Home Sleep Testing

George Zureikat, MD
DABSM
ABP- Sleep Medicine
September 12th 2015
Financial disclosures

• I make a living as a sleep physician.
Objectives

• Discuss:
  OSA
  Type of sleep studies
  Type of HST
  HST/OCST
  Algorithm of HST
  Indications for HST
  Indications for In-Lab testing.
  Follow up
WHAT IS OSA?

• Episodes of complete or partial collapse of airway are translated to # of apnea and hypopnea events (AHI).
  – Apnea = cessation of airflow > 10 seconds
  – Hypopnea = Decreased airflow > 10 seconds associated with:
    • Arousal
    • SpO2 desaturation.
OSA
OSA
OSA On HST
Severity of OSA in Adults

- Mild OSA: AHI of 5-14/hour
- Moderate: AHI of 16-30/hour
- Severe: AHI > 30/hour
HST AKA

- Out of Center Sleep Testing (OCST)
- Portable Monitoring (PM) by ASSM
- Limited Channel Testing (LCT)
- Proposed- Home Obstructive Sleep Apnea Management (HOSAM)
Prevalence of OSA

2013 prevalence estimates of OSA in USA (AHI ≥ 15)

<table>
<thead>
<tr>
<th></th>
<th>1988-1994</th>
<th>2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>Men</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(30-49 y)</td>
<td>6%</td>
<td>10%</td>
</tr>
<tr>
<td>(50-70 y)</td>
<td>14%</td>
<td>17%</td>
</tr>
<tr>
<td>Women</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(30-49 y)</td>
<td>2%</td>
<td>3%</td>
</tr>
<tr>
<td>(50-70 y)</td>
<td>7%</td>
<td>9%</td>
</tr>
</tbody>
</table>

OSA is highly prevalent!

Explosion of Sleep Studies

Medicare 2009-2011: ~$450M/yr
Growth of Accredited Sleep Centers

Estimated total sleep labs 2013 = 3700
Clinical Guidelines for the Use of Unattended Portable Monitors in the Diagnosis of Obstructive Sleep Apnea in Adult Patients
Portable Monitoring Task Force of the American Academy of Sleep Medicine

- At least: Air flow, Effort, SpO2.
- An experience Tech must apply all the sensors.

- Accredited sleep center.
- Must be able to display all raw data.

- Raw data must be reviewed by board certified sleep physician.
- A follow up visit to review the result is a must.
CMS & OSA

1986
- In-lab
- >10 sec > 30 events > 6 hours

2001
- AHI>15/hr
- AHI 5-15/hr with EDS or others

2008
- Approved HST type II, III, IV

2009
- Approved HST fees
## HST Medicare Volume

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>95800</td>
<td></td>
<td>-</td>
<td>-</td>
<td>3,761</td>
<td>5,532</td>
<td>7,602</td>
</tr>
<tr>
<td>95801</td>
<td></td>
<td>-</td>
<td>-</td>
<td>132</td>
<td>274</td>
<td>179</td>
</tr>
<tr>
<td>95806</td>
<td></td>
<td>7,422</td>
<td>8,205</td>
<td>8,250</td>
<td>11,145</td>
<td>18,267</td>
</tr>
</tbody>
</table>

Why OCST/ HST

• Cost

• Convenient to patients
  - Eliminate first night effects.
  - Patients may need extra care / transportation to the sleep center.
  - Distance from a sleep center.

• Insurance requirement.
Problem

• Limited montage.
  EEG, stages, arousals etc.
• Not all snorers are candidates for the HST.
• Does not diagnose other sleep disorders (PLMS, Narcolepsy, RBD etc).
• False negative (Lack of REM or supine position in suspected patients).
HST Market Share

