Providence HEALTH CARE	Department: **Respiratory Services**	Date Originated: October 2012 Date Reviewed/Revised:
Clinical Guideline	Topic: Critical Care – Pressure Regulated Volume Control (PVRC) (Respiratory Therapy) Number: B-00-12-12077	Related Links:

APPLICABLE SITES:

☒ St. Paul's Hospital
☒ Mount Saint Joseph Hospital

EQUIPMENT:

- Servo I ventilator (PRVC)
- PB 840 ventilator (VC+)
- AVEA ventilator (PRVC)
- Hamilton T1 Transport Ventilator (CMV+ or APVcmv)

GENERAL INFORMATION:

Pressure Regulated Volume Control (PRVC, VC+), is an assist control mode combining pressure control with a set tidal volume target. This *dual control* mode allows the target tidal volume to be delivered at the lowest possible airway pressures.

The ventilator accomplishes this by monitoring the delivered tidal volume and then adjusting the pressure control level and inspiratory flow rates to maintain the set tidal volume. This occurs on a breath to breath basis as the ventilator adjusts the pressure control level in response to changes in lung characteristics.

PRVC MAY NOT BE APPROPRIATE WITH PATIENTS EXHIBITING:

- Variable effort
- High inspiratory flow demands (i.e. air hunger)
- Asthma
- COPD Exacerbation
- Asynchrony/agitation
- Excessive leak

INITIAL PARAMETERS:

- Tidal Volume – set to appropriate level of 6-8 mL/Kg of IBW
- RR – set as usual to maintain pH within goal range
- Ti – set as usual
- FiO_2 – to keep SpO_2 in goal range
- PEEP – as per usual
- Trigger Sensitivity
- Rise Time

SPECIAL CONSIDERATIONS:

Particular emphasis must be placed on the setting of the **high pressure limit**.

For example, if patient lung characteristics *worsen* with a resultant decrease in tidal volume (i.e. a decrease in compliance or an increase in resistance), the pressure control level will continue to rise on a breath by breath basis until it reaches a pre-determined high pressure limit, at which point it becomes *regulated*. The limit is influenced by the *clinician-set* high pressure limit, and varies slightly based on the type of ventilator as per the listing below.

VENTILATOR-SPECIFIC DETERMINATION OF *REGULATED* PRESSURE LIMIT:

PB840 Ventilator:

- Pressure is regulated **3 cmH_2O BELOW the clinician-set high pressure limit**
- Maximum pressure change between each breath is 3 cmH_2O **EXCEPT** during the *first 5 breaths following start up*, where pressure may vary by up to 10 cmH_2O

Hamilton T1 Transport Ventilator:

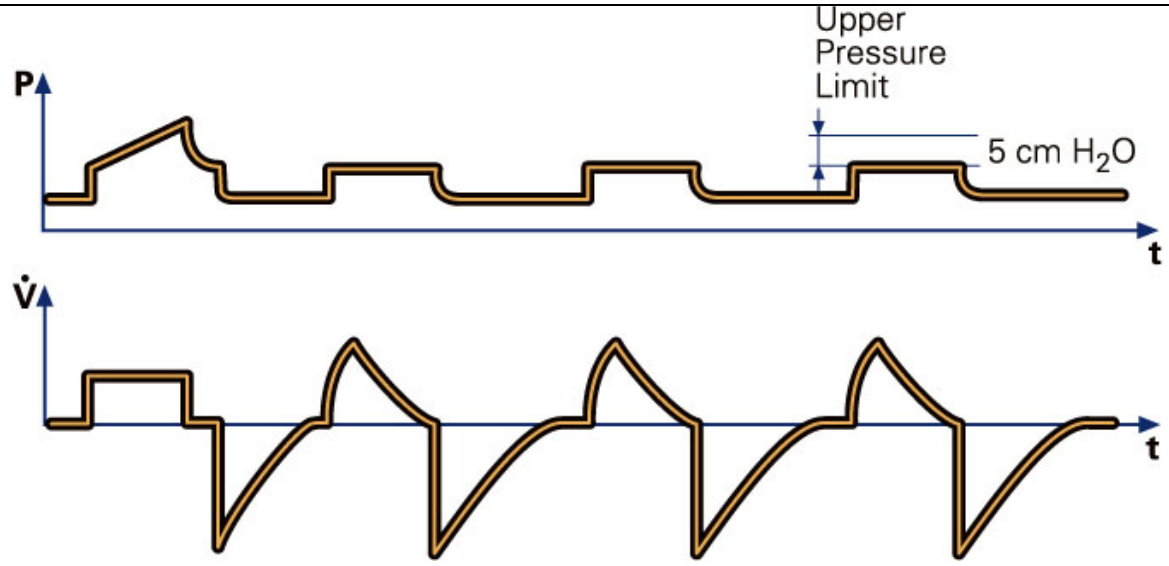
- Pressure is regulated **10 cmH_2O BELOW the clinician-set high pressure limit** to a maximum of 60 cmH_2O
- Maximum pressure change between each breath is 2 cmH_2O

AVEA Ventilator:

- Pressure is limited ***AT* the clinician-set high pressure alarm limit**
- Maximum pressure change between each breath is 3 cmH_2O

Servo-I Ventilator:

- Pressure is regulated **5 cmH_2O BELOW the clinician-set high pressure alarm limit**
- After a further 2-3 consecutive regulated breaths occur, the ventilator will produce an audio/visual alarm indicating "***Regulated Pressure Limit***"; should this occur the target tidal volume will not be achieved and an intervention will be necessary
- Maximum pressure change between each breath is 3 cmH_2O



WAVEFORMS DEPICT SERVO-I VENTILATOR

Upon initiation of PRVC mode, the ventilator will deliver a volume control test breath using the set (target) tidal volume and a short inspiratory pause. The ventilator then calculates a plateau pressure and uses this value as the initial pressure control level.

CAUTIONS:

PRVC may be problematic in patients who are experiencing ventilator dysynchrony or have an irregular ventilatory pattern with varying inspiratory flow demands (i.e. air hungry). Since the pressure control level is determined based on measurements from the previous breath, changes in patient effort can in theory lead to hypoventilation. For example, if a patient makes several large inspiratory efforts consecutively, the algorithm may decrease the pressure control level continuously over the next several breaths, which may then result in a pressure control level which is significantly lower than desired. Should the patient then become apneic the ventilator would deliver a tidal volume much lower than set; it may take several additional breaths for the target tidal volume to be achieved based on the maximum breath to breath variation of 3 cmH_2O.

DOCUMENTATION & ROUNDS REPORTING:

Terminology for this mode varies with the ventilator model. For consistency, the term *Pressure Regulated Volume Control (PRVC)* is to be used with all documentation, when on rounds and when reporting ventilator parameters.