


# AVAPS Made Easy

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## Non-Disclosure

- ▶ This presentation is not endorsed by any outside companies.
- ▶ I am not a paid speaker for the manufacturer/ developer of the devices containing AVAPS and will in no way benefit from presenting this topic.
- ▶ I am currently managing 80+ patients on AVAPS. We have developed a home management program that has seen great success in reducing hospital readmissions due to pulmonary exacerbations. My presentation is brought to you from the knowledge I have obtained through the course of my work with these devices and the great experience I have obtained.




## OBJECTIVES

- ▶ Explain How AVAPS Works
- ▶ Describe Which Patients Are Most Likely To Benefit From AVAPS
- ▶ Explain AVAPS To Patients AND Practitioners




## AVAPS “What’s AVAPS stand for again?”

- ▶ **A-** Average
- ▶ **V-** Volume
- ▶ **A-** Assured
- ▶ **P-** Pressure
- ▶ **S-** Support




## Not Just Another Mode of Ventilation!!!

- ▶ Pressure Support Ventilation
- ▶ Targets Consistent Tidal Volume
- ▶ Sixty Second Intervals
- ▶ \*\*Similar to PRVC.....



## What Makes Up AVAPS

- ▶ EPAP- Expiratory Positive Airway Pressure
- ▶ IPAP min- Inspiratory Positive Airway Pressure Range Minimum
- ▶ IPAP max – Inspiratory Positive Airway Pressure Range Maximum (Pressure Limit)
- ▶ Volume Target ( target tidal volume set for 8-10 cc/kg IBW, less in severe fibrotic lung disease)
- ▶ Respiratory Rate, I-Time



### How Does AVAPS Work?

**\*\*Simplified Algorithm\*\***

1cmH2O=60mL of VT

**Initial IPAP**

- $IPAP_{start} = V_{i\ target} / 60 + EPAP$

**Average Tidal Volume is Measured**

- $V_{i\ avg} = \sum(V_{i1} to V_{in}) / Breaths$

First minute of patient use

After Each Breath

**Incremental IPAP**

- Calculated IPAP change
- $IPAP_{inc} = (V_{i\ target} - V_{i\ avg}) * PS / V_{i\ avg}$

**Rate of Change**

- $IPAP_{per\ breath} = IPAP_{inc} / Breath$
- Max IPAP Change is 1cmH2O/60 seconds

60 Second Pressure Changes

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### AVAPS ALGORITHM UPDATE

• **IPAP MIN** → **RANGE MIDPOINT** → **IPAP MAX**

New Algorithm Starts midway between Min and Max

After 40 Breaths

**Incremental IPAP**

- Calculated IPAP change
- $IPAP_{inc} = (V_{i\ target} - V_{i\ avg}) * PS / V_{i\ avg}$

60 Second Pressure Changes

**Rate of Change**

- $IPAP_{per\ breath} = IPAP_{inc} / Breath$
- Max IPAP Change is 1-5cmH2O/60 seconds

**New 13.0 Software Upgrade**

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### Featuring AVAPS

▶ **What It Does:**

- Automatically adapts pressure support to maintain a targeted tidal volume

▶ **Why It Matters:**

- Automatically adapts to disease progression and changing patient needs
- Improves ventilation efficacy
- Simplifies the titration process

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### Why Not Use A Standard BiPAP?

- ▶ BiPAP substantially improves Oxygenation and sleep quality in patients with hypoventilation
- ▶ The addition of AVAPS substantially reduces CO2 above the reduction achieved via BiPAP alone.

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### Which Patients Benefit Most From AVAPS?

- ▶ Patients prone to **HYPOVENTILATION!**
  - *This occurs when there is a reduction in the amount of air that enters the lungs. These patients experience decreased levels of oxygen and increased carbon dioxide in the blood.*

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### Who Experiences HYPOVENTILATION

- ▶ Patients who experience any of the following:
  - Obstructive Lung Disease
    - COPD
    - Cystic Fibrosis
  - Restrictive Disorders
    - Obesity Hypoventilation
    - Pulmonary Fibrosis
    - Scoliosis / Kyphoscoliosis
  - Respiratory Muscle Weakness (neuromuscular diseases)
    - ALS
    - Muscular Dystrophy
    - Paralysis
    - Spinal Cord Trauma

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### How Can AVAPS Be Used?

- ▶ Non-Invasive Interfaces
  - Full Face Mask
  - Nasal Mask
  - Total Face Mask
- ▶ Invasive Interfaces
  - Tracheostomy
  - Endotracheally



### Remember this!

- ▶ AVAPS works to target consistent tidal volumes throughout use
- ▶ Provides for enhanced patient comfort (pressure support ventilation)
- ▶ Reduction in muscle load
- ▶ Improved patient use - compliance
- ▶ MORE EFFECTIVE MANAGEMENT OF CO<sub>2</sub>
  - Reduced hospital days
  - Reduced pulmonary infections
  - Improved quality of life



### Patient Case 1 Hypercapneic Respiratory Failure

- ▶ 62 y/o female- Severe ES COPD, Chronic Hypercapneic Respiratory Failure, Hospice four months leading up to encounter
- ▶ Husband wanted full resuscitation
- ▶ Initial CO<sub>2</sub> >120mmtorr
- ▶ ABG shortly after BIPAP initiation
  - pH 7.36, PCO<sub>2</sub> >115, PO<sub>2</sub> 82, HCO<sub>3</sub> >60 BE 40, Saturation 96% on 55% fio<sub>2</sub> via BIPAP.
- ▶ AVAPS Initiated in ICU
- ▶ Discharged 5 days later on AVAPS-type device
- ▶ 24 months later – no hospitalizations, unplanned doctors office visits or ER visits, no exacerbations or pulmonary infections!!!
- ▶ Compliance >100%



### Patient Case 2 Restrictive Thoracic/Hypercapneic Respiratory Failure

- ▶ 55 y/o Female- morbid obesity, hypoventilation syndrome, COPD.
- ▶ Multiple hospitalizations in 12 mo period prior to initial encounter
- ▶ Respiratory failure >trached>weaned>decannulated >recurrent pneumonias> home cpap (failed)
- ▶ Presence of chronic hypercapnea
- ▶ AVAPS-Device initiated in patients home
- ▶ 24 months post initiation still no exacerbations, unplanned hospitalizations or ER/Doctors office visits.
- ▶ Compliance > 100%



### Patient Case 3 Progressing ALS

- ▶ 58 y/o Male-ALS, remote history of COPD
- ▶ At time of encounter > using bipap 24/7 at 23/16!
- ▶ Physician recommended Trach > patient refused
- ▶ FVC 27% of predicted
- ▶ AVAPS –device initiated (patient tolerance and perceived level of dyspnea improved remarkably)
- ▶ 30 day post initiation FVC improved to 38%
- ▶ 22 months post initiation no significant exacerbations, unplanned ER/Hospitalizations due to pulmonary infections/exacerbations.
- ▶ Electively Withdrew from Life Support this past January ☺



### This is The Reason I Am Here!



*In Remembrance Nov 16, 1955 -  
January 27, 2013 {~ALS~}*

**Thank You!**

► **Questions?**

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