Market Share

<table>
<thead>
<tr>
<th>Year</th>
<th>Market Share</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011</td>
<td>5</td>
</tr>
<tr>
<td>2012</td>
<td>15</td>
</tr>
<tr>
<td>2013</td>
<td>30</td>
</tr>
<tr>
<td>2014</td>
<td>40</td>
</tr>
<tr>
<td>2015</td>
<td>47.5</td>
</tr>
<tr>
<td>2016</td>
<td>50</td>
</tr>
<tr>
<td>CMS Types of Sleep Testing</td>
<td></td>
</tr>
<tr>
<td>-----------------------------</td>
<td></td>
</tr>
<tr>
<td><strong>Type I</strong></td>
<td></td>
</tr>
<tr>
<td>- Minimum 7.</td>
<td></td>
</tr>
<tr>
<td>- Attended</td>
<td></td>
</tr>
<tr>
<td>- EOEEG</td>
<td></td>
</tr>
<tr>
<td>- EOG</td>
<td></td>
</tr>
<tr>
<td>- Chin EMG</td>
<td></td>
</tr>
<tr>
<td>- Limb EMG</td>
<td></td>
</tr>
<tr>
<td>- ECG</td>
<td></td>
</tr>
<tr>
<td>- Snoring</td>
<td></td>
</tr>
<tr>
<td>- Position</td>
<td></td>
</tr>
<tr>
<td>- Effort</td>
<td></td>
</tr>
<tr>
<td>- Flow</td>
<td></td>
</tr>
<tr>
<td>- SpO2</td>
<td></td>
</tr>
<tr>
<td>- Others: Co2.</td>
<td></td>
</tr>
<tr>
<td>- CPAP</td>
<td></td>
</tr>
<tr>
<td><strong>Type II</strong></td>
<td></td>
</tr>
<tr>
<td>- Minimum 7.</td>
<td></td>
</tr>
<tr>
<td>- Unattended:</td>
<td></td>
</tr>
<tr>
<td>- Same as type I</td>
<td></td>
</tr>
<tr>
<td><strong>Type III</strong></td>
<td></td>
</tr>
<tr>
<td>- Minimum 4:</td>
<td></td>
</tr>
<tr>
<td>- 2 ( effort + airflow )</td>
<td></td>
</tr>
<tr>
<td>- 1 ECG/ HR</td>
<td></td>
</tr>
<tr>
<td>- 1 SpO2</td>
<td></td>
</tr>
<tr>
<td><strong>Type IV</strong></td>
<td></td>
</tr>
<tr>
<td>minimum of 3 channels.</td>
<td></td>
</tr>
<tr>
<td>must allow channels</td>
<td></td>
</tr>
<tr>
<td>that allow direct</td>
<td></td>
</tr>
<tr>
<td>calculation of an AHI or</td>
<td></td>
</tr>
<tr>
<td>RDI as the result of</td>
<td></td>
</tr>
<tr>
<td>measuring airflow or</td>
<td></td>
</tr>
<tr>
<td>effort.</td>
<td></td>
</tr>
<tr>
<td>Type I</td>
<td>Type II</td>
</tr>
<tr>
<td>--------</td>
<td>---------</td>
</tr>
<tr>
<td>95810: PSG, 95805: MSLT 95811: PAP Titration.</td>
<td>HCPCS #G0398</td>
</tr>
<tr>
<td>AASM Type</td>
<td>Description</td>
</tr>
<tr>
<td>-----------</td>
<td>-------------</td>
</tr>
</tbody>
</table>
| Type I | AS CMS: Attended  
95810: PSG,  
95805: MSLT  
95811: PAP  
Titration. |
| Type II | AS CMS Unattended  
CPT: 95807 |
| Type III | Four physiologic variables:  
Effort  
Flow  
EKG  
SpO2  
Some: snoring, position, light |
| Type IV | Two channels:  
Airflow  
SpO2 |

CPT 95806  
HCPCS #G0400
AASM guidelines for Type III

4 physiologic variables are measured including:

