DSM-V serves as an entry level classification, mainly for psychiatrists, and it is to be hoped that in the future the two classifications will be merged into one that will cause less confusion not only for clinicians but also for agencies that reimburse for health care and provide for treatment options. This review discusses the main features of the diagnostic entries in the ICSD-3 and presents the pharmacological treatment focus for the disorders.

The *International Classification of Sleep Disorders* (ICSD-3) produced by the American Academy of Sleep Medicine was a major revision of the prior classification and was published in 2014 [1 ICSD3]. In 2013 the American Psychiatric Association published the revised version of the *Diagnostic and Statistical manual of mental Disorders fifth edition (DSM-V)* which includes a section entitled "Sleep Wake Disorders," an update of the DSM-IV section [2 DSMV]. This more simplified classification system results in a classification for mental health and general medical clinicians who are not experts in sleep medicine. *The International Classification of Diseases* modified version, the ICD-10-CM, that will be adopted in the USA in 2014 contains a classification that more closely conforms to the ICSD-3 [3 ICD10]. The ICSD3 will be used for this review.

The *International Classification of Sleep Disorders* (ICSD-3) is a major revision of the ICSD-2 and was published in March of 2014 (Table 1). The main change was

M. Thorpy, M.D. (✉)
Sleep-wake Disorders Center, Montefiore Medical center, Albert Einstein College of Medicine, Bronx, NY, USA
e-mail: thorpy@aecom.yu.edu



A. Guglietta (ed.), *Drug Treatment of Sleep Disorders*, Milestones in Drug Therapy,
DOI 10.1007/978-3-319-11514-6_3

**Table 1** ICSD-3 (Adapted from the International Classification of Sleep Disorders, Third Revision 2014)

| | ICD-9-CM code: | ICD-10-CM code: |
|---|---|---|
| Insomnia disorders: | | |
| Chronic insomnia disorder | 342 | F51.01 |
| Short-term insomnia disorder | 307.41 | F51.02 |
| Other insomnia disorder | 307.49 | F51.09 |
| Isolated symptoms and normal variants: | | |
| Excessive time in bed | | |
| Short sleeper | | |
| Sleep-related breathing disorders: | | |
| Obstructive sleep apnea disorders: | | |
| Obstructive sleep apnea, adult | 327.23 | G47.33 |
| Obstructive sleep apnea, pediatric | 327.23 | G47.33 |
| Central sleep apnea syndromes: | | |
| Central sleep apnea with Cheyne–Stokes breathing | 786.04 | R06.3 |
| Central apnea due to a medical disorder without Cheyne-Stokes breathing | 327.27 | G47.37 |
| Central sleep apnea due to high altitude periodic breathing | 327.22 | G47.32 |
| Central sleep apnea due to a medication or substance | 327.29 | G47.39 |
| Primary central sleep apnea | 327.21 | G47.31 |
| Primary central sleep apnea of infancy | 770.81 | P28.3 |
| Primary central sleep apnea of prematurity | 770.82 | P28.4 |
| Treatment-emergent central sleep apnea | 327.29 | G47.39 |
| Sleep-related hypoventilation disorders: | | |
| Obesity hypoventilation syndrome | 278.03 | E66.2 |
| Congenital central alveolar hypoventilation syndrome | 327.25 | G47.35 |
| Late-onset central hypoventilation with hypothalamic dysfunction | 327.26 | G47.36 |
| Idiopathic central alveolar hypoventilation | 327.24 | G47.34 |
| Sleep-related hypoventilation due to a medication or substance | 327.26 | G47.36 |
| Sleep-related hypoventilation due to a medical disorder | 327.26 | G47.36 |
| Sleep-related hypoxemia disorder: | | |
| Sleep-related hypoxemia | 327.26 | G47.36 |
| Isolated symptoms and normal variants: | | |
| Snoring | | |
| Catathrenia | | |
| Central disorders of hypersomnolence: | | |
| Narcolepsy Type 1 | 347.01 | G47.411 |

(continued)

