Diagnostic Testing for Sleep Disorders

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NOVEMBER 11, 2016
Objectives of Talk

• Describe the most common types of sleep tests
• Explain how and why we test for sleep disorders
• Briefly review the most common sleep disorders that require testing
Diagnostic Tests for Sleep Disorders

- Polysomnography (PSG, Sleep Study)
- Overnight Oximetry
- Actigraphy
- Multiple Sleep Latency Test (MSLT)
- Maintenance of Wakefulness Test (MWT)
## Diagnostic Tests for Sleep Disorders

<table>
<thead>
<tr>
<th>Sleep Test</th>
<th>Quality Measured</th>
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<tbody>
<tr>
<td>Polysomnography</td>
<td>Simultaneous recording of multiple biophysiological signals to study and characterize sleep and sleep disorders.</td>
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<tr>
<td>Overnight oximetry</td>
<td>Monitor oxygen saturation and heart rate in bed overnight.</td>
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<td>Actigraphy</td>
<td>Measure sleep/wake patterns over long periods of time by monitoring body movements.</td>
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<tr>
<td>Multiple Sleep Latency Test</td>
<td>Test ability to fall asleep during the day when permitted and whether REM sleep appears earlier than usual.</td>
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<tr>
<td>Maintenance of Wakefulness Test</td>
<td>Test ability to stay awake with low levels of stimulation without resorting to extraordinary measures.</td>
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Polysomnography

- 4 Levels of Polysomnograms
- Conducted during the patient’s typical sleep time
- Varying levels of complexity
  - # of signals recorded simultaneously
  - Whether attended by a sleep technologist
  - In-laboratory vs. home

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<td>Full PSG, in-lab, attended</td>
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Level I Polysomnography – “Gold Standard”

Evaluate:

- Sleep-related breathing disorders
- Narcolepsy or idiopathic hypersomnia
- Significant parasomnias (atypical, potential to cause injury)
- Nocturnal seizures when clinical evaluation and daytime EEG are inconclusive
- Rarely helpful for insomnia
- Not the first choice for restless legs syndrome
- Treatment: titration of PAP (positive airway pressure) therapy
Level I Polysomnography - Parameters

- Electroencephalogram (EEG)
- Electrooculogram (EOG)
- Chin electromyogram (EMG)
- Leg electromyogram (EMG)
- Airflow signals
- Respiratory effort signals
- Oxygen saturation
- Body position
- Electrocardiogram (ECG)
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Level I Polysomnography

- Apneas
- Hypopneas
- Apnea/hypopnea index (AHI)
- Oxygen saturation nadir
- Positional effects
- Arousals and what due to
- Sleep architecture
- Parasomnias, especially REM sleep behavior disorder
Level I Polysomnography

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Level I Polysomnogram – 30-second view
Level I Polysomnogram – 2-minute view
Level I Polysomnogram – 2-minute view
Level I Polysomnography

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Level I Polysomnography

APNEA/HYPOPNEA INDEX =
average number of apneas and hypopneas per hour of sleep

• Total # of apneas + hypopneas
• Divided by # of hours of sleep
Level I Polysomnography

- Sleep Architecture
Level I Polysomnography

- Hypnogram
Level I Polysomnography – “Gold Standard”
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Overnight Oximetry

- Monitor oxygen saturation with pulse oximetry overnight
- Usually done at home – sometimes also used in inpatient setting
- Not able to tell when patient is awake or asleep
Actigraphy

- Monitoring sleep/wake patterns over long periods of time
- Monitors body movements (think “Fit Bit”)
- Assumes periods of inactivity represent sleep
- Assumes periods of activity represent wakefulness
- Especially helpful when compared to a sleep log
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Multiple Sleep Latency Test

- Evaluate excessive daytime sleepiness
- Measures the physiological tendency to fall asleep in quiet situations
- Evaluate inappropriate early appearance of REM sleep after sleep onset
- Test used to diagnose narcolepsy vs. idiopathic hypersomnolence
Multiple Sleep Latency Test

