

Sleep Disorders in General

Last updated: May 8, 2019

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10-15% of population have sleep-related problems!

CLASSIFICATION

International Classification of Sleep Disorders:

1. **Dyssomnias** - sleep disorders that result in:
 - 1) **insomnia** (perceived inability to obtain sufficient sleep)
 - 2) **excessive daytime somnolence** (excessive sleepiness or fatigue during day)
2. **Parasomnias** - undesirable physical & mental phenomena that occur during sleep - **disorders of arousal / partial arousal / sleep stage transition**.
3. Sleep disorders **associated** with:
 - a) **psychiatric disorders** (esp. depression and anxiety) – sleep disturbance may be first or most significant symptom!
 - b) **medical disorders** (e.g. awakening by pain, respiratory difficulty due to asthma, urge to urinate, etc).
 - c) **neurodegenerative disorders**:
 - neuronal systems involved in *sleep-wake regulation*;
 - neuronal systems involved with regulation of *breathing* during sleep;
 - neuronal systems involved with *motor control* during sleep.
4. **Proposed** sleep disorders.

Dyssomnias and parasomnias are **PRIMARY disorders**.

INTRINSIC disorders are related to processes within body; vs. **EXTRINSIC disorders** - due to processes outside body.

FULL CLASSIFICATION

I. DYSSOMNIA

A. Intrinsic Sleep Disorders

1. Psychophysiological Insomnia
2. Sleep State Misperception
3. Idiopathic Insomnia
4. Narcolepsy
5. Recurrent Hypersomnia
6. Idiopathic Hypersomnia
7. Posttraumatic Hypersomnia
8. Obstructive Sleep Apnea Syndrome
9. Central Sleep Apnea Syndrome
10. Central Alveolar Hypoventilation Syndrome
11. Periodic Limb Movement Disorder
12. Restless Legs Syndrome
13. Intrinsic Sleep Disorder NOS

B. Extrinsic Sleep Disorders

1. Inadequate Sleep Hygiene
2. Environmental Sleep Disorder
3. Altitude Insomnia
4. Adjustment Sleep Disorder

5. Insufficient Sleep Syndrome
 6. Limit-Setting Sleep Disorder
 7. Sleep-Onset Association Disorder
 8. Food Allergy Insomnia
 9. Nocturnal Eating (Drinking) Syndrome
 10. Hypnotic-Dependent Sleep Disorder
 11. Stimulant-Dependent Sleep Disorder
 12. Alcohol-Dependent Sleep Disorder
 13. Toxin-Induced Sleep Disorder
 14. Extrinsic Sleep Disorder NOS
- C. Circadian Rhythm Sleep Disorders**
1. Time Zone Change (Jet Lag) Syndrome
 2. Shift Work Sleep Disorder
 3. Irregular Sleep-Wake Pattern
 4. Delayed Sleep Phase Syndrome
 5. Advanced Sleep Phase Syndrome
 6. Non-24-Hour Sleep-Wake Disorder
 7. Circadian Rhythm Sleep Disorder NOS

II. PARASOMNIAS

- A. Arousal Disorders**
1. Confusional Arousals
 2. Sleepwalking
 3. Sleep Terrors
- B. Sleep-Wake Transition Disorders**
1. Rhythmic Movement Disorder
 2. Sleep Starts
 3. Sleep Talking
 4. Nocturnal Leg Cramps
- C. Parasomnias Usually Associated with REM Sleep**
1. Nightmares
 2. Sleep Paralysis
 3. Impaired Sleep-Related Penile Erections
 4. Sleep-Related Painful Erections
 5. REM Sleep-Related Sinus Arrest
 6. REM Sleep Behavior Disorder
- D. Other Parasomnias**
1. Sleep Bruxism
 2. Sleep Enuresis
 3. Sleep-Related Abnormal Swallowing
 4. Nocturnal Paroxysmal Dystonia
 5. Sudden Unexplained Nocturnal Death Syndrome
 6. Primary Snoring
 7. Infant Sleep Apnea
 8. Congenital Central Hypoventilation Syndrome
 9. Sudden Infant Death Syndrome
 10. Benign Neonatal Sleep Myoclonus
 11. Other Parasomnia NOS