**Table 1** (continued)

| | ICD-9-CM code: | ICD-10-CM code: |
|---|---|---|
| Narcolepsy Type 2 | 347.00 | G47.419 |
| Idiopathic hypersomnia | 327.11 | G47.11 |
| Kleine–Levin syndrome | 327.13 | G47.13 |
| Hypersomnia due to a medical disorder | 327.14 | G47.14 |
| Hypersomnia due to a medication or substance | 292.85 (drug-induced); | F11-F19 |
| | 291.82 (alcohol-induced) | |
| Hypersomnia associated with a psychiatric disorder | 327.15 | F51.13 |
| Insufficient sleep syndrome | 307.44 | F51.12 |
| Isolated symptoms and normal variants: | | |
| Long sleeper | | |
| Circadian rhythm sleep–wake disorders: | | |
| Delayed sleep–wake phase disorder | 327.31 | G47.21 |
| Advanced sleep–wake phase disorder | 327.32 | G47.22 |
| Irregular sleep–wake rhythm disorder | 327.33 | G47.23 |
| Non-24-h sleep–wake rhythm disorder | 327.34 | G47.24 |
| Shift work disorder | 327.36 | G47.26 |
| Jet lag disorder | 327.35 | G47.25 |
| Circadian sleep–wake disorder not otherwise specified (NOS) | 327.30 | G47.20 |
| Parasomnias: | | |
| NREM-related parasomnias: | | |
| Disorders of arousal (From NREM sleep) | | |
| Confusional arousals | 327.41 | G47.51 |
| Sleepwalking | 307.46 | F51.3 |
| Sleep terrors | 307.46 | F51.4 |
| Sleep-related eating disorder | 327.40 | G47.59 |
| REM-related parasomnias | | |
| REM sleep behavior disorder: | 327.42 | G47.52 |
| Recurrent isolated sleep paralysis | 327.43 | G47.51 |
| Nightmare disorder | 307.47 | F51.5 |
| Other parasomnias: | | |
| Exploding head syndrome | 327.49 | G47.59 |
| Sleep-related hallucinations | 368.16 | H53.16 |
| Sleep enuresis | 788.36 | N39.44 |
| Parasomnia due to a medical disorder | 327.44 | G47.54 |
| Parasomnia due to a medication or substance | 292.85 (drug-induced) | F11-F19 |
| | 291.82 (alcohol-induced) | |
| Parasomnia, unspecified | 327.40 | G47.50 |

(continued)

**Table 1** (continued)

| | ICD-9-CM code: | ICD-10-CM code: |
|---|---|---|
| Isolated symptoms and normal: | | |
| Sleep talking | | |
| Sleep-related movement disorders: | | |
| Restless legs syndrome | 333.94 | G25.81 |
| Periodic limb movement disorder | 327.51 | G47.61 |
| Sleep-related leg cramps | 327.52 | G47.62 |
| Sleep-related bruxism | 327.53 | G47.63 |
| Sleep-related rhythmic movement disorder | 327.59 | G47.69 |
| Benign sleep myoclonus of infancy | 327.59 | G47.69 |
| Propriospinal myoclonus at sleep onset | 327.59 | G47.69 |
| Sleep-related movement disorder due to a medical disorder | 327.59 | G47.69 |
| Sleep-related movement disorder due to a medication or substance | 292.85 (drug-induced) | F11-F19 |
| | 291.82 (alcohol-induced) | |
| Sleep-related movement disorder, unspecified | 327.59 | G47.69 |
| Isolated symptoms and normal variants: | | |
| Excessive fragmentary myoclonus | | |
| Hypnagogic foot tremor and alternating leg muscle activation | | |
| Sleep starts (Hypnic Jerks) | | |
| Other sleep disorder | 327.8 | G47.8 |
| Appendix A: | | |
| Fatal familial insomnia | 046.8 | A81.83 |
| Sleep-related epilepsy | 345 | G40.5 |
| Sleep-related headaches | 784.0 | R51 |
| Sleep-related laryngospasm | 787.2 | J38.5 |
| Sleep-related gastroesophageal reflux | 530.1 | K21.9 |
| Sleep-related myocardial ischemia | 411.8 | I25.6 |
| Appendix B: | | |
| ICD-10-CM coding for substance-induced sleep disorders | | F10-F19 |

the simplification of the Insomnia disorders and an expansion of the sleep-related breathing disorders.