- Respiratory movement
- Air flow
- HR or EKG
- SpO2

Others:
- Snoring
- Position
- Light sensor

Code # 95806

Hypopnea = decr airflow + effort + desat of >3%
<table>
<thead>
<tr>
<th>Company</th>
<th>Advanced Brain Monitoring</th>
<th>BRAEBON Medical</th>
<th>Cadwell Laboratories Inc</th>
<th>CleveMed</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Product</strong></td>
<td>X4/Sleep Profiler</td>
<td>MediByte Jr</td>
<td>ApneaTrak with Easy III Software</td>
<td>SleepView</td>
</tr>
<tr>
<td><strong>Cost to Buy</strong></td>
<td>See website for introductory and research pricing</td>
<td>$2,750</td>
<td>$3,900 (standard)/$2,900 (recorder that uses disposable kits)</td>
<td>$2,400</td>
</tr>
<tr>
<td><strong>Cost to Rent</strong></td>
<td>$370/month</td>
<td>Contact seller</td>
<td></td>
<td>$825/quarter (includes web portal and study kits)</td>
</tr>
<tr>
<td><strong>Owner’s Warranty (years)</strong></td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td><strong>Cost of Consumables per Study</strong></td>
<td>Depends on configuration</td>
<td>$7</td>
<td>$7 (standard version)/$20 (full disposable kit version: chest and abdominal belts, snore/airflow sensor, Sat), pulse oximeter probe)</td>
<td>$10 (included in rental)</td>
</tr>
<tr>
<td><strong>Type</strong></td>
<td>N/A</td>
<td>Type III</td>
<td>Type III and IV</td>
<td>Type III</td>
</tr>
<tr>
<td><strong>Channels</strong></td>
<td>8 channels: 3 channels frontal EEG, aux EMG or ECG, pulse rate, snoring (dB), head movement, head position</td>
<td>7 channels: oronasal airflow, snoring (airflow), CPAP flow, CPAP pressure, chest RIP effort, SpO₂, pulse rate, body position</td>
<td>10 channels: airflow (thermal sensor), nasal pressure/mask pressure, chest respiratory effort belt (choice of RIP or PVD), abdomen respiratory effort belt (choice of RIP or PVD), snoring microphone, snoring signal (pressure transducer), oximeter (SpO₂, sensor), pulse rate, body position, event button (marking lights on/off and/or other significant events)</td>
<td>8 channels: respiratory effort belt (RIP), body position, airflow (thermistor), airflow (pressure based), snore (from cannula), heart rate, pulse oximetry, actigraphy (with web portal)</td>
</tr>
<tr>
<td>Product</td>
<td>CleveMed</td>
<td>Compumedics USA Inc</td>
<td>Itamar Medical Inc</td>
<td>Natus Neurology</td>
</tr>
<tr>
<td>--------------------------</td>
<td>----------</td>
<td>---------------------</td>
<td>--------------------</td>
<td>----------------</td>
</tr>
<tr>
<td><strong>SleepScout</strong></td>
<td><img src="Image" alt="Image" /></td>
<td><img src="Image" alt="Image" /></td>
<td><img src="Image" alt="Image" /></td>
<td><img src="Image" alt="Image" /></td>
</tr>
<tr>
<td><strong>Somté</strong></td>
<td><img src="Image" alt="Image" /></td>
<td><img src="Image" alt="Image" /></td>
<td><img src="Image" alt="Image" /></td>
<td><img src="Image" alt="Image" /></td>
</tr>
<tr>
<td><strong>WatchPAT Unified</strong></td>
<td><img src="Image" alt="Image" /></td>
<td><img src="Image" alt="Image" /></td>
<td><img src="Image" alt="Image" /></td>
<td><img src="Image" alt="Image" /></td>
</tr>
<tr>
<td><strong>Embleta MPR PG</strong></td>
<td><img src="Image" alt="Image" /></td>
<td><img src="Image" alt="Image" /></td>
<td><img src="Image" alt="Image" /></td>
<td><img src="Image" alt="Image" /></td>
</tr>
<tr>
<td><strong>Nomad</strong></td>
<td><img src="Image" alt="Image" /></td>
<td><img src="Image" alt="Image" /></td>
<td><img src="Image" alt="Image" /></td>
<td><img src="Image" alt="Image" /></td>
</tr>
<tr>
<td><strong>AccuSom</strong></td>
<td><img src="Image" alt="Image" /></td>
<td><img src="Image" alt="Image" /></td>
<td><img src="Image" alt="Image" /></td>
<td><img src="Image" alt="Image" /></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Price/Price Type</th>
<th>CleveMed</th>
<th>Compumedics USA Inc</th>
<th>Itamar Medical Inc</th>
<th>Natus Neurology</th>
<th>Nihon Kohden America Inc</th>
<th>NovaSom</th>
</tr>
</thead>
<tbody>
<tr>
<td>N/A</td>
<td>$5,990</td>
<td>$3,450</td>
<td>$4,950 (list price)</td>
<td>$3,889</td>
<td>Ask sales representative</td>
<td>N/A</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Quantity</th>
<th>CleveMed</th>
<th>Compumedics USA Inc</th>
<th>Itamar Medical Inc</th>
<th>Natus Neurology</th>
<th>Nihon Kohden America Inc</th>
<th>NovaSom</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1 (extension available)</td>
<td>1</td>
<td>1</td>
<td>N/A</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Additional Cost</th>
<th>CleveMed</th>
<th>Compumedics USA Inc</th>
<th>Itamar Medical Inc</th>
<th>Natus Neurology</th>
<th>Nihon Kohden America Inc</th>
<th>NovaSom</th>
</tr>
</thead>
<tbody>
<tr>
<td>$15</td>
<td>N/A</td>
<td>$4-$6/month</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>&lt;$4</td>
<td>N/A</td>
<td>$40-$50 depending on volume</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>$10</td>
<td>N/A</td>
<td>$10</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>$5</td>
<td>N/A</td>
<td>$5</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Type</th>
<th>CleveMed</th>
<th>Compumedics USA Inc</th>
<th>Itamar Medical Inc</th>
<th>Natus Neurology</th>
<th>Nihon Kohden America Inc</th>
<th>NovaSom</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type III</td>
<td><img src="Image" alt="Image" /></td>
<td><img src="Image" alt="Image" /></td>
<td><img src="Image" alt="Image" /></td>
<td><img src="Image" alt="Image" /></td>
<td><img src="Image" alt="Image" /></td>
<td><img src="Image" alt="Image" /></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Features</th>
<th>CleveMed</th>
<th>Compumedics USA Inc</th>
<th>Itamar Medical Inc</th>
<th>Natus Neurology</th>
<th>Nihon Kohden America Inc</th>
<th>NovaSom</th>
</tr>
</thead>
<tbody>
<tr>
<td>9 channels: thoracic effort, abdominal effort, body position, auxiliary DC (thermistor), airflow (pressure based), snore (derived from airflow), pulse oximetry, ECG, EMG</td>
<td><img src="Image" alt="Image" /></td>
<td><img src="Image" alt="Image" /></td>
<td><img src="Image" alt="Image" /></td>
<td><img src="Image" alt="Image" /></td>
<td><img src="Image" alt="Image" /></td>
<td><img src="Image" alt="Image" /></td>
</tr>
<tr>
<td>Up to 13 channels from 8 inputs: nasal pressure, snorising, CPAP mask pressure, thoracic and abdominal effort, body position, SpO₂, pulse rate, plethysmography waveform, signal quality, limb movement (or optional nasal thermistor), 2xEXG (EEG, EOG, EMG, ECG, or off)</td>
<td><img src="Image" alt="Image" /></td>
<td><img src="Image" alt="Image" /></td>
<td><img src="Image" alt="Image" /></td>
<td><img src="Image" alt="Image" /></td>
<td><img src="Image" alt="Image" /></td>
<td><img src="Image" alt="Image" /></td>
</tr>
<tr>
<td>6 channels: PAT signal, pulse rate, oximetry, snoring (optional), body position (optional)</td>
<td><img src="Image" alt="Image" /></td>
<td><img src="Image" alt="Image" /></td>
<td><img src="Image" alt="Image" /></td>
<td><img src="Image" alt="Image" /></td>
<td><img src="Image" alt="Image" /></td>
<td><img src="Image" alt="Image" /></td>
</tr>
<tr>
<td>Pressure, sound, gravity (X,Y,Z), biopulm ExG, thermistor, thorax RIP, abdominal RIP, DC, nasal flow, mask pressure, snore, sound amplitude, body position, activity, X sum, X flow</td>
<td><img src="Image" alt="Image" /></td>
<td><img src="Image" alt="Image" /></td>
<td><img src="Image" alt="Image" /></td>
<td><img src="Image" alt="Image" /></td>
<td><img src="Image" alt="Image" /></td>
<td><img src="Image" alt="Image" /></td>
</tr>
<tr>
<td>11 channels: thermistor, pressure transducer, snore, body position sensor (internal), SpO₂, plett wave, pulse wave (derived from SpO₂), chest effort, abdominal effort, 2-EMG channels, 1-DC input</td>
<td><img src="Image" alt="Image" /></td>
<td><img src="Image" alt="Image" /></td>
<td><img src="Image" alt="Image" /></td>
<td><img src="Image" alt="Image" /></td>
<td><img src="Image" alt="Image" /></td>
<td><img src="Image" alt="Image" /></td>
</tr>
<tr>
<td>Respiratory effort, pulse oximetry, airflow, heart rate, snoring</td>
<td><img src="Image" alt="Image" /></td>
<td><img src="Image" alt="Image" /></td>
<td><img src="Image" alt="Image" /></td>
<td><img src="Image" alt="Image" /></td>
<td><img src="Image" alt="Image" /></td>
<td><img src="Image" alt="Image" /></td>
</tr>
</tbody>
</table>
# HST (Sleep Review 2015)