III. SLEEP DISORDERS ASSOCIATED WITH MEDICAL / PSYCHIATRIC DISORDERS

- A. Associated with Mental Disorders**
1. Psychoses
 2. Mood Disorders
 3. Anxiety Disorders
 4. Panic Disorder
 5. Alcoholism
- B. Associated with Neurologic Disorders**
1. Cerebral Degenerative Disorders
 2. Dementia
 3. Parkinsonism
 4. Fatal Familial Insomnia
 5. Sleep-Related Epilepsy
 6. Electrical Status Epilepticus of Sleep
 7. Sleep-Related Headaches

C. Associated with Other Medical Disorders

1. Sleeping Sickness
2. Nocturnal Cardiac Ischemia
3. Chronic Obstructive Pulmonary Disease
4. Sleep-Related Asthma
5. Sleep-Related Gastroesophageal Reflux
6. Peptic Ulcer Disease
7. Fibrositis Syndrome

IV. PROPOSED SLEEP DISORDERS

1. Short Sleeper
2. Long Sleeper
3. Subwakefulness Syndrome
4. Fragmentary Myoclonus
5. Sleep Hyperhidrosis
6. Menstrual-Associated Sleep Disorder
7. Pregnancy-Associated Sleep Disorder
8. Terrifying Hypnagogic Hallucinations
9. Sleep-Related Neurogenic Tachypnea
10. Sleep-Related Laryngospasm
11. Sleep Choking Syndrome

Two principal neurobiologic systems govern sleep-wake cycle:

one that actively generates sleep and sleep-related processes → *sleep disorders*.

another that times sleep within 24-h day → *circadian rhythm disorders*.

SLEEP STAGE and associated SLEEP DISORDER:

SLEEP STAGE	SLEEP DISORDER
Pre-sleep	Restless leg syndrome Hypnic jerks
Light sleep (Stage 1-2)	Periodic limb movements of sleep
Deep sleep (Stage 3-4)	Confusional arousals Sleepwalking Sleep terrors
REM sleep	Nightmares REM sleep behavioral disorder
Sleep/wake transition	Hypnagogic and hypnopompic hallucinations Sleep paralysis

ETIOLOGY

1. **Shift working, jet lag** - fighting internal circadian clock.
2. **Neurodegenerative diseases** - internal clocks no longer function effectively.
3. **Medical or psychiatric illness** - sleep fluctuates with severity of underlying illness.
4. **Pharmacological agents:**
 - a) withdrawal of sedatives
 - b) stimulants

DIAGNOSIS

DETAILED HISTORY is especially important (because physical examination is often not revealing during waking hours):

1. **Quantity & quality** of sleep:
 - **hour** of bedtime and final awakening;
 - DELAYED PHASE SLEEP - inability to fall asleep until late at night, with corresponding late awakening; normal in adolescents!
 - PHASE ADVANCED SLEEP - fall asleep easily at early hour but awaken early in morning.
 - **latency** from bedtime to onset of sleep; events that delay sleep onset;
 - number and duration of nocturnal **awakenings**;
 - **activities** during night (interview of bed partner or family members);
 - perceived subjective **sleep quality**.

Good sleep criteria:

1. **Sufficient** - provides adequate alertness and feeling of vitality during day
2. **Efficient** - easily initiated, continuously maintained, not excessively prolonged
3. **Convenient** - occurring during period of time when patient would not need or prefer to be awake (usually at night).

2. **Psychological states** at time of sleep onset (e.g. worries, ruminations over daytime problems, anxiety cause alertness and prevent sleep onset).
 3. Presence and severity of **daytime sleepiness** - nodding off or napping during quiet, *passive* activities; in more severe cases, sleep may occur during *active* periods (→ life-threatening situations).
 4. **Age of onset**
 5. **Duration and progression** (e.g. transient vs. chronic).
 6. **Variation from day to day** (e.g. working days vs. weekend & vacation periods; shift workers).
 7. **Medications**.
 8. **Family history** (esp. RLS, narcolepsy, sleep apnea, fatal familial insomnia).
- **SLEEP DIARY** (for consecutive 14-day period) is useful adjunct to patient history.
 - **wrist ACTIGRAPH** is worn for 2 weeks and continually records physical activity; quiescence periods suggest sleep time; not indicated for routine diagnosis of any sleep disorder.