The organization of the ICSD-3 produced a greater degree of standardization between disorder texts. It includes information in all the following categories where available: Alternate Names, Diagnostic Criteria, Essential Features, Associated Features, Clinical and Pathophysiological Subtypes, Demographics: Prevalence, Gender Bias, Racial/Ethnic Bias, Cultural Issues, Predisposing and Precipitating Factors: Risk factors, Familial Pattern (Genetics, Familial clusters), Onset, Course, and Complications: Medical, Neurological, Psychiatric/social, Developmental

Issues (Pediatric, Geriatric), Pathology and Pathophysiology, Objective Findings; Sleep logs, Actigraphy, Questionnaires, Polysomnography, Multiple sleep latency test, Neurological (Electroencephalogram, Cerebrospinal Fluid, Neuroimaging, Electromyogram, Autonomic), Endocrine, Genetic Testing, Physical Findings (Respiratory, Arterial Blood Gas, Pulmonary Function, Ventilatory Response), Cardiac (Electrocardiogram, Echocardiogram, Cardiac Catheterization), and Serum Chemistry. Several disorders are now classified as Isolated Symptoms and Normal Variants, which includes: Excessive Time in Bed, Short Sleeper, Snoring, Catathrenia, Long Sleeper, Sleep Talking, Excessive Fragmentary Myoclonus, Hypnagogic Foot Tremor and Alternating Leg Muscle Activation, and Sleep Starts (Hypnic Jerks).

## 1 Insomnia Disorders

The Insomnia disorders are characterized by one major disorder termed Chronic Insomnia Disorder. This recognizes the fact that the clinical features of insomnia can be the result of a primary or secondary process but the consequences are similar no matter what the etiology (Edinger et al. 2011). The diagnosis rests upon a sleep symptom such as difficulty initiating sleep that occurs three times per week for at least 3 months and has daytime consequences. Psychophysiological insomnia and insomnia disorders of the ICSD-2 are mentioned as subtypes of chronic insomnia disorder. The inclusion of Short-Term Insomnia Disorder with similar diagnostic criteria applies to insomnia that is less than 3 months in duration. Excessive time in bed and short sleeper are included as isolated symptoms and normal variants, not as specific disorders.

Treatment of the insomnia disorders is by both behavioral as well as pharmacological means. Cognitive behavior therapy for insomnia (CBT-I) is a well recognized effective means of treating insomnia that is often combined with pharmacological therapy. Most often the hypnotics are used in conjunction with CBT-I. Those FDA approved include the benzodiazepines such as triazolam, flurazepam, and temazepam which have largely been replaced with the newer benzodiazepine receptor agonists (BZRAs) such as zolpidem, eszopiclone, and zaleplon (Schwartz and Goradia 2013). The choice of agent depends upon the half-life of the medication, side effect profile, and reimbursement issues. Alternative approved hypnotics include a melatonin agonist, ramelteon, and a sedating antidepressant medication doxepin. Sedating antidepressants are not FDA approved for insomnia but are often used due to their lack of drug scheduling and potential for habituation, such as trazodone or amitriptyline (Bertisch et al. 2014). New hypnotic agents based upon hypocretin receptor antagonism are likely to be available in 2015 (Zisapel 2012).

## 2 Sleep-Related Breathing Disorders

The Sleep-Related Breathing Disorders are organized into four main categories: obstructive sleep apnea (OSA) disorders, central sleep apnea (CSA) syndromes, sleep-related hypoventilation disorders, and sleep-related hypoxemia disorder. The central sleep apnea syndromes are divided into eight types: two related to Cheyne–Stokes breathing (CSB), high altitude, substance, three primary CSA disorders of which one is infancy and the other prematurity, and a new entity entitled treatment-emergent central sleep apnea. The latter category applies to central apnea that follows CPAP administration.

