SLEEP PHYSIOLOGY

NREM

Stage 1:

transitional stage characterized by aimless thoughts, a feeling of drifting, and frequent myoclonic jerks of the face, hands and feet. The individual is easily awakened during this stage. Last from 1-2 minutes.

Stage 2:

the individual is more relaxed but is still easily awakened. Last from 5-15 minutes.

Sleep physiology- cont...

- **Stage 3 and 4:**

- Random stimuli do not arouse the individual from these deepest levels of sleep. Last from 15-30 minutes and constitutes approximately 20% of the total sleep time. During this stage eye movement cease and there is profound muscle relaxation. NREM dreams are often realistic, and often similar to a recent activity. These dreams are more difficult to remember than REM dreams. NREM sleep is a time of energy conservation and renewal.

Sleep physiology cont…

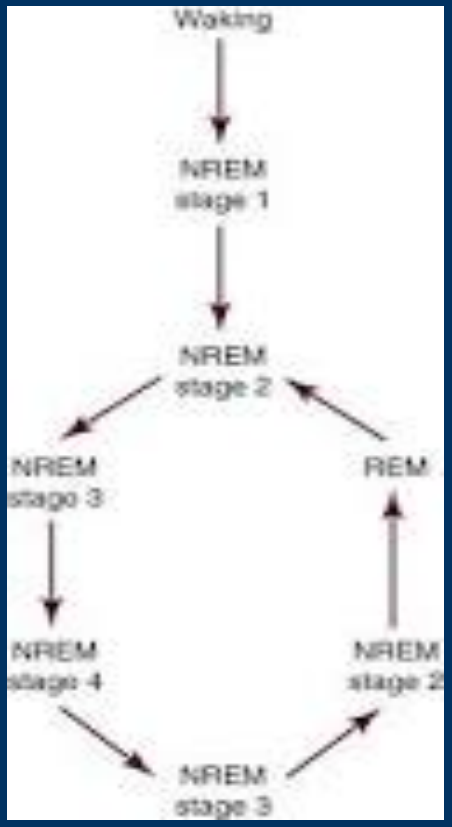
REM

•During this stage, burst of eye movements are seen that are often associated with periods of dreaming. Immobility and functional paralysis of the skeletal muscles is seen.

•REM sleep filters information stored from the days activities, sifting the important from the trivial, helping to psychologically integrate activities such a problem solving. REM sleep seems to facilitate emotional adaptation to the physical and physiologic environment and is needed in large quantities after periods of stress and learning.

THE CYCLIC NATURE OF SLEEP

- At the onset of sleep, the individual normally progress trough repetitive cycles beginning with NREM stages 1 through 4 and then back again to stage 2.
- From stage 2 the individual enters REM. Stage 2 is then re entered, and the cycle repeats. These cycles occur at approximately 90 minute intervals.
- In a school aged children who sleep between 10 and 11 hours per night, six to seven cycles are normally completed



SLEEP DISORDERS

Dyssomnias:

- Are primary disorders of **initiating or maintaining sleep or of excessive sleepiness** and are characterized by a disturbance in the amount, quality, or timing of sleep.

Parasomnias:

- Are a category of sleep disorders that involve abnormal movements, behaviors, emotions, perceptions, and dreams that **occur while falling asleep, sleeping, between sleep stages, or during arousal from sleep.**

*** To fulfill these diagnoses, the sleep disturbance is not better explained by another sleep disorder, medical or neurological disorder, mental disorder, medication use , or substance use disorder

DYSSOMNIAS

Psychophysiological insomnia:

Evidence of conditioned sleep difficulty and/or heightened arousal in bed as indicated by:

- Excessive focus or heightened anxiety about sleep
- Difficulties falling asleep in bed at the desired bedtime or during planned naps, but no difficulties falling asleep during other monotonous activities when not intending to sleep.
- Mental arousal in bed characterized either by intrusive thoughts or a perceived inability to volitionally cease sleep-preventing mental activity
- Heightened somatic tension in bed reflected by a perceived inability to relax the body sufficiently to allow the onset of sleep

Management of **psychophysiological** insomnia

- Stimulus control therapy: A set of instructions designed to reassociate the bed/bedroom with sleep and to re-establish a consistent sleep-wake schedule
- Sleep restriction therapy: A method designed to curtail time in bed to the actual amount of sleep time.
- Relaxation therapy: Clinical procedures aimed at reducing somatic training tension
- Cognitive therapy: Psychological methods aimed at challenging and changing misconceptions about sleep and faulty beliefs about insomnia and its perceived daytime consequences.
- Sleep hygiene education: General guideline about healthy sleep practices
- Cognitive behavioral therapy: Combination of any of the above therapies

Idiopathic insomnia (childhood onset)

- The course is chronic
- Onset during infancy or childhood
- No identifiable precipitant or cause
- Persistent course with no periods of sustained remission
- The sleep disturbance is not better explained by another sleep disorder, medical or neurological disorder, mental disorder, medication use, or substance use disorder

Management of idiopathic insomnia

- Stimulus control therapy: A set of instructions designed to reassociate the bed/ bedroom with sleep and to re-establish a consistent sleep-wake schedule
- Sleep restriction therapy: A method designed to curtail time in bed to the actual amount of sleep time.
- Relaxation therapy: Clinical procedures aimed at reducing somatic training tension
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Inadequate sleep hygiene

- The insomnia is present for at least one month
- Inadequate sleep hygiene practices are evident as indicated by the presence of at least one of the following:
- Improper bed scheduling consisting of frequent daytime napping, selecting highly variable bedtimes and rising times, or spending excessive amounts of time in bed
- Routine use of products containing alcohol. Nicotine, or caffeine, especially in the period preceding bedtime
- Engaging in mentally stimulating, physically activating, or emotionally upsetting activities too close to bedtime
- Frequent use of the bed for activities other than sleep (television watching, reading, studying, snacking, thinking, planning)
- Failure to maintain a comfortable sleeping environment

Management of inadequate sleep hygiene

1. Adhere to age appropriate sleep recommendations.

2. Regular bedtime and awakening time in the morning.

3. A steady daily amount of exercise.

4. Occasional loud noises disturb sleep. Sound attenuating the bedroom might be advisable for people who have to sleep close to excessive noise.

