

**OLIVE VIEW-UCLA MEDICAL CENTER
RESPIRATORY CARE SERVICES – SLEEP MEDICINE
POLICY & PROCEDURE**

**NUMBER: 9017
VERSION: 2**

SUBJECT/TITLE: PROTOCOL FOR BI-LEVEL PAP TITRATIONS

POLICY: All individuals who record sleep studies must follow best practices for bi-level titrations in order to attain the ideal pressure setting for their patients. Too low of pressures may cause patients to either be suboptimal treated or to wake up in a panic. Too much pressure may cause the patient to experience bloating or mask leakage. Determining the appropriate pressure setting for each patient will lead to improved adherence and outcome. Bi-level titrations are not an exact science, and it is understood that technologists may need to make minor changes for individual patients. The procedure below is meant as a guideline.

PURPOSE: In order to provide the highest quality care for our patients, our sleep disorders center adheres to the AASM Standards of Accreditation. The accompanying policy and procedure on bi-level titrations follows the spirit of the Clinical Guidelines for the Manual Titration of Positive Airway Pressure in Patients with Obstructive Sleep Apnea. We recognize that the guidelines from this 2008 consensus paper are non-binding, and that there may be some minor deviations found in our policy.

DEPARTMENTS: RESPIRATORY CARE SERVICES

DEFINITIONS: BI-LEVEL PAP-Positive airway pressure where the inspiration pressure is higher than the expiratory pressure for pressure support and to decrease the effort in which the patient has to use to exhale.

A. Indications for Positive Airway Pressure

PAP is indicated for patients who are diagnosed with mild, moderate or severe OSA.

Adult >= 12 years	mild	moderate	severe
AHI	5 to < 15	15 to 30	> 30
Children < 12 years	mild	moderate	severe
AHI	1 to < 5	5 to < 10	> 10

B. Bi-level Positive Airway Pressure (BPAP) Titration

Titration guidelines for when and how to switch to BPAP:

- a. When the patient complains that he/she is uncomfortable or is intolerant of high CPAP pressures. (Document this on the record).
- b. When CPAP level is 15 cm H₂O and respiratory disturbances

SUBJECT/TITLE: **PROTOCOL FOR BI-LEVEL PAP TITRATIONS**

Policy Number: 9017

Page Number: 2

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Begin BPAP at EPAP 4cm H₂O or the CPAP level at which obstructive apnea was eliminated; set IPAP 4 cm H₂O higher.

Patients < 18 years old	Patients > 18 years old
Minimum IPAP =8, EPAP =4 cm H ₂ O	Minimum IPAP = 8, EPAP = 4 cm H ₂ O
Maximum IPAP = 15 cm H ₂ O	Maximum IPAP = 30 cm H ₂ O
Minimum I/E difference = 4 cm H ₂ O	Minimum I/E difference = 4 cm H ₂ O
Maximum I/E difference = 10 cm H ₂ O	Maximum I/E difference = 10 cm H ₂ O

Increase IPAP pressure by a minimum of 1 cm H₂O with an interval of no less than 5 minutes when you see the following:

Patients < 18 years old	Patients > 18 years old
1 hypopnea	3 hypopneas
3 RERAs	5 RERAs
1 min. of loud or unambiguous snoring	3 min. of loud or unambiguous snoring

Increase both IPAP and EPAP pressure by a minimum of 1 cm H₂O with an interval of no less than 5 minutes when you see the following:

Patients < 18 years old	Patients > 18 years old
1 obstructive apnea	2 obstructive apneas

PROCEDURE:

- 1.0 Review the Dr’s order and then the patient’s clinical note for pertinent history.
- 2.0 Review the patient’s previous sleep study or studies to assess the severity of sleep-disordered breathing, the type of respiratory events, and the position & stage at which the events were most severe. This will help to attain a better titration.
 - 2.1 Example: If the patient’s sleep-disordered breathing was worse in the supine position, you would want to make sure the patient stayed in the supine position as much as possible; or, if it was worse during REM sleep, you would want to minimize sleep disruption so that they can achieve and maintain REM sleep.
- 3.0 Application of electrodes, montages, filters, sensitivities, and scoring will be performed according to The AASM Manual for the Scoring of Sleep and Associated Events: Rules, Terminology and Specifications Version 2.0.
- 4.0 If the patient has not previously been on CPAP, begin the patient on a bi-level setting of 8/4 cm of water. If the patient is morbidly obese or unable to fall asleep on the setting of 8/4 cm of water, higher starting pressures may be needed. If the patient has previously been successfully treated on CPAP, place the expiratory pressure at the therapeutic CPAP setting and the inspiratory pressure at 4 cm of water more. The standard differential pressure utilized during bi-level titrations typically

