

SICU Ventilator Protocol and Spontaneous Breathing Trials

Purpose:

To establish and describe the ventilator protocol to be used on mechanically ventilated patients in the SICU. To establish and describe the policy for spontaneous breathing trials (SBT).

Description:

This protocol is designed to allow for the management and/or weaning of the patient receiving mechanical ventilation in SICU. This protocol may not meet the needs of all patients. Those with more involved pulmonary compromise may require alternative strategies.

PROTOCOL

Patient Criteria:

This protocol is to be used on patients in the SICU when a physician order for "SICU ventilator protocol" is written.

Exclusion Criteria:

- 1) Patients currently requiring Inverse Ratio Ventilation (in any mode)
- 2) Patients currently on >10 cmH₂O of PEEP
- 3) Closed Head Injury patients (unless cleared by Neuro with MD order)

Equipment:

All patients on the SICU ventilator protocol will require continuous pulse oximetry to provide SpO₂ data.

Initial Ventilator Settings:

If the protocol is requested at initiation of mechanical ventilation, the physician will order specific settings or the Respiratory Care Practitioner will place the patient on settings based on the following:

- FiO₂ 100%; wean promptly as tolerated to 40% per Protocol/Weaning Criteria
- SIMV mode with RR of 12-14
- Vt 8cc/Kg ideal body weight (IBW) – refer to calculation
 - May decrease to 6cc/Kg IBW if P_{plat} >30 cmH₂O
 - May utilize PC modes to maintain P_{plat} ≤ 30 cmH₂O and Vt 6-8cc/Kg IBW
- Pressure Support at 12 cmH₂O (adjust to maintain spontaneous Vt ≥ 5 cc/Kg IBW)
- I:E ratio $\leq 1:1$
- PEEP @ 5 cmH₂O

Obtain an ABG 30 minutes after initiation of ventilation **and PRN** for acute changes in patient's respiratory status.

If mechanical ventilation is already in progress at the time the protocol is requested, the protocol will be entered at the point corresponding to the current settings.

Protocol / Weaning Criteria:

The patient should maintain the following criteria prior to and during the protocol. If at any time during the protocol the patient “fails” to maintain these parameters, return to the previous settings. The protocol/weaning may resume after these parameters are achieved.

- HR < 140
- Total RR < 35
- Systolic BP < 180 and > 90mmHg
- SpO2 >=88%
- PaO2 55-80 torr
- P_{plat} ≤30 cmH₂O
- Arterial pH 7.3 – 7.45
- **RSBI ≤80; COPD ≤ 105**

Oxygenation Criteria: PaO2 55-80 torr or SpO2 ≥ 88%

Wean FiO2 to 40% as tolerated by SpO2 ≥ 88%. Titrate FiO2 and PEEP using the following incremental FiO2/PEEP combinations to maintain arterial oxygenation within the parameters:

FiO2	0.3	0.4	0.4	0.5	0.5
PEEP	5	5	8	8	10

If FiO2 ≥ .5 and PEEP > 10cmH2O is required to maintain oxygenation criteria, contact physician to consider other modes/strategies to optimize mean airway pressure (i.e. BiLevel / BiVent / Airway Pressure Release Ventilation / HFOV). This will remove patient from the SICU protocol until patient is able to maintain criteria with PEEP ≤ 10cmH2O. A physician order is required to resume protocol.

Plateau Pressure (P_{plat}) Criteria: P_{Plat} ≤ 30cmH2O

Assess inspiratory plateau pressure with an inspiratory pause/hold (if applicable). Maintain P_{plat} < 30cmH2O by titrating tidal volume range of 6-8cc/Kg IBW. If unable to maintain P_{plat} ≤ 30, notify physician to consider pressure modes available. PRVC and PC modes can be utilized with this protocol in order to achieve Protocol Criteria.

Titration Rate: achieve pH goal of 7.3-7.45

Titrate rate (increase or decrease) as tolerated to maintain protocol criteria. Physician must be notified if ventilator rate of >25/minute required to maintain criteria (consider NaHCO3).

Titration Pressure Support: (if available with current mode)

Titrate pressure support by 2 cmH2O as tolerated by the protocol criteria, maintaining spontaneous Vt ≅ 5cc/Kg IBW. If PS level >15cmH2O is required to maintain adequate Vt, consider increasing ventilator rate (when applicable) to maintain protocol criteria and/or notify physician.

WEANING PARAMETERS:

- Weaning Parameters are obtained @ 0600 if patient is on FiO2 ≤ 0.4 and PEEP ≤ 5cmH2O
- Obtain NIF. Patient must exceed -20cmH2O.
- Obtain RR, minute volume and Vt for one minute (may use ventilator on PS and PEEP of 0 cmH2O)
- RR < 35; Vt ≥ 5cc/Kg IBW; VC ≥ 12cc/Kg IBW (if obtained); SpO2 ≥ 88%

If patient’s weaning parameters are unacceptable, do not perform Spontaneous Breathing Trial.

Spontaneous Breathing Trials: (SBTs)

SBTs will be performed daily for patients on the SICU Ventilator Protocol from 0700 – 0900 once the following criteria are met.

- Weaning Parameters already obtained @ 0600 (Patient on $FiO_2 \leq 0.4$ and $PEEP \leq 5 \text{cmH}_2\text{O}$) and are acceptable (See 'Weaning Parameters' section above)

If the above criteria are met, place patient on CPAP 0/ PS 0 for 30 minutes.

- Calculate $RSBI = RR / V_t$ (in liters) – **last minute of trial**
- Physician will be notified after the 30 minute SBT with weaning parameters and RSBI and a decision for extubation or trach collar will be discussed.

An order for a Spontaneous Breathing Trial can be written for any patient.

Failure Criteria for SBT:

Spontaneous breathing trial will be aborted and patient will be placed on previous ventilator settings if any of the following exist:

- $RR > 35$
- Intolerable dyspnea, diaphoresis, excessive use of accessory muscles, or paradoxical respiratory pattern
- Heart rate > 135 beats per minute or change in HR > 20 not attributed to another cause
- Systolic BP $> 180 \text{mmHg}$ or $< 90 \text{mmHg}$
- Onset of cardiac arrhythmias, deterioration of mental status (if applicable)
- $SpO_2 < 88\%$

If patient fails SBT, place patient on previous ventilator settings. Patient will be reassessed for Spontaneous Breathing Trial the next morning.

Extubation Assessment:

- Hemodynamically stable
- Patient able to protect airway and control secretions (coughs, lifts head-if applicable)
- $NIF > 20 \text{cmH}_2\text{O}$, $VC > 12 \text{cc/Kg IBW}$ (if possible)
- Weaning/Protocol Criteria maintained during SBT
- Leak present when ETT cuff deflated

If the patient is assessed and physician agrees to extubate, an order must be written/obtained for extubation.

Patient will be extubated to 40% aerosol mask (**physician to be present in ICU during extubation**). Patient can be weaned to nasal cannula and subsequently room air with $SpO_2 \geq 90\%$.

Ideal Body Weight Calculation

Men = 48Kg for 5 feet + 2.7Kg for each additional inch in height
Women = 45Kg for 5 feet + 2.3Kg for each additional inch in height

Morbid Obese (> 100 lbs of IBW) calculation

$$IBW + \left(\frac{\text{Actual weight(kg)} - IBW}{4} \right)$$

Predicted minute volume (VE) equation:

$$\text{Actual CO}_2 \times \text{Current VE} = \text{Desired CO}_2 \times \text{Predicted VE}$$

Approved: _____
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