<table>
<thead>
<tr>
<th>Company</th>
<th>Nox Medical</th>
<th>Philips Respironics</th>
<th>ResMed</th>
<th>SleepMed</th>
<th>SOMNOmedics Inc America</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Product</strong></td>
<td>NOX-T3</td>
<td>Alice PDx</td>
<td>ApneaLink Air</td>
<td>ARES</td>
<td>SOMNOscreen plus</td>
</tr>
<tr>
<td><strong>Cost to Buy</strong></td>
<td>Contact Nox Medical</td>
<td>Call your Respironics representative</td>
<td>$1,999</td>
<td>$2,995</td>
<td>Depending on channel configuration</td>
</tr>
<tr>
<td><strong>Cost to Rent</strong></td>
<td>Contact seller</td>
<td>$169/month (volume discounts available)</td>
<td>$169/month</td>
<td>$339/unlimited use monthly rental (device, technical edits, and study consumables included)</td>
<td></td>
</tr>
<tr>
<td><strong>Owner's Warranty (years)</strong></td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>Lifetime of rental</td>
<td>2</td>
</tr>
<tr>
<td><strong>Cost of Consumables per Study</strong></td>
<td>Depends on configuration</td>
<td>Call your local Respironics representative</td>
<td>$4</td>
<td>Included in rental</td>
<td>$1.60-$2.10 (depending on channel configuration)</td>
</tr>
<tr>
<td><strong>Type</strong></td>
<td>Type III</td>
<td>Type II, III, IV</td>
<td>Type III</td>
<td>Type III</td>
<td>Types I-IV</td>
</tr>
<tr>
<td><strong>Channels</strong></td>
<td>16+ channels: flow, snoring, 2x effort, R&amp;I sum, R&amp;I flow, SpO₂, pulse, plethysmogram, body position, activity, complete audio, cal audio volume in dB, event, 2x ECG, information from up to 7 auxiliary devices with multiple channels per each one can be recorded via Bluetooth</td>
<td>20 channels: airflow/pressure, snore, thoracic/abdominal respiratory effort, SpO₂, pulse rate, body position/activity/EMS, EEG, event, ECG/EEG, pressure, flow, leak, pulse transit time, heart rate</td>
<td>Respiratory effort, pulse, oxygen saturation, nasal flow, snoring</td>
<td>10 channels: airflow (pressure), SpO₂, heart rate, acoustic snoring (DB &amp; pattern), actigraphy (head position and movement), EEG/EOG/EMG (INREM/REM), respiratory effort (optional), behaviorally estimated sleep/wake, behavioral arousals, &amp; signal quality</td>
<td>1-58 nasovagal flow (thermistor and nasal cannula), snoring, 2x R&amp;I efforts (chest and abdomen), body position, SpO₂, pulse rate pulse waveform, pulse plethysmography, movement, motor activity, ambient light, patient marker, 2x FLM, EEG, EMG, EEG, ECG, AUX for external devices</td>
</tr>
</tbody>
</table>
# HST CPT Codes

