Goals Session
Putting it all Together

Adherence to therapy
Case presentations
Treatment issues

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Disclosures

• Advisory - Carecore National; Philips; Vapotherm
Goals for this presentation

• Discuss adherence monitoring and technology
• Show examples of OSA cases illustrating common problems and solutions
• Insomnia case
• Plenty of time for your questions
Isn’t it obvious that CPAP adherence data is helpful?

• Many “obvious” things in medicine turn out to be wrong after they are tested
  – Estrogen supplementation in menopause
  – Anti-oxidants supplementation for cancer and heart disease just about everything else

• It is possible that CPAP adherence monitoring is a nice “supplement” to clinical decision making but does not fundamentally change results
Tracking systems

- Data collected
- Data transmitted
- Impact on outcomes
- Conclusions
Evolution of CPAP Adherence Tracking Systems

- Card systems
- Internet telephony
- Newer systems – Bluetooth to cell phone
Data collected

- **Conventional profile**
  - Hours
  - Hours per night
  - Time at Pressure

- **Enhanced profile**
  - Pressure prescription
    - Fixed mode
    - Auto mode
  - Events
    - Apneas
    - Hypopneas
    - Snoring
  - Leak
Example of a basic adherence report, 2005

50 YO female, AHI 12, Epworth 14
## Compliance Summary

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date Range</td>
<td>05/02/2005 - 06/05/2005 (35 days)</td>
</tr>
<tr>
<td>Days with Device Usage</td>
<td>35 days</td>
</tr>
<tr>
<td>Days without Device Usage</td>
<td>0 days</td>
</tr>
<tr>
<td>Percent Days with Device Usage</td>
<td>100.0%</td>
</tr>
<tr>
<td>Cumulative Usage</td>
<td>9 days 12 hrs. 34 mins.</td>
</tr>
<tr>
<td>Maximum Usage (1 Day)</td>
<td>8 hrs. 8 mins.</td>
</tr>
<tr>
<td>Average Usage (All Days)</td>
<td>6 hrs. 31 mins. 49 secs.</td>
</tr>
<tr>
<td>Average Usage (Days Used)</td>
<td>6 hrs. 31 mins. 49 secs.</td>
</tr>
<tr>
<td>Minimum Usage (1 Day)</td>
<td>4 hrs. 39 mins.</td>
</tr>
<tr>
<td>Percent of Days with Usage &gt;= 4 Hours</td>
<td>100.0%</td>
</tr>
<tr>
<td>Percent of Days with Usage &lt; 4 Hours</td>
<td>0.0%</td>
</tr>
<tr>
<td>Total Blower Time</td>
<td>9 days 12 hrs. 34 mins.</td>
</tr>
</tbody>
</table>

Same patient, same report
Adherence report, 2008

35 YO male, AHI 25, Epworth 7
**Same patient, same report**

**Compliance Summary**

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date Range</td>
<td>06/19/2008 - 06/08/2009 (355 days)</td>
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<tr>
<td>Days with Device Usage</td>
<td>15 days</td>
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<td>Days without Device Usage</td>
<td>340 days</td>
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<tr>
<td>Percent Days with Device Usage</td>
<td>4.2%</td>
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<tr>
<td>Cumulative Usage</td>
<td>11 hrs. 18 mins. 26 secs.</td>
</tr>
<tr>
<td>Maximum Usage (1 Day)</td>
<td>2 hrs. 20 mins.</td>
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<tr>
<td>Average Usage (All Days)</td>
<td>1 mins. 54 secs.</td>
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<tr>
<td>Average Usage (Days Used)</td>
<td>45 mins. 13 secs.</td>
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<tr>
<td>Minimum Usage (1 Day)</td>
<td>1 mins. 21 secs.</td>
</tr>
<tr>
<td>Percent of Days with Usage &gt;= 4 Hours</td>
<td>0.0%</td>
</tr>
<tr>
<td>Percent of Days with Usage &lt; 4 Hours</td>
<td>100.0%</td>
</tr>
<tr>
<td>Total Blower Time</td>
<td>1 day 6 hrs. 2 mins. 52 secs.</td>
</tr>
</tbody>
</table>

