Changes in the Evaluation and Treatment of Sleep Apnea

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Sleep Related Breathing Problems

- Obstructive Sleep Apnea
- Central Sleep Apnea
- Complex Sleep Apnea
- Hypoventilation Syndromes
Obstructive Sleep Apnea

• Repetitive collapse of upper airway tissue during sleep:
Why do we care...

Risk factor for:
- Increased mortality
- Cardiac dysrhythmia (atrial fibrillation, asystole, NSVT, ventricular ectopy)
- CAD
- Pulmonary hypertension
- Stroke
- Diabetes mellitus
- Motor vehicle accident

Makes patients miserable:
- Hypersomnolence
- Fatigue
- Cognitive complaints
- Mood complaints
- Insomnia
What determines risk:

• Apnea Hypopnea Index - Number of episodes of reduced airflow per hour of sleep
• Presence and level of hypoxemia
• Amount of sleep disruption
The gold standard
Broad amount and type of sleep information...

- EEG - Direct assessment of sleep quality
- Multiple respiratory channels
- Limb movements
- EKG
- Audio/Video (for parasomnias)
- End tidal or transcutaneous CO2 (hypoventilation)
- .....
...But maybe more than we need if our only concern is obstructive sleep apnea.
Increasing OSA diagnostic tests & their cost

Source: CMS Claims Data (2009); # Diagnostic Tests if 25% of Patients are Medicare
An ideal additional sleep diagnostic tool would be...

• Quick
• Inexpensive
• Accurately make a diagnosis of OSA
• Accurately assess severity of OSA
• Lead to successful treatment of OSA
Home Sleep Testing
Giving up a lot...

- Payer policies and economic realities lead to limited channel testing
- No direct measurement of sleep quality, or sleep vs wake (EEG)
- No CO2
- No limb data
- No body position data
- No video (helpful for parasomnias)
- No EKG
Treatment

• Positive Airway Pressure
• Weight loss
• Mandibular advancement device (mouthpiece)
• Surgery
• Positional therapy
Positive Airway Pressure

Traditionally, pressure adjusted during attended polysomnography: “titration”

More recently, units can adjust pressure automatically based on airflow
Auto setting CPAP

• Does well:
  – Adjusts pressure based on changes in airflow

• Does not do at all or unreliably:
  – Adjust for hypoxemia without major changes in flow
  – Adjust for hypoventilation or hypercapnia
  – Identify or adjust for central events
  – Adjust for poor CPAP tolerance
Bottom line - HST

• Use home tests only in patients with high risk of moderate to severe OSA
• Don’t use if other sleep disorders suspected
• Don’t use if other problems that may confound HST results are present
• If negative, DON’T STOP EVALUATION - proceed to attended polysomnography
Bottom line – auto CPAP

• Don’t use when central sleep apnea is present, or risk of inducing central sleep apnea is high:
  – Heart failure
  – Chronic narcotic use
  – Significant neurologic disease

• Don’t use when known hypoventilation, or risk of hypoventilation:
  – Significant pulmonary disease
  – Hypoxemia not solely from OSA

• If not working, move promptly to attended titration
HOME VERSUS LABORATORY DIAGNOSIS AND TREATMENT OF OSA

A Multisite Randomized Trial of Portable Sleep Studies and Positive Airway Pressure Autotitration Versus Laboratory-Based Polysomnography for the Diagnosis and Treatment of Obstructive Sleep Apnea: The HomePAP Study

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Study Objectives: To test the utility of an integrated clinical pathway for obstructive sleep apnea (OSA) diagnosis and continuous positive airway pressure (CPAP) treatment using portable monitoring devices.

Design: Randomized, open-label, parallel group, unblinded, multicenter clinical trial comparing home-based, unattended portable monitoring for diagnosis and autotitrating CPAP (autoPAP) compared with in-laboratory polysomnography (PSG) and CPAP titration.

Setting: Seven American Academy of Sleep Medicine (AASM) accredited sleep centers.

Participants: Consecutive new referrals, age 18 yr or older with high probability of moderate to severe OSA (apnea-hypopnea index [AHI] ≥ 15) identified by clinical algorithm and Epworth Sleepiness Scale (ESS) score ≥ 12.

Interventions: Home-based level 3 testing followed by 1 wk of autoPAP with a fixed pressure CPAP prescription based on the 90% pressure from autotitration of PAP therapy (autoPAP) device (HOME) compared with attended, in-laboratory studies (LAB).

Measurements: CPAP acceptance, time to treatment, adherence at 1 and 3 mo; changes in ESS, and functional outcomes.

Results: Of 373 participants, approximately one-half in each study arm remained eligible (AHI ≥ 15) to continue in the study. At 3 mo, PAP usage (nightly time at pressure) was 1 hr greater: 4.7 ± 2.1 hr (HOME) compared with 3.7 ± 2.4 hr (LAB). Adherence (percentage of night used ≥ 4 hr) was 12.6% higher: 62.8 ± 29.2% compared with 49.4 ± 36.1% in the HOME versus LAB. Acceptance of PAP therapy, titration pressures, effective titrations, time to treatment, and ESS score change did not differ between arms.