<table>
<thead>
<tr>
<th>CPT CODE</th>
<th>CURRENT WORK RVU</th>
<th>CPT DESCRIPTOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>95800</td>
<td>1.05</td>
<td>Sleep study, unattended, simultaneous recording; heart rate, oxygen saturation, respiratory analysis (e.g., by airflow or peripheral arterial tone), and sleep time</td>
</tr>
<tr>
<td>95801</td>
<td>1.00</td>
<td>Sleep study, unattended, simultaneous recording; heart rate, oxygen saturation, respiratory analysis (e.g., by airflow or peripheral arterial tone)</td>
</tr>
<tr>
<td>95806</td>
<td>1.25</td>
<td>Sleep study, unattended, simultaneous recording of, heart rate, oxygen saturation, respiratory airflow, and respiratory effort (e.g., thoracoabdominal movement)</td>
</tr>
</tbody>
</table>

RVU = Relative Value Unit;  CPT = Current Procedure Terminology  
*Source: American Medical Association*
Billing for HST

1- Determine the type of HST device.
2- Apply the CPT and or HCPCS code.
3- Know the HST Coverage Guidelines for Each Health Insurance Payer.
4- Report the Corresponding ICD-9 Diagnosis and soon to be ICD-10 Code(s).
Examples of coding