Obstructive sleep apnea syndrome maintains the criterion of five or more respiratory events per hour of sleep when studied in a sleep center or by out of center sleep studies (OCST), so long as typical symptoms are present, otherwise 15 or more predominantly obstructive respiratory events are sufficient to make the diagnosis. The OSA disorders are divided into adult and pediatric types. In the pediatric criteria, for those less than 18 years of age, only one obstructive event is required per hour of sleep so long as respiratory symptoms or sleepiness are present; alternatively, obstructive hypoventilation along with symptoms is required.

Central sleep apnea with Cheyne–Stokes breathing (CSA-CSB) is five or more central apneas or hypopneas per hour of sleep with a pattern that meets criteria for CSB. Central sleep apnea without CSB is diagnosed as central sleep apnea due to a medical disorder without Cheyne–Stokes breathing that occurs as a consequence of a medical or neurological disorder. Central sleep apnea due to high altitude periodic breathing is central apnea attributable to high altitude of at least 1,500 m but usually above 2,500 m. Central sleep apnea due to a medicine or substance most typically due to an opioid or respiratory depressant is not associated with CSB. Primary central sleep apnea (CSA) is five or more central apneas or central hypopneas per hour of sleep in the absence of CSB and of unknown etiology. Primary central sleep apnea of infancy occurs in an infant with greater than 37 weeks conceptional age with recurrent, prolonged (>20 s duration) central apneas and periodic breathing for more than 5 % of total sleep time during sleep. Primary central sleep apnea of prematurity occurs in an infant of less than 37 weeks conceptional age with similar respiratory events.

Treatment-emergent central sleep apnea is diagnosed when five or more obstructive events occur during a PSG with continuous positive airway pressure (CPAP) that shows resolution of obstructive events and presence of central apneas or hypopneas (Westhoff et al. 2012).

The treatment of the sleep-related breathing disorders is mainly based upon improved ventilation during sleep with devices such as a CPAP, bilevel positive airway (BiPAP) device, or an adaptive servoventilation (ASV) device. Medication is rarely used but may be considered in central sleep apnea syndrome where medroxyprogesterone has been shown to be helpful especially in patients with an obesity-hypoventilation component to their disease. Rarely a respiratory stimulant

antidepressant such as protriptyline may also be useful, but its usefulness is impaired by significant adverse effects (Hudgel 1995).

## 3 Central Disorders of Hypersomnolence

The central disorders of hypersomnolence comprise eight disorders. Narcolepsy has undergone a major revision with elimination of the disorder name terms, with or without cataplexy. Type 1 narcolepsy is that presumed to be due to hypocretin loss with either measured reduction in csf hypocretin or cataplexy with associated electrophysiological findings. Narcolepsy Type 2 is that which is confirmed by electrophysiological studies in the absence of cataplexy or with a normal csf hypocretin level. A major change in the narcolepsy criteria is the addition of including a SOREMP on the nocturnal PSG as one of the two required to meet the MSLT criteria of two SOREMPs for diagnosis. This is based upon a study that indicates that the positive predictive value of a SOREMP on the nocturnal PSG for narcolepsy is 92 % (Andlauer et al. 2013). Approximately 50 % of patients with narcolepsy will have a SOREMP less than 15 min on the nocturnal PSG.

Narcolepsy is treated by medications that either treat both major symptoms of EDS and cataplexy, such as sodium oxybate, or by medications that target each symptom separately. Wake promoting agents such as modafinil or armodafinil are the preferred agents for EDS and can be combined with a norepinephrine antagonist such as venlafaxine for the treatment of cataplexy. Alternative medications for sleepiness include the amphetamines such as dextroamphetamine, combination amphetamine salts (adderall) or rarely methamphetamine, and methylphenidate (Ahmed and Thorpy 2010). Mazindol is available in France and has been used successfully for treating the sleepiness and cataplexy in narcolepsy (Nittur et al. 2013).