Conclusions: A home-based strategy for diagnosis and treatment compared with in-laboratory PSG was not inferior in terms of acceptance, adherence, time to treatment, and functional improvements.


Keywords: OSA, portable monitoring, diagnosis, randomized clinical trial, autotitration

Citation: Rosen CL; Auckley D; Benca R; Foldvary-Schaefer N; Iber C; Kapur V; Rueschman M; Zee P; Redline S. A multisite randomized trial of portable sleep studies and positive airway pressure autotitration versus laboratory-based polysomnography for the diagnosis and treatment of obstructive sleep apnea: The HomePAP Study. SLEEP 2012;35(6):757-767.
HomePAP – the patients

• Sleepy adult patients with a **high pre-test probability of moderate to severe OSA**
• **Exclusions:**
  – Pulmonary disease
  – Awake hypercapnia/hypoventilation
  – Respiratory, heart, or neuromuscular failure
  – Concerns about unsafe driving
  – Chronic narcotic use
  – >5 drinks / day
  – Suspicion for other sleep disorders – like chronic insomnia, restless legs, narcolepsy
  – Anticipated bariatric surgery
  – Living arrangements incompatible with home testing
HomePAP cont’d

• Large accredited academic sleep centers
• If home test wasn’t clearly positive, patient underwent attended polysomnography
• If clearly positive (since patients with contraindications to auto-setting CPAP were excluded), auto CPAP was tried
• If that failed, in-lab attended CPAP titration
Figure 1—(A) Simplified illustration of the protocol for participants randomized to the lab-based trial arm. (B) Simplified illustration of the protocol for participants randomized to the home-based trial arm. *Decisions for split, repeat, or cross-back studies per protocol for negative or unacceptable studies. AHI, apnea-hypopnea index; PSG, polysomnography; CPAP, continuous positive airway pressure; PAP positive airway pressure; APAP, autotitrating positive airway pressure.
It is very likely that over the next few years home sleep apnea testing will continue to grow ... ...sleep medicine will have evolved into a discipline with more than one test to evaluate its patients, ideally fitting the right test to the right patient in the right setting.
Identifying high risk

- Snoring
- Witnessed sleep apnea, choking or gasping from sleep
- BMI
- Hypertension
- Sleepiness
- Neck circumference (>17 inches)
Identifying high risk
Like always, start with a good history...

- To rule out risk of other sleep disorders that would necessitate attended testing
- To assess for contraindications to home testing
- To assess for contraindications to auto-titrating CPAP
Cases
Case 1 - Success at Home

• 60 year old male
• 10-15 years of snoring with gasping awakenings and witnessed sleep apnea
• Tired and sleepy during the day
• Denies restless legs, parasomnias, symptoms of narcolepsy
• History includes gout and essential hypertension
Success at Home cont’d

• Takes irbesartan and aspirin
• BMI of 31
• 18” collar
• A very crowded mouth (Friedman tongue position 4)
Home test results
Home test results
Home test results

- AHI of 35 on home testing
- Moderate to severe oxygen desaturations
- Auto CPAP 5-20 prescribed
Follow-up 5 days after starting CPAP

• Improved sleep
• Resolution of snoring and sleep apnea per spouse
• Improvement in daytime sleepiness
• Liked, but didn’t love interface, so was refit
• Based on download data, changed to static CPAP of 9
Home testing goes astray

• 47 year old male
• 7 years of mild fatigue and sleepiness during the day
• Home testing two years prior to presentation, very mild OSA, AHI = 6
• Started on auto CPAP
• Download from CPAP shows AHI 8 (higher than without!)
• No impact on symptoms, so doesn’t use consistently
Home testing goes astray

- Uncomfortable urge to move his legs in the evening
- Complicated history that includes UC, PSC, hypogonadism, hypothyroidism
- BMI = 38, 19” neck, crowded mouth
Let’s sort it out..
The results...

- AHI of 35.5 (!)
- Significant hypoxemia
- Lots of limb movements to go along with his RLS
- Instructed to wear CPAP consistently
- Initiated a trial of pramipexole
- Hgb checked with ferritin (for RLS) 19.9
Follow-up

• Improved sleep quality
• Improved RLS symptoms at 0.375 mg of pramipexole
• Improved daytime fatigue and sleepiness
• Hgb down to 18.8
No matter how you get there...

• Whether via traditional PSG and titration, or HST and auto-CPAP, getting patients successfully onto CPAP requires patience and TLC...

• Adherence to CPAP is a major end-point
73 year old female

- Known OSA, many years
- Never did well with CPAP
- Significant co-morbidities, including progressing CAD and htn, and symptoms of fatigue and sleepiness
- Desired re-trial of treatment
Re-titrated – lower pressure effective
And after trying lots of interfaces,
Finally found one she liked,
and now she wears it.

Statistics

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12/12/2012 - 2/3/2013

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<td>Maximum: 31.2</td>
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<td>Central: 1.8</td>
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<td>AHI: 2.5</td>
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<td>Total hours used: 347:01</td>
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<td>Median daily usage: 6.29</td>
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