• 95806
  – HR
  – SpO2
  – Effort
  – Flow

• 95800 or 95801
  – HR
  – SpO2
  – Air flow or peripheral arterial tone
Billing for HST

- Minimum of 6 hours of recording time.
- Use modifier 56 If less hours were recorded.
- Use modifier 26 if you are billing for interpretation only.
- Use modifier TC if the technical portion is billed.
<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>ICD-9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Obstructive Sleep Apnea</td>
<td>327.23</td>
</tr>
<tr>
<td>Sleep related hypoventilation/hypoxia</td>
<td>327.26</td>
</tr>
<tr>
<td>Insomnia with Sleep apnea</td>
<td>780.51</td>
</tr>
<tr>
<td>Hypersomnia with Sleep apnea</td>
<td>780.50</td>
</tr>
<tr>
<td>Unspecified Sleep Apnea</td>
<td>780.57</td>
</tr>
</tbody>
</table>
G Codes

- In 2008, CMS created G-codes (G0398, G0399, and G0400) to describe HSAT services. The G-codes were published prior to the establishment of the CPT codes.
- The G-codes are found in the Healthcare Common Procedure Coding System (HCPCS) Level II codebook and are maintained and valued by CMS.
- G-codes are procedure codes developed by CMS to identify products, supplies, and services not included in the CPT codes for which there is a programmatic operating need to separately identify them on a national level.
- Reimbursement is determined regionally by the specific Local Coverage Determination (LCD).
G Codes

• “G0398: Home sleep study test (HST) with type II portable monitor, unattended; minimum of 7 channels: EEG, EOG, EMG, ECG/heart rate, airflow, respiratory effort and oxygen saturation.

• G0399: Home sleep test (HST) with type III portable monitor, unattended; minimum of 4 channels: 2 respiratory movement/airflow, 1 ECG/heart rate and 1 oxygen saturation.

• G0400: Home sleep test (HST) with type IV portable monitor, unattended; minimum of 3 channels.”
Healthcare & Sleep

- Fewer sleep labs (3700 to < 3000).
- OCST growth (50% market share in 2016).
- More PCP’s will be employed by hospitals.
- Lower reimbursement.
- Slow to no growth.
- Sleep Benefits Managers (AIM).
- Rapidly growing ACO’s:
  - Quality focus: (Patient experience, clinical outcome & cost)
Healthcare Trend & Sleep

• In Lab studies will decline by 1.4 million / year.
• OCST volume grows to 850 k/ year.
• Net revenue is loss.
• Estimate closing of about 1000 sleep labs.
Algorithm for Evaluation of OSA

1. Identify Patient At Risk
   - STOP BANG
   - ESS

2. HST Vs In-lap
   - Indications
   - Insurances

3. Consult with BCSMP
   - AASM requirement
   - PCP comfort
STOPBANG

- Do you SNORE loud?
- Do you feel TIRED, fatigued or Sleepy during the day?
- Has anyone OBSERVED you stop breathing during sleep?
- Do you have high blood PRESSURE?
- BMI > 35 kg/m²
- Age > 50 years?
- NECK > 40 cm or > 16 inches?
- GENDER- Male?

High Risk = or > 3 yes answers.
Low risk < 3 yes answers.
ESS

**Epworth Sleep Scale**

<table>
<thead>
<tr>
<th>What is the probability that you will face a chance of dozing in the following situations:</th>
<th>(Never)</th>
<th>(Slight)</th>
<th>(Moderate)</th>
<th>(High)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sitting and reading</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Watching TV</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Sitting inactive in a public place (for example, at a theatre or in a meeting)</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>As a passenger in a car for an hour without a break</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Lying down to rest in the afternoon when circumstances permit</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Sitting and talking to someone</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Sitting quietly after a lunch without alcohol</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>In a car, while stopped for a few minutes in the traffic</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>

ESS 10 or > define daytime sleepiness
AIM Specialty Health, May 20th 2014
**Indications for HST**

1- Suspected OSA AND NO Contraindication for HST

2- Established OSA – FU HST

To evaluate the need for continued CPAP
- Weight loss
- Efficacy of surgery: AT, UPPP
- Efficacy of oral appliances
1- Suspected OSA:

ANY of the following criteria AND no contraindication for HST:

1- Observed apnea
2- A combination of two of the following:
   a- EDS (ESS > 10), inappropriate daytime napping (Driving, eating, conversation). Or EDS not explained by any other condition.
   b- Habitual snoring or gasping/choking with awakening
   c- Treatment-resistant Hypertension
   d- BMI > 30 kg/m2
   e- Craniofacial anomalies or neuromuscular disease.
3- Meet one of 2a-2e and
   History of stroke (Greater than 30 days previously), Transient Ischemic attack, coronary artery disease, sustained SVT or bradycardia
Established OSA
FU HST

• To evaluate the need for continued CPAP

  Weight loss
  Efficacy of surgery: AT, UPPP
  Efficacy of oral appliances
2- Contraindications to HST

- 18 years or younger.
- Moderate-severe COPD.
- CHF with H/O Ventricular fibrillation or sustained ventricular tachycardia in patient without implanted defibrillator.
- Moderate or severe CHF- NYHA class III or IV.
- Cognitive impairment (inability to follow simple instructions).
Contraindications to HST

- Physical impairment – inability to apply HST.
- Patient has a suspect or established one of the following diagnosis:
  - CSA
  - PLMS
  - Narcolepsy
  - Idiopathic hypersomnia
  - Parasomnia
  - Nocturnal seizures
Contraindications to HST

- Previous technically suboptimal HST (2 night of studies attempted)
- Previous 2 night HST which did not diagnose OSA in clinically suspected OSA.
- Oxygen dependent patient for any reason.
- History of CVA in the last 30 days.
- Chronic opiate narcotic use when discontinuation is not an option.
Contraindications to HST

- BMI > 33 Kg/m2+ HCO3 > 28 mmol/L
- Established a diagnosis of obesity hypoventilation syndrome.
Indications for in LAB (attended)
Sleep studies in Adults (19 or older)

1- Suspect OSA
2- Sleep disorder other than OSA
3- Established sleep disorder: FU
1- Suspect OSA

Meet any of the following Criteria AND has a contraindication for HST

1- Observed apnea

2- A combination of two of the following:
   a- EDS (ESS > 10), inappropriate daytime napping (Driving, eating, conversation. Or EDS not explained by any other condition.
   b- Habitual snoring or gasping/choking with awakening
   c- Treatment-resistant Hypertension
   d- BMI> 30kh/m²
   e- Craniofacial anomalies or neuromuscular disease

3- Meet one of 2a-2e and
History of stroke (Greater than 30 days previously), Transient Ischemic attack, coronary artery disease, sustained SVT or bradycardia
2- Sleep Disorder Other than OSA

- CSA
- Narcolepsy
- Nocturnal seizures
- Parasomnia
- Idiopathic hypersomnia
- PLMS
- Nocturnal desaturation (COPD or certain restrictive thoracic disorders or unexplained Right Heart failure, polycythemia, arrhythmias during sleep or pulmonary hypertension)
3- Established Sleep Disorder (OSA or other) : Follow Up

• Any patient with an established diagnosis if ANY of the Following (1 or 2) AND patient has a contraindication for HST:
  1- Efficacy of surgery (AT, UPPP) or oral appliances.
  2- Significant weight loss (> 10% from the time of previous sleep study).
3- Established Sleep Disorder (OSA or other): Follow Up

• A patient with established OSA or other sleep disorder if ANY of the following applies:
  1- To titrate CPAP/BiPAP in patient who is contraindicated to use APAP (CHF; COPD).
  2- Re-titration in patient who is contraindicated to APAP and a previous split night failed to establish adequate pressure.
  3- Retitrate in patient who is contraindicated to APAP and has recurrence or worsening symptoms during treatment with CPAP/ BiPAP.
Indications for In-Lab sleep testing in 18 years of age or younger

- 1- Suspected sleep disorder
- 2- Established Sleep disorder (Follow up study).
1- Suspected sleep disorder

• An in-lab testing in any patient meet ANY of the following criteria 1-11

  1- Habitual snoring in association with one or more of the following:
    a- Restless or disturbed sleep.
    b- ADD, ADHD with learning or poor school performance
    c- Frequent awakenings
    d- bedwetting
    e- Growth retardation or FTT.
1- Suspected sleep disorder

- 2- EDS or altered mental status not explained by other condition.
- 3- Unexplained polycythemia
- 4- Unexplained Cor pulmonale
- 5- Witness apnea (Greater than two breathes)
- 6- Labored breathing during sleep.
- 7- Hypertrophy of tonsils and adenoids in patient who is at significant surgical risk.
1- Suspected sleep disorder