Idiopathic hypersomnia (IH) is a single entity with elimination of the two ICSD-2 hypersomnia disorders that had specific sleep duration criteria. The new idiopathic hypersomnia disorder requires either an MSLT mean sleep latency of 8 m or less, or a nocturnal sleep duration of at least 660 min. The ICSD-2 category of recurrent hypersomnia has been reduced to a single entry Kleine–Levin syndrome (KLS) with a subtype of menstrual-related Kleine–Levin syndrome (Arnulf et al. 2008). The sleepiness must persist for 2 days to 5 weeks and at least once every 18 months. There can be only one symptom with the sleepiness of cognitive dysfunction, altered perception, eating disorder, or disinhibited behavior.

Treatment of IH is similar to that for narcolepsy without cataplexy. Wake promoting agents such as modafinil or armodafinil, amphetamines, and methylphenidate are the preferred agents (Lavault et al. 2011). Sodium oxybate can be considered but little data exists on its effectiveness for IH. Mazindol is available in France and has been used successfully (Nittur et al. 2013). KLS treatment is generally disappointing but medications that have been tried include lithium carbonate and amantadine (Arnulf et al. 2008).

Insufficient sleep syndrome is the new term for the previous more cumbersome term of behaviorally induced insufficient sleep syndrome. The reduced sleep must be present most days for at least 3 months. Extension of sleep time must result in resolution of symptoms. The other three items in the hypersomnia disorders section are hypersomnia related to a medical disorder, medication or substances, or psychiatric disorder.

Long sleeper is no longer regarded as a disorder but as a normal variant. There are no diagnostic criteria but a total sleep time of 10 or more hours is suggested as being usually accepted.

## 4 Circadian Rhythm Sleep–Wake Disorders

The circadian rhythm sleep–wake disorders comprise six specific disorders including delayed sleep–wake phase disorder (DSWPD), advanced sleep–wake phase disorder (ASWPD), irregular sleep–wake rhythm disorder, non-24-h sleep–wake rhythm disorder, shift work disorder, and jet lag disorder. These disorders arise when there is a substantial misalignment between the internal circadian rhythm and the desired sleep–wake schedule. Specific general diagnostic criteria are given for circadian rhythm sleep–wake disorder (CRSWD). A 3-month duration of symptoms is a requirement for diagnosing all these disorders except for jet lag disorder which has a requirement of jet travel across at least two time zones. A circadian rhythm disorder not otherwise specified (NOS) is listed for patients who have a circadian rhythm sleep–wake disorder who meet all the criteria for CRSWD but not the specific types.

The CRSWDs are treated by considering chronobiological principles. Most require some alteration and management of the sleep–wake schedule by behavioral means. Medications can be helpful, particularly melatonin to stabilize or to help advance the sleep pattern. Chronobiotics include circadian regulators capable of entraining desynchronized or misaligned circadian rhythms as one might observe in patients with delayed sleep phase disorder or non-24-h sleep–wake disorder (Thorpy and Roth 2013). These medications can reset the circadian clock in the suprachiasmatic nucleus of the hypothalamus, resulting in alignment of circadian rhythms with the day/night cycle (Touitou and Bogdan 2007). The only FDA approved chronobiotic for a CRSD is the melatonin agonist, tasimelteon, which is approved for the treatment of non-24-h sleep–wake rhythm disorder (Dhillon and Clarke 2014). Patients with other CRSWDs may be helped by the use of hypnotics at night to help with the quality of nocturnal sleep and/or the use of wake promoting agents during the day, such as modafinil, to prevent sleep episodes at inappropriate times of the day (Morgenthaler et al. 2007).

## 5 Parasomnias

The parasomnias are divided into three groups: the NREM-related parasomnias, REM-related parasomnias, and an other parasomnia category. They are defined as undesirable physical events or experiences that occur during entry into sleep, within sleep, during arousal from sleep.