**Sleep Therapy Statistics**

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Time in Large Leak Per Day</td>
<td>52 secs.</td>
</tr>
<tr>
<td>Average AHI</td>
<td>7.4</td>
</tr>
<tr>
<td>EPAP Pressure</td>
<td>8.0 cmH2O</td>
</tr>
<tr>
<td>IPAP Pressure</td>
<td>12.0 cmH2O</td>
</tr>
</tbody>
</table>
Adherence report, 2012

52 YO male, AHI 32, Epworth 12
Same patient - more detailed report

- Obstructed Airway Apnea Index (OA)
- Hypopnea Index (H)
- Vibratory Snore Index
- Leak (LPM)

Average Obstructed Airway Apnea Index
1.1

Average Hypopnea Index
1.5
Average AHI
2.6

Average Vibratory Snore Index
89.9

Average Max Leak
56.4
Average 90% Leak
40.0
Average Leak
34.3
Average Large Leak
14 secs.
<table>
<thead>
<tr>
<th>Respironics</th>
<th>ResMed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Max leak</td>
<td>Median leak</td>
</tr>
<tr>
<td>Average 90% leak</td>
<td>95% percentile</td>
</tr>
<tr>
<td>Average leak</td>
<td>Maximum leak</td>
</tr>
<tr>
<td>Average large leak</td>
<td>Unintentional leak</td>
</tr>
</tbody>
</table>
Mask leak Confusion

• Data Management software displays *Total Leak* (either l/min or l/sec)

• Total Leak = Intentional Leak plus unintentional leak

• Unintentional leak = Total leak minus Intentional leak

• Intentional Leak can be estimated from the pressure / flow related to a given exhalation valve for fixed CPAP levels
Leak measures on adherence reports

- Obstructed Airway Apnea Index (OA)
- Hypopnea Index (H)
- Vibratory Snore Index
- Leak (LPM)
Event Detection Device vs. PSG

The REMstar Pro detects sleep-disordered breathing events similar to that of manually scored PSG. The use of an event detection machine may help assess therapy effectiveness and determine the need for additional diagnostic testing.
Comparing PSG vs. AED
Berry et al, Sleep, 2012
Comparing PSG vs. AED
Berry et al, Sleep, 2012

Area = 0.86
Adherence to CPAP

What drives adherence
- Symptoms
- OSA severity
- Socioeconomic status?
- Humidification?

What does NOT drive adherence
- Age
- Side-effects
- Wife nagging
- Guilt
- Threats
- Cajoling
- Employment risk
- A lot of other things
More CPAP usage = Better outcomes

% With Normal Values

ESS
FOSQ
MSLT

Develop an adherence monitoring plan

- Formal plan not required today but “informal” strategies are important
- Strongly recommend you begin a process of tracking adherence
- Is very likely to be important in the future
Case 1

- 45 yo male presents with loud snoring, daytime sleepiness, choking/ gasping at night
- BMI 34 Kg/m2
- Epworth scale 12
- History of chronic nasal congestion and deviated septum
Case 1

• Dx sleep study shows
  – 366 min total sleep time
  – 70% stage N2, 10% stage N3, 20% stage REM
  – AHI supine = 25
  – AHI lateral = 12
  – LSAT = 82%; CT 90 = 20%

• What is the next step?
Case 1

• In lab CPAP study
  – 70 min at final pressure of 12cm
  – AHI at final pressure is 6
  – Titrated on nasal mask
  – 10 min REM sleep in supine position at 10cm but not at final pressure

• What do you do next?
Question 1

What pressure setting would you choose?