SUBJECT/TITLE: PROTOCOL FOR BI-LEVEL PAP TITRATIONS

Policy Number: 9017

Page Number: 3

ranges from 3 to 5 cm of water, with 4 cm of water being the most common. There is little difference from CPAP at differentials of less than 3 cm of water. Higher differential pressures are uncomfortable to some patients, but may be needed in patients who are morbidly obese or who have neuromuscular diseases.

- 5.0 If apneas or frequent hypopneas are present, inspiratory and expiratory pressure settings should be increased by 2 cm of water. If occasional hypopneas, snoring, or mask flow limitation (see below) are present, inspiratory and expiratory pressure settings should be increased by 1 cm of water and maintained for at least 5 minutes to determine if events improve or resolve. Pressure settings may need to be increased more quickly during REM sleep given the limited amount of REM during sleep and the need to treat events during this stage.
- 6.0 If a mask leak occurs, the tech should first fix the leakage before raising the pressure. Otherwise, the final pressure setting chosen for the patient may be too high. Once the mask leak has been fixed, decrease the pressure to the last setting where mouth breathing and/or mask leakage was not present, and then re-titrate as indicated. Make sure to document directly on the study the steps taken to resolve the leak, and the type of masks used. Pressure settings usually do not need to be set as high with a nasal mask than with a full-face mask.
- 7.0 The recoding technologist should document directly on the study at least every 30 minutes.
- 8.0 If the patient takes a break from wearing the mask, do not decrease the bi-level pressure on attempted return to sleep unless the patient remains awake for 15 minutes, or the patient specifically requests that the pressure be lowered.
- 9.0 Do not raise pressure settings for central apneas. If the patient develops central apneas, pressure setting may need to be lowered. If the patient has central apneas on bi-level, the use of spontaneous timed (ST) mode may be indicated. Make sure to document directly on the study why ST mode is being utilized.
- 10.0 Ensure that supine sleep has been seen on the chosen setting. Increasing the inspiratory and expiratory pressures by 1 or 2 cm of water to show range may be helpful to ensure that the correct bi-level pressure has been established.

Level of titration achieved

You have achieved an **optimal** titration when you see the following:

- a. The Respiratory Disturbance Index (RDI) is <5 per hour for a period of at least 15 minutes at the selected pressure and within the manufacturer's acceptable leak limit.
- b. The SpO₂ is above 90% at the selected pressure.
- c. Supine REM sleep at the selected pressure is not continually interrupted by spontaneous arousals or awakenings.

You have achieved **good** titration when you see the following:

- a. The Respiratory Disturbance Index (RDI) is <10 per hour (or is reduced by 50% if the baseline RDI was <15) for a period of at least 15 minutes at the selected pressure and within the manufacturer's acceptable limit.
- b. The SpO₂ is above 90% at the selected pressure.
- c. Supine REM sleep at the selected pressure is not continually interrupted by spontaneous arousals or awakenings.

SUBJECT/TITLE: **PROTOCOL FOR BI-LEVEL PAP TITRATIONS**

Policy Number: **9017**

Page Number: **4**

You have achieved an **adequate** titration when you see the following:

- a. The Respiratory Disturbance Index (RDI) is NOT <10 per hour but the RDI is reduced by 75% from baseline.
- b. Criteria for optimal or good titration is met but you did NOT get a sample of supine REM at the selected pressure.

An unacceptable titration does not meet any of the above grades.
Repeat titration should be considered.

References:	
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SUBJECT/TITLE: **PROTOCOL FOR BI-LEVEL PAP TITRATIONS**
Policy Number: **9017**
Page Number: **5**