The NREM-related parasomnias comprise general diagnostic criteria for the group heading of disorders of arousal (from NREM sleep). Specific general diagnostic criteria are given for disorders of arousal (DA) and the detailed text applies to all of the DA's as no text is presented in each of the specific DAs except for diagnostic criteria. Sleep-related abnormal sexual behaviors are listed as a subtype to be classified under confusional arousals. Diagnostic criteria are given for three disorders: confusional arousals, sleepwalking, and sleep terrors. The final NREM-related parasomnia is sleep-related eating disorder (SRED) that requires an arousal from the main sleep period to distinguish it from night eating syndrome (NES) disorder which is excessive eating between dinner and bedtime, and SRED requires an adverse health consequence from the disorder.

Treatment of the non-REM-related parasomnias is primarily by ensuring the patient is protected in the environment by removing any sharp objects such as furniture from near the bed. Sometimes hypnosis or cognitive behavioral therapy (CBT) has been helpful. Medications have rarely been effective for sleepwalking or sleep terrors but some patients have been helped with benzodiazepines, such as clonazepam, which reduce slow-wave sleep or the use of antidepressant medications such as paroxetine (Attarian and Zhu 2013).

The REM-related parasomnias include REM sleep behavior disorder (RBD), recurrent isolated sleep paralysis (RISP), and nightmare disorder. RBD which is repeated episodes of vocalizations and/or complex motor behaviors requires the polysomnographic evidence of REM sleep without atonia (RWA) (Schenck and Howell 2013). RISP is the recurrent inability to move the trunk and all of the limbs at sleep onset or upon awakening from sleep that causes distress or fear of sleep. Nightmare disorder is repeated occurrence of extended, extremely dysphoric, and well-remembered dreams that usually involve threats to survival, security, or physical integrity.

The REM-related parasomnias, such as nightmares or sleep paralysis, are usually treated by the use of REM suppressing medications which typically are antidepressants that are sedative such as imipramine. Behavioral management is also important as well as psychiatric management in the case of nightmares. However in RBD, clonazepam is the most effective medication, and less effective but useful when clonazepam cannot be taken is melatonin in high doses up to 12 mg (McCarter et al. 2013). Rivastigmine has been shown to be helpful in refractory RBD patients with mild cognitive impairment (Brunetti et al. 2014).

The other parasomnia section includes three specific disorders: exploding head syndrome (EHS), sleep-related hallucinations, and sleep enuresis. EHS is a complaint of a sudden noise or sense of explosion in the head either at the wake–sleep

transition or upon awakening during the night associated with abrupt arousal. Sleep-related hallucinations are predominantly visual hallucinations that are experienced just prior to sleep onset or upon awakening during the night or in the morning. Sleep enuresis is involuntary voiding during sleep at least twice a week in people older than 5 years of age. Parasomnias associated with medical disorders, and medication or substance and unspecific parasomnia, comprise the other entries in this category. Sleep talking is a normal variant that can occur in both NREM or REM sleep and can be associated with parasomnias such as RBD or DAs.

EHS usually does not require treatment although topiramate has been reported to be helpful (Palikh and Vaughn 2010). Sleep-related hallucinations may be helped by REM suppressant medications. Sleep enuresis is largely a maturational problem that requires no treatment other than behavioral management; however, sometimes desmopressin may be helpful. There is a report that sertraline can be effective in desmopressin nonresponders (Mahdavi-Zafarghandi and Seyedi 2014).

## 6 The Sleep-Related Movement Disorders

The sleep-related movement disorders (SRMD) comprises seven specific disorders; restless legs syndrome (RLS), periodic limb movement disorder (PLMD), sleep-related leg cramps, sleep bruxism, sleep-related rhythmic disorder (RMD), benign sleep myoclonus of infancy (BSMI), and propriospinal myoclonus at sleep onset (PSM). SRMD are relatively simple, usually stereotyped movements that disturb sleep or its onset.

Restless legs syndrome (also known as Willis–Ekbom disease) is an urge to move the legs, usually accompanied by or thought to be caused by uncomfortable and unpleasant sensations in the legs. The ICSD-3 criteria do not include any frequency or duration criteria as is contained in the DSM-V criteria.