5. Environmental comfort (temperature).

6. Hunger may disturb sleep. A light bedtime snack (especially warm milk or similar drink) seems to help many individuals sleep.

7. An occasional sleeping pill may be of some benefit, but the chronic use of hypnotics is ineffective at most and detrimental in some insomniacs.

8. Caffeine in the evening disturbs sleep, even in persons who do not feel it does.

9. Alcohol helps tense people to fall asleep fast, but the ensuing sleep is then fragmented.

10. Rather than trying harder and harder to fall asleep during a poor night, switching on the light and doing something else may help the individual who feels angry, frustrated, or tense about being unable to sleep

Obstructive sleep apnea- signs and symptoms

- Characterized by prolonged partial upper airway obstruction, intermittent complete or partial obstruction, or both prolonged and intermittent obstruction that disrupts normal ventilation during sleep.
- Cessation of breathing
- Cor pulmonale
- Cyanosis
- Enuresis
- Excessive daytime somnolence

Obstructive sleep apnea cont…

- Gasping for air
- Irritability
- Nighttime awakening
- Poor academic performance
- Pulmonary hypertension
- Snoring
- Unusual daytime behavior

Obstructive sleep apnea- PSG evaluation

- Morning headaches
- Secondary enuresis
- Polysomnographic recording:
- demonstrates one or more scoreable respiratory event per hour of sleep
- Frequent arousal from sleep associated with increased respiratory effort
- Arterial oxygen desaturation in association with apneic episodes
- Hypercapnia during sleep

Obstructive sleep apnea- physical examination

- Marked negative esophageal pressure swings
- Adeno-tonsillar hypertrophy
- Craniofacial abnormalities
- Growth disturbances
- Failure to thrive
- Obesity
- Laryngeal pathology

Obstructive sleep apnea - management

- Continuous positive airway pressure
- Weight loss in obese children.
- alternatives are tolerated poorly in children and rarely are considered primary therapy.
- Adeno-tonsillectomy (is curative in most patients).

PARASOMNIAS

Parasomnias:

- Consists mainly of inappropriate physical behaviors that intrude predominantly during sleep.

Sleep terrors

- Are benign. Almost always occur within 1-2 hours after falling asleep, last anywhere from a few minutes to an hour, and children have no memory of the events.
- Child avoid being comforted
- They may get more upset if you talk to them and try to calm them down
- They are struck halfway between sleep and awake

Sleep terrors – precipitating factors

- Not getting enough sleep
- An irregular sleep schedule
- Fever, illness
- Some medications
- Sleeping with a full bladder
- Sleeping in a different environment
- Sleeping in a noisy environment
- Stress

Sleep terrors- management

- Keep the child safe
- Don’t wake the child
- Guide the child back to bed
- Try not to interfere too much
- Ensure enough sleep
- Maintain a regular sleep schedule
- Don’t discuss sleep terror the next day
- Additional treatment: Refer to sleep management specialist

Sleep requirement by age in 24 hrs.

• Newborns (0-2 months):	11-18 hrs.
• Infants (2-12 months):	9-12 hrs. night (w/ 2-5 hrs. of naps each day)
• Toddlers (1- 3 years):	12 -14 hrs. total (w/ 1 nap of 1.5 – 3 hrs.)
• Preschoolers (3-5 years):	11-13 hrs. (total)
• School-aged (6-12 years):	10-11 hrs.
• Adolescents (13-18 years):	9- 9.5 hrs.

BEARS instrument for screening

Medscape® www.medscape.com

Examples of developmentally appropriate trigger questions	Toddler/Preschool (2-5 years)	School-aged (6-12 years)	Adolescent (13-18 years)
Bedtime problems	Does your child have any problems going to bed and/or falling asleep?	Does your child have any problems at bedtime?	Do you have any problems falling asleep at bedtime? (C)
Excessive daytime sleepiness	Does your child take naps or seem over-tired or sleepy a lot during the day?	Does your child have difficulty waking in the morning, feel sleepy during the day, or take naps?	Do you feel sleepy a lot during the day? in school? while driving? (C)
Awakenings	Does your child wake up a lot at night?	Does your child wake up a lot at night and/or have trouble getting back to sleep? Any sleepwalking or nightmares?	Do you wake up a lot at night and/or have trouble getting back to sleep? (C)
Regularity and duration of sleep	Does your child have a regular bedtime and wake time? What are they?	What time does your child go to bed and get up on school days? Weekends? Do you think this is enough sleep?	What time do you usually go to bed on school nights? Weekends? How much sleep do you usually get? (C)
Snoring	Does your child snore a lot or have difficulty breathing at night?	Does your child have loud or nightly snoring or any breathing difficulties at night?	Does your teenager snore loudly or nightly? (P)

The "BEARS" instrument is divided into 5 major sleep domains, providing a comprehensive screen for the major sleep disorders affecting children in the 2-18 year old age range. Each sleep domain has a set of age-appropriate "trigger questions" for use in the clinical interview.
P=Parent; C=Child.

Source: J Pediatr Health Care @ 2003 Mosby, Inc.

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