- 8- Suspected congenital central alveolar hypoventilation syndrome or hypoventilation due to Neuromuscular disease or chest wall abnormalities.
- 9- Clinical evidence of sleep-related breathing disorder in infants with ALTE.
- 10- For the exclusion of OSA in patient who had AT > 8 weeks ago.
- 11- The initial study failed to show OSA (inadequate, equivocal, or non diagnostic with report of sleep disorder breathing).
2- Established Sleep disorder- Follow Up

- In-Lab sleep study for ANY of the following criteria 1-5:
  1. OSA patient with persistent snoring despite treatment with CPAP.
  2. Patient had AT 8 weeks ago for established OSA.
  3. To re-evaluate OSA and the need for continued PAP if significant weight loss (> 10% of body weight).
  4. CPAP/ BiPAP titration
  5. The initial sleep study has led to a diagnosis other than OSA and repeat study is request to assess the efficacy of therapy
INDICATIONS FOR APAP OR CPAP
APAP
Indicated When both are Met

1- Home or in-lab with AHI of 15/hour.
2- AHI 5-15 + (Any)
   EDS,
   Impaired cognition,
   Mood disorder
   Insomnia
   Treatment – resistant hypertension (3 or more meds)
   Ischemic heart disease
   H/O stroke

+ 

Patient has none of the following conditions:

1- Age 18 years or younger
2- CHF
3- COPD
4- CSA
5- N-M disorders
   (Muscular dystrophy, myasthenia gravis)
Ongoing Treatment of CPAP/ BPAP

Use > 4 hours > 70% of the time during a consecutive 30 days within the preceding 90 days.

OR

Clinical evidence submitted by the provider that demonstrate continued clinical benefit from the use of PAP device.
HST Outcomes and Compliance

• Studies published in the American Journal of Clinical Sleep Medicine indicated that HST patients had higher rate of dropout from therapy.

• On the other hand studies performed by the University of Pittsburgh and VA of Pittsburgh found the outcomes and compliance were similar 3 months post study.
The Impacts of HST to Sleep Centers?

• Closure of Sleep labs / reductions of beds.
• Less In-Lab testing.
• More HST.
• PAP Nap testing.
• Develop a model of “Total Sleep Health”.

“Total Sleep Health” Model

- Changed approach to providing more for patients than just a polysomnogram.
- Compliance with treatment.
- Care managed by board certified sleep physician
- Expected increase in “Face-time”
- Follow up testing for patient as needed.
- Care will demand QI measurement.
Summary

• HST is here to stay and is on the rise.
• HST is indicated for patients with suspect OSA and has No contraindication (Mainly suspected CSA).
• Prior authorization is the norm.
• AIM will dictate what test is indicated.
• Sleep Centers need to adjust for the changes.
• Correct billing & documentation.
Question #1

- Home Sleep Testing is indicated for the following condition(s):
  A. Obstructive sleep apnea
  B. Central Sleep Apnea
  C. Sleep apnea in children
  D. All of the above
Question #1

- Home Sleep Testing is indicated for the following condition(s):
  A. **Obstructive sleep apnea**
  B. Central Sleep Apnea
  C. Sleep apnea in children
  D. All of the above
Question #2

• HST measures all of the following parameters Except:
  
  A. Air flow  
  B. Effort  
  C. SpO2  
  D. EEG
Question #2

• HST measures all of the following parameters *Except*:
  A. Air flow
  B. Effort
  C. SpO2
  D. EEG
Question #3

• The following patient is **not** an indication for a HST:
  A. A previously healthy 30 yrs old with snoring a BMI of 33 kg/m2.
  B. A 65 yrs with snoring and daytime sleepiness.
  C. A 55 yrs old with moderate CHF and history of snoring & BMI of 25kg/m2
  D. A 19 yrs old with snoring, daytime sleepiness and large tonsils
Question #3

• The following patient is **not** an indication for a HST:
  A. A previously healthy 30 yrs old with snoring a BMI of 33 kg/m2.
  B. A 65 yrs with snoring and daytime sleepiness.
  C. A 55 yrs old with moderate CHF and history of snoring & BMI of 25kg/m2
  D. A 19 yrs old with snoring, daytime sleepiness and large tonsils
Thank you