PLMD is defined as the polysomnography demonstration of periodic limb movements (PLMS) of >5/h in children and >15/h in adults that cause significant sleep disturbance or impairment of functioning. Sleep-related leg cramps are painful sensations that occur in the leg or foot with sudden, involuntary muscle hardness or tightness. Sleep-related bruxism is tooth grinding during sleep that is associated with tooth wear or morning jaw muscle pain or fatigue. RMD is repetitive, stereotyped, and rhythmic motor behaviors involving large muscle groups that are sleep related. BSMI is repetitive myoclonic jerks that involve the limbs, trunk, or whole body that occurs from birth to 6 months of age during sleep. As PSM mainly occurs during relaxed wakefulness and drowsiness as the patient attempts to sleep, the term "at sleep onset" has been added to the propriospinal myoclonus name. The three final categories are related to a medical disorder, medication of substance, and an unspecified parasomnia.

Treatment of RLS is mainly by dopamine agonists such as pramipexole or rotigitine; however, because of augmentation there is a move to use alpha-2-delta ligands, such as gabapentin enacarbil or pregabalin, as first-line medications

(Silber et al. 2013). Opioids, such as oxycodone or tramadol, can be used when dopamine agonists or alpha-2-delta agonists are not effective. PLMD, when treatment is required, is usually treated with the same medications as RLS. RMD is fairly unresponsive to medications but clonazepam has been used but behavioral treatments or hypnosis may be more effective (Chisholm and Morehouse 1996). BSMI and PSM usually require no medication treatment.

## 7 Isolated Symptoms and Normal Variants

Isolated symptoms and normal variants include excessive fragmentary myoclonus (EFM), hypnagogic foot tremor and alternating muscle activation, and sleep starts (hypnic jerks). EFM is now regarded as a normal variant found on polysomnographic EMG recordings that are characterized by small movements of the corners of the mouth, fingers, or toes or without visible movement. Hypnagogic foot tremor (HFT) is rhythmic movement of the feet or toes that occurs in the transition between wake and sleep or in light NREM sleep, and alternating muscle activation (ALMA) is brief activation of the anterior tibialis in one leg with alternation in the other leg. Sleep starts (hypnic jerks) are brief, simultaneous contractions of the body, or one or more body segments occurring at sleep onset.

The isolated symptoms and normal variants usually do not require any specific treatment.

The final category in the ICSD-3 is a general other sleep disorder category for disorders that cannot be classified elsewhere.

**Conclusion**

The new ICSD-3 is a major advance over previous versions, but it is unfortunate that some of the diagnostic criteria differ from that of DSM-V, for example, the criteria for narcolepsy. However, the DSM-V serves as an entry level classification, mainly for psychiatrists, and it is to be hoped that in the future the two classifications will be merged into one that will cause less confusion not only for clinicians but also for agencies that reimburse for health care and provide for treatment options.

Appendix A lists several disorders that are coded in other sections of ICD 10 other than the sleep sections and include: Fatal Familial Insomnia, Sleep-Related Epilepsy, Sleep-Related Headaches, Sleep-Related Laryngospasm, Sleep-Related Gastroesophageal Reflux, and Sleep-Related Myocardial Ischemia. Appendix B lists the ICD sleep-related substance-induced sleep disorders.

## References

Ahmed I, Thorpy M (2010) Clinical features, diagnosis and treatment of narcolepsy. Clin Chest Med 31(2):371–381

American Academy of Sleep Medicine (2014) International classification of sleep disorders, 3rd edn. American Academy of Sleep Medicine, Darien, IL

American Psychiatric Association (2013) Diagnostic and statistical manual of mental disorders, 5 DSM-Vth edn. American Psychiatric Association, Washington, DC

Andlauer O, Moore H, Jouhier L et al (2013) Nocturnal REM sleep latency for identifying patients with narcolepsy/hypocretin deficiency. JAMA Neurol 6:1–12