A. 12cm?
B. 14cm?
C. Change to auto titrating CPAP?
D. Repeat the titration in laboratory?
Answer to Question 1

• Correct answer is A
  – The titration was adequate at 12cm.
  – Lack of REM sleep does not make it inadequate
  – Autocpap may work but you don’t know that for sure and you have an adequate titration at 12
Case 1

1. Need to know acute clinical outcome – did the CPAP titration work for the patient?
   A. Assess by questionnaires, direct questioning
   B. Does he feel better?
   C. Side-effects during the study?

2. Should he be set up on CPAP?
   A. Will he accept it for home use?
   B. 80-90% will say “yes”
Reflection about Case 1

1. What follow-up interval would you recommend?

2. How comfortable are you with making decisions without full data?
Case 2

• 50 yo male with severe OSA
• AHI at diagnosis is 45
• AHI on treatment is 9
• Prescribed CPAP pressure is 10cm
• He uses a full face mask.
• Problem: feels claustrophobic with mask
Case 2

What would you do next?
A. Change mask to nasal mask
B. Desensitization to full face mask
C. Refer to a dentist for an oral appliance
D. Change to autocpap
Case 2

- You change mask to a nasal mask
- Patient likes it better and sleeps better with it for 3 months
- Then develops persistent red marks on the bridge of his nose
- It is unsightly and he is embarrassed by it
Question 2

What is the next best step in his therapy?
A. Silicone pad on bridge of nose to cushion mask
B. Change to nasal pillows
C. Go back to full face mask
D. Loosen straps on the nasal mask and tolerate more leak
Case 2

• Correct answer is B
• Classic indication to change to nasal pillows
• Factors to consider
  – Cost of replacement mask
  – Is the current mask working otherwise
  – Ability to get silicone pads
  – Or ability to use other padding
Claustrophobia

- Psychological feeling of being “closed in”
- Relatively common
- Difficult to address quickly
- Use less encumbering masks – nasal pillows instead of full face
- Desensitization works variably well – few clinical trials
Case 3

- 47 yo female with moderate sleep apnea
- AHI 25
- On CPAP 8cm with nasal mask
- Good CPAP adherence; avg 4.7 hours per night
- She gains 25# over a 6 month period and is now having snoring and feels CPAP not working as well
Question 3

What is the next best step in her therapy?
A. Empirically increase the CPAP by 2-3cm
B. Repeat sleep lab CPAP titration
C. Change to BiPAP with new lab titration
D. Refer for an oral appliance
Case 3

• A, B, and C are all plausible
• I would do A, C, then B.
• Routinely adjust pressures up or down 2-3 cm
• Could use APAP to find the “right” pressure for established patients
• Try to keep people out of the sleep lab for retitrations…
• In my experience, the pressure is often not the problem…something else is
Case 4

- 29 yo graduate student
- School fulltime; works part-time
- Mother recently died suddenly
- Gets in bed at 11pm – takes up to 2 hours to fall asleep
- Out of bed at 7am; feels “run down”
- Otherwise healthy; no medications; no prior history of sleep problems
Case 4

What is the most likely diagnosis?

A. Insomnia related to stress
B. Insomnia related to adjustment disorder
C. Insomnia related to major depression
D. Insomnia related to chronic medical illness
Case 4

• Correct answer is B
• She has an adjustment disorder due to her mother’s death and her natural bereavement
Case 4

• Treatment?
• Short term use of hypnotics is appropriate
  – Zolpidem, Ezopiclone, Temazepam, etc
• Short term Cognitive Behavioral Therapy is appropriate
  – Focus on sleep restriction and stimulus control and dealing with intrusive thoughts
Case 4

• Behavioral therapy for insomnia

• 4 Principles
  1. Don’t go to be until you are sleepy
  2. Don’t stay in bed if you can’t sleep
  3. Get out of bed at the same time every day
  4. Avoid excessive napping
Summary

• Basic CPAP management principles
• Basic case examples
• Frequently more than 1 right answer for CPAP management
Question 4

The value you see in obtaining a CCSH credential in terms of career development or advancement is

A. High
B. Medium
C. Low
Questions and Answers

Please send me your feedback to
atwoodcw@yahoo.com