- Patients are allowed 4 or 5 opportunities to nap across their usual day beginning 1.5-3 hours after awakening.
- During each nap opportunity, they have 20 minutes to “try and fall asleep.”
- If sleep occurs in a given nap opportunity, the patient is allowed to sleep for 15 minutes in order to see if the patient will go into REM sleep within 15 minutes of sleep onset.
- The appearance of REM sleep within 15 minutes of sleep onset is called a sleep-onset REM period (SOREMP).
- Two or more SOREMPs are abnormal except in infants.
- Mean sleep latency is calculated from the 4 or 5 naps.
Multiple Sleep Latency Test

- Normal onset for REM sleep is approximately 90 minutes (range 70 to 110 minutes)
- Normal adults have a mean sleep latency of 10-20 minutes
- An in-lab polysomnogram the night before to verify at least 6 hours of sleep
- Sleep log and actigraphy for 1-2 weeks before the MSLT
- Medications that could affect the results of the test are stopped several days before the MSLT, if possible
- Urine drug screen the morning of the MSLT
Narcolepsy Type 1

- Previously called Narcolepsy with Cataplexy
- Cataplexy AND mean sleep latency of ≤8 minutes AND two or more SOREMPs
Narcolepsy Type 2

• Previously called Narcolepsy without Cataplexy
• Mean sleep latency of ≤8 minutes AND two or more SOREMPs
• Cataplexy is absent
Idiopathic Hypersomnia

- Fewer than two SOREMPs

- The presence of at least one of the following:
  - Mean sleep latency of ≤8 minutes OR
  - Typical sleep time of 12-14 hours per day OR
  - Insufficient sleep syndrome is ruled out OR
  - Hypersomnolence not better explained by another sleep disorder, medical disorder, psychiatric disorder, or drug/medication
Maintenance of Wakefulness Test

- Tests a patient’s ability to stay awake during low levels of stimulation without resorting to extraordinary measures
- Patient sits in a recliner and is instructed to “try to remain awake”
- 4 opportunities to resist falling asleep at 2-hour intervals across the patient’s usual day
- The room should be dimly lit and quiet, with night light in the room
- Patient in street clothes
- Instructions: Please sit still and remain awake for as long as possible. Look directly ahead of you, and do not look directly at the light.
- Patient is not allowed to use extraordinary measures to stay awake such as slapping the face or singing
Maintenance of Wakefulness Test

- Sleep onset is defined as the first epoch of greater than 15 seconds of cumulative sleep in a 30-second epoch
- Trial is ended after 3 consecutive epochs of stage 1 sleep, or one epoch of any other stage of sleep
STOP-BANG Questionnaire

- **Snoring?**
  - Do you **Snore Loudly** (loud enough to be heard through closed doors or your bed-partner elbows you for snoring at night)?

- **Tired?**
  - Do you often feel **Tired, Fatigued, or Sleepy** during the daytime (such as falling asleep during driving or talking to someone)?

- **Observed?**
  - Has anyone **Observed** you **Stop Breathing** or **Choking/Gasping** during your sleep?

- **Pressure?**
  - Do you have or are you being treated for **High Blood Pressure**?
STOP-BANG Questionnaire

- **Body Mass Index more than** 35 kg/m²?
- **Age older than** 50?
- **Neck size large?** (Measured around Adam’s apple)
  - For male, is your shirt collar 17 inches or larger?
  - For female, is your shirt collar 16 inches or larger?
- **Gender = Male?**
STOP-BANG Questionnaire

For general population
OSA - Low Risk: Yes to 0 - 2 questions
OSA - Intermediate Risk: Yes to 3 - 4 questions
OSA - High Risk: Yes to 5 - 8 questions
or Yes to 2 or more of 4 STOP questions + male gender
or Yes to 2 or more of 4 STOP questions + BMI > 35kg/m²
or Yes to 2 or more of 4 STOP questions + neck circumference 17 inches / 43cm in male or 16 inches / 41cm in female

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Chung F et al. Anesthesiology 2008; 108: 812-821,
Chung F et al Br J Anaesth 2012; 108: 768-775,

Toronto Western Hospital, University Health Network
University of Toronto
www.stopbang.ca
THANK YOU

• I would like to thank
  • Dr. Madeleine Grigg-Damberger
  • Dr. Frank Ralls

• For their assistance with the preparation of this presentation