Name of Policy: **Clinical guidelines for manual titration of positive airway pressure using bi-level volume assured pressure support** **Policy Number**: 3364-171-07-02 **Approving Officer**: Chief Executive Officer Chief Operating Officer Medical Director **Responsible Agent**: Director, Respiratory Care **Scope**: The University of Toledo Medical Center Pulmonary Services Department	 **Effective date:** **Original effective date**: March 17, 2023

Key words: Bi-level, Volume-assured, Hypoventilation, Ventilation, Noninvasive

	New policy proposal	X	Minor/technical revision of existing policy
	Major revision of existing policy		Reaffirmation of existing policy

(A) Policy statement

All qualified and trained polysomnographic technologists will be able to set-up and titrate patients using Volume-Assured Pressure Support (VAPS).

(B) Purpose of policy

To effectively treat sleep-related Hypoventilation/Hypoxemia, Obesity Hypoventilation Syndrome, stable chronic alveolar hypoventilation syndromes, Hypercapnic Central Sleep Apnea, COPD/OSA Overlap Syndrome, neuromuscular disease, thoracic restrictive disease, or chronic respiratory failure.

(C) Overview

Also known as volume-targeted bilevel positive airway pressure (VT-BPAP), Volume-Assured Pressure Support is an advanced noninvasive positive pressure ventilation. Specifically, it is a pressure-volume hybrid mode of pressure-support, volume-controlled ventilation which delivers a more consistent tidal volume with the comfort of pressure support ventilation. The pressure support or assistance delivered during the inspiratory phase aims to ensure a certain tidal volume

that is calculated as a function of predicted body weight. The device assesses the preset tidal volume or minute ventilation during a variable time window of 1-5 minutes.

"Average" Volume-Assured Pressure Support (AVAPS) by Philips Respironics targets average exhaled tidal volume. The operating IPAP is allowed to fluctuate between a minimum and maximum pressure support level to ensure the target tidal volume. If a patient's tidal volume decreases below a certain threshold, the device responds by increasing the IPAP and restores the tidal volume to approximately the preselected target volume.

"Intelligent" Volume-Assured Pressure Support (iVAPS) by ResMed targets alveolar ventilation and augments pressure support to achieve and maintain targeted alveolar ventilation, accounting for anatomical dead space. During periods of low respiratory rate, the "intelligent" backup rate is triggered with patient-device synchrony if the patient falls two-thirds below the set respiratory rate.

Because the AVAPS and iVAPS devices adjust pressure support based on the patient's respiratory cycle breath by breath, they adapt to changes in severity of disease and are therefore ideal for sleep hypoventilation or respiratory insufficiency.

(D) Procedure

(1) Upon receipt of an order for VAPS with a qualifying diagnosis, the Sleep Lab will call and schedule the patient for an in-lab titration.

(2) Training – Whenever possible, patient education and training shall be performed in the same manner as specified by the CPAP Titration Procedure. If the patient has not previously been on Volume-Assured Pressure Support, training shall be conducted on a bilevel setting on 9/5 cm H_2O.

(a) Set-up and inspect the unit for the minimalization of leaks.

(b) Add heated humidification using sterile water.

(c) Select VAPS mode.

(d) Fit interface to patient comfort.

(e) Allow the patient to feel the pressure through the interface, check for leaks and patient tolerance.

(f) Initial settings per the initial order, or VAPS protocol-see attached.
(i) Set patient height (set using inches).

(ii) Set target patient rate equivalent to patient's spontaneous respiratory rate (recommended no less than 15 bpm).
(iii) Set target alveolar ventilation (Va) such that tidal volume (Vt) is equal to 6ml/kg ideal body weight (IBW).
(iv) End Positive Airway Pressure (EPAP) = 5 centimeters of water (cm H2O).
(v) Minimum Pressure Support (min PS) = 4 cm H2O.
(vi) Maximum Pressure Support (max PS) = 20 cm H2O.

(g) Follow VAPS flowchart
(i) EPAP – Increase. $\underline{\geq}$ 1 cm H2O every $\underline{\geq}$ 5 minutes to eliminate obstructive apnea, hypopneas, snoring, and flow limitations.
(ii) Target Va - Increase by 0.3 every ≥ 5 min until desaturations are resolved.
(iii) Target patient rate - If central events persist, increase by 1–2 BPM every 20 min as needed.
(iv) Chart all settings and patient tolerance.

(3) Components.

(a) Patient education.

(b) Patient hook-up.
(i) International 10-20 hook-up.
(ii) Chin Electromyograph (EMG).
(iii) Eye Electrooculogram (EOG).
(iv) Anterior Tibialis leads right and left.
(v) Chest Respiratory Inductance Plethysmography (RIP) belts.
(vi) Abdomen RIP belt.
(vii) Oximeter.
(viii) Snore microphone.

(c) Patient to bed.

(d) Lights out.

(e) Impedance check.

(f) Machine calibration.

(g) Patient calibration.

(h) Machine calibration.

(i) Lights on.

(j) Disassemble PAP device, remove all electrodes, and process each for disinfection or disposal per policy.

(E) Reference:

See Procedure Volume-Assured Pressure Support (VAPS) Titration Procedure

Approved by:	**Policies Superseded by this Policy:**
	• *None*
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