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AASM Clinical Guidelines for the Manual Titration of Positive Airway Pressure in Patients with Obstructive Sleep Apnea

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Development of PAP Titration Guidelines

- The American Academy of Sleep Medicine developed these guidelines after a survey of 51 accredited sleep disorders centers revealed that PAP titration procedures varied widely among sleep centers and 22% did not have written protocols at all.
Why Develop PAP Titration Guidelines

- Lack of standardized protocols for all sleep centers can result in clinicians and technologists relying on protocols written by industry or other sleep disorders centers which may not be supported by clinical evidence.
Methods for Guidelines Development

- Task Force Developed
- **Objective:** find all studies describing PAP titration protocols published from 1968 through date of searches
- Literature Search Keywords:
  - CPAP Initiation
  - CPAP Titration
  - CPAP Adjustment
  - PAP Titration
  - BiLevel Positive Pressure Titration
  - BiLevel Pressure Titration
  - BiPAP Titration
  - BiPAP Adjustment

*All literature searches computer based using PubMed*
Methods for Guidelines Development

- **Initial Results**
  - 372 Articles and Abstracts
  - 26 Relevant

- **Supplemental Literature Searches (same keywords):**
  - 82 results
  - 7 additional relevant articles
  - 22 additional publications from bibliographies of publications collected

- Industry PAP Titration Protocols reviewed but not used to support guidelines
Formal Consensus Process

- Agreement for or against
- Disagreement
- Indeterminate

Consensus process and evidence grading used to indicate the level of evidence available to support the recommendation
- Positive impact on the practice of sleep medicine
- Improved patient treatment outcomes
- Decreased healthcare costs
- To be used as guidelines--not practice parameters
Goals for PAP Titration

- A standardized protocol with results that reach optimal PAP pressure that can be reproduced.
- Reduction of Respiratory Disturbance Index (RDI)—not reduction of Apnea/Hypopnea Index (AHI).
  - RDI includes apnea, hypopnea and respiratory effort-related arousals (RERAS).
  - AHI (Apnea/hypopnea index) includes only apnea and hypopnea.
# Severity Criteria

<table>
<thead>
<tr>
<th>RDI Severity</th>
<th>Adults</th>
<th>Children (&lt;12)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mild RDI</td>
<td>5 - &lt;15</td>
<td>1 - &lt;5</td>
</tr>
<tr>
<td>Moderate RDI</td>
<td>15 - 30</td>
<td>5 - &lt;10</td>
</tr>
<tr>
<td>Severe RDI</td>
<td>&gt;30</td>
<td>&gt;10</td>
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Optimal Settings for CPAP Titration

- Performed in an accredited sleep disorders center with the CPAP titration protocol carried out by a certified sleep technologist (RPSGT/RST).
Optimal Settings for CPAP Titration

- The CPAP titration procedure should be reviewed by a Board Certified Sleep Specialist using Practice Parameters for Polysomnography and using the AASM Manual for the Scoring of Sleep and Associated Events.
Optimal Settings for CPAP Titration

• The minimum and maximum pressure recommendations in the guidelines depend on the device used, since some PAP machines may not offer the minimum of 4 cmH$_2$O and a maximum of 30 cmH$_2$O.
Sleep technologists and clinicians should combine experience and judgment when using the recommendations to obtain the best possible PAP titration for patients.

Manual PAP titration of CPAP or BPAP was considered to be the “Gold Standard” for selection of optimal positive pressure when the guidelines were written, but Auto PAP is now prescribed much more in the current US market.
Recommendations

First important step is to provide education, hands-on demonstration, careful mask fitting and a period of acclimation for patients.
Goal of CPAP titration is to increase pressure (IPAP and/or EPAP) to eliminate obstructive apnea, hypopnea, REREAS and snoring.

Note that sleep is fragmented with many arousals. Obstructive events are more prominent during supine sleep (blue arrows) or REM sleep (solid red arrows), without capturing supine REM sleep.
**Recommendations**

- **Starting PAP Pressures:**
  - Start titration with a minimum CPAP pressure of \(4 \text{ cmH}_2\text{O}\) in both pediatric and adult populations.
  - During BPAP titration, the recommended minimum starting pressures for IPAP/EPAP are \(8/4 \text{ cmH}_2\text{O}\) in adult and pediatric patients.
Maximum Pressure Recommendations:

- Maximum CPAP pressure: 15 cmH₂O
- Maximum pressure during BPAP pressures:
  - 20 cmH₂O for patients under 12 years of age
  - 30 cmH₂O in patients over 12 years of age
Recommendations

- Recommended to use a minimum pressure differential during BPAP titration is 4 cmH$_2$O and maximum differential of 10 cmH$_2$O.
  - Increase CPAP (IPAP or EPAP) by at least 1 cmH$_2$O.
  - There should not be less 5 minute intervals between CPAP pressure increases.
Increase CPAP Pressures (IPAP or EPAP) in the following situations:

<table>
<thead>
<tr>
<th># of Events</th>
<th>Type of Event</th>
<th>Age</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Obstructive Apnea</td>
<td>&lt;12 years</td>
</tr>
<tr>
<td>2</td>
<td>Obstructive Apneas</td>
<td>&gt;12 years</td>
</tr>
<tr>
<td>1</td>
<td>Hypopnea</td>
<td>&lt;12 years</td>
</tr>
<tr>
<td>3</td>
<td>Hypopneas</td>
<td>&gt;12 years</td>
</tr>
<tr>
<td>3</td>
<td>RERAS</td>
<td>&lt;12 years</td>
</tr>
<tr>
<td>5</td>
<td>RERAS</td>
<td>&gt;12 years</td>
</tr>
<tr>
<td>1 Minute</td>
<td>Loud Snoring</td>
<td>&lt;12 years</td>
</tr>
<tr>
<td>3 Minutes</td>
<td>Loud Snoring</td>
<td>&gt;12 years</td>
</tr>
</tbody>
</table>
Switching to BPAP

- Patient unable to tolerate high CPAP Pressure
- Patient continues to have obstructive events at CPAP of 15 cmH$_2$O or higher

Philips DreamStation BiPAP autoSV Servo-ventilation system
When performing a Split-Night CPAP titration, use the same procedures identified for full-night CPAP titration.

ResMed AirSense™ 10 AutoSet™ for Her
Final pressure should generate an RDI <5/hr with minimum SaO2 above 90%
<table>
<thead>
<tr>
<th><strong>Determining Success</strong></th>
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<tr>
<th><strong>Optimal Titration</strong></th>
<th>RDI $&lt;5/\text{hr.}$ for at least 15 minutes in the supine position and includes REM sleep</th>
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<tr>
<td><strong>Good Titration</strong></td>
<td>RDI $&lt;10/\text{hr.}$ or there is a 50% decrease in RDI if baseline RDI was $&lt;15/\text{hr.}$ and includes supine position and REM sleep</td>
</tr>
<tr>
<td><strong>Adequate Titration</strong></td>
<td>RDI is not reduced to $&lt;10/\text{hr.}$ but is reduced by 75% from the baseline RDI</td>
</tr>
<tr>
<td><strong>Unacceptable Titration</strong></td>
<td>Titration does not meet any of the above criteria. PAP titration should be repeated or if performing split-night titration, the sleep study does not meet the AASM titration criteria of at least 3 hours</td>
</tr>
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Any Questions?