PHYSICAL EXAMINATION is rarely helpful, with following exceptions:

- 1) **sleep apnea** → head & neck examination (lateral narrowing of oropharynx, oropharyngeal crowding secondary to increased tongue and soft tissue volume, enlarged tonsils, micrognathia, and retrognathia).
- 2) **restless leg syndrome** → neurologic examination.
- 3) daytime complaints consistent with any of **medical causes** → examination of affected organ system.

INSTRUMENTAL EXAMINATION

Overnight POLYSOMNOGRAPHY - most reliable test for certain sleep disturbances.

- very labor intensive and expensive (e.g. monitored by *technician* who is present throughout night).
- for some patients, strange surroundings reduce ability to sleep normally, and obtaining accurate sleep recording requires 1 night of adaptation before actual recording night.

Components:

1. **EEG** (2-28 channels; always includes top of head and C₃, C₄ sites) - to characterize stage of sleep; some patients complain of insomnia but, in fact, have normal amount of sleep!

2. **Eye movements (EOG)**
3. **Mentalis muscle activity (chin EMG)** - tonic activity during non-REM sleep; \pm EMG of anterior tibialis muscles - detection of leg movements.
4. **ECG**
5. **Respiratory movements** - measurement of *air flow* through nasal passages and mouth using thermistors + recording *thoracoabdominal excursions* with surface electrodes.
6. **Oxygen saturation** - ear oximeter.
7. **Microphone** (taped to face) - to record snoring.

Standardized sleep scoring is based on **EEG**, **EOG** (electro-oculogram), and **chin EMG** (EMG of mentalis muscle).

- possible additional measurements:
 - **videotaping** abnormal sleep behaviors.
 - penile tumescence registration.
 - body temperature registration.
- **PORTABLE SLEEP MONITORING** is less expensive and more convenient for patients, but less accurate (indicated only for patients who *cannot be studied in sleep laboratory* or for *follow-up* studies when diagnosis has already been established by standard PSG).

MULTIPLE SLEEP LATENCY TEST (MSLT) – *four or five 20-minute nap opportunities* across waking day (each nap separated by 2 hours) - objective measure of DAYTIME SLEEP TENDENCY.

- patient is lying down in darkened room and instructed to try to sleep.
- each session is terminated after 20 min if no sleep occurs or 15 min after sleep onset.
- **mean sleep latency** for all five naps is determined:
 - < 5 minutes – pathological sleepiness;
 - 5-10 minutes – borderline;
 - > 10 minutes – normal.
- during naps, sleep is staged and **REM latency** is determined;
 - if REM sleep occurs during ≥ 2 naps, it is consistent with diagnosis of **narcolepsy**;
 - REM latency \downarrow also in major **depression** (vs. **anxiety disorders** - normal REM latency, but mean sleep latency \uparrow).
- MSLT test is accurate if performed day following overnight PSG.
- indicated for - narcolepsy, idiopathic hypersomnia, EDS severity assessment.

NEUROIMAGING - not necessary for evaluation of primary sleep disorder.

LABORATORY TESTS

Thyroid tests and *drug screens* should be obtained in most cases.

NEUROPSYCHOLOGY TESTING - determining *cognitive impairment* and *mood disorders*.

TREATMENT

GOOD SLEEP HYGIENE

1. Keep **bedroom** dark, quiet, and cool.
2. Go to bed and arise from bed **at same time each day**.
3. Consistent **calming activities** before sleep (reading, warm bath)
4. **Warm milk** helps some patients sleep.
5. **Pillows** between or under knees or under waist often help to relax back muscles.
6. **Regular exercises** promote sleep, but avoid **exercising before bedtime**.
7. Use bed only for **sleep** and **sexual activity**; avoid using bed (or bedroom) to **read, watch television, or work**.
8. Avoid **late-day napping**.

9. Avoid **stress & worrisome thoughts** before sleep.
10. Avoid **caffeine** and **nicotine** intake.
11. Avoid **late night meals**.
12. **Alcohol** intake at bedtime may *shorten sleep latency* but often causes *sleep fragmentation* later in night, with *early morning awakening*; alcohol also worsens most *respiratory problems* in sleep.
13. Get out of bed and do something relaxing *if unable to sleep after 15-20 minutes*; this can be repeated as often as needed.

Physician's responsibility to notify licensing authorities of increased risk of sleepiness-related vehicle accidents;

- legal requirements vary from state to state.
- at minimum, *physicians should document discussions with patient* (regarding increased risk of operating vehicle, as well as recommendation that driving be suspended until successful treatment can be instituted).

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