Arnulf I, Lin L, Gadoth N et al (2008) Kleine-Levin syndrome: a systematic study of 108 patients. Ann Neurol 63:482–493

Attarian H, Zhu L (2013) Treatment options for disorders of arousal: a case series. Int J Neurosci 123(9):623–625

Bertisch SM, Herzig SJ, Winkelman JW, Buettner C (2014) National use of prescription medications for insomnia: NHANES 1999–2010. Sleep 37(2):343–349

Brunetti V, Losurdo A, Testani E et al (2014) Rivastigmine for refractory REM behavior disorder in mild cognitive impairment. Curr Alzheimer Res 11(3):267–273

Chisholm T, Morehouse RL (1996) Adult headbanging: sleep studies and treatment. Sleep 19 (4):343–346

Dhillon S, Clarke M (2014) Tasimelteon: first global approval. Drugs 74(4):505–511

Edinger JD, Wyatt JK, Stepanski EJ et al (2011) Testing the reliability and validity of DSM-IV-TR and ICSD-2 insomnia diagnoses: results of a multi-method/multi-trait analysis. Arch Gen Psychiatry 68:992–1002

Hudgel DW (1995) Pharmacologic treatment of obstructive sleep apnea. J Lab Clin Med 126 (1):13–18

International Classification of Diseases (2010) Tenth Revision, Clinical Modification (ICD-10-CM), National Center for Health Statistics. Centers for Disease Control and Prevention (CDC), December 20, 2010

Lavault S, Dauvilliers Y, Drouot X et al (2011) Benefit and risk of modafinil in idiopathic hypersomnia vs. narcolepsy with cataplexy. Sleep Med 12(6):550–556

Mahdavi-Zafarghandi R, Seyedi A (2014) Treatment of monosymptomatic nocturnal enuresis: sertraline for non-responders to desmopressin. Iran J Med Sci 39(2):136–139

McCarter SJ, Boswell CL, St Louis EK et al (2013) Treatment outcomes in REM sleep behavior disorder. Sleep Med 14(3):237–242

Morgenthaler TI, Lee-Chiong T, Alessi C et al (2007) Standards of practice committee of the American academy of sleep medicine. Practice parameters for the clinical evaluation and treatment of circadian rhythm sleep disorders. An American academy of sleep medicine report. Sleep 30(11):1445–1459

Nittur N, Konofal E, Dauvilliers Y et al (2013) Mazindol in narcolepsy and idiopathic and symptomatic hypersomnia refractory to stimulants: a long-term chart review. Sleep Med 14 (1):30–36

Palikh GM, Vaughn BV (2010) Topiramate responsive exploding head syndrome. J Clin Sleep Med 6(4):382–383

Schenck CH, Howell MJ (2013) Spectrum of RBD (overlap between RBD and other parasomnias). Sleep Biol Rhythms 11(Suppl 1):27–34

Schwartz TL, Goradia V (2013) Managing insomnia: an overview of insomnia and pharmacologic treatment strategies in use and on the horizon. Drugs Context 2013:212257. doi:10.7573/dic.212257

Silber MH, Becker PM, Earley C et al (2013) Medical advisory board of the Willis-Ekbom disease foundation. Willis-Ekbom disease foundation revised consensus statement on the management of restless legs syndrome. Mayo Clin Proc 88(9):977–986

Thorpy MJ, Roth T (2013) Toward a classification of medications for sleep and circadian rhythm disorders. Nat Sci Sleep 5:143–145

Touitou Y, Bogdan A (2007) Promoting adjustment of the sleep-wake cycle by chronobiotics. Physiol Behav 90(2–3):294–300

Westhoff M, Arzt M, Litterst P (2012) Prevalence and treatment of central sleep apnoea emerging after initiation of continuous positive airway pressure in patients with obstructive sleep apnoea without evidence of heart failure. Sleep Breath 16:71–78

Zisapel N (2012) Drugs for insomnia. Expert Opin Emerg Drugs 17(3):299–317