VUMC Multidisciplinary Surgical Critical Care Service

Ventilator Management Guideline

Policy

All patients requiring mechanical ventilation in the SICU are managed following this protocol unless otherwise ordered by their physician in the computerized order entry system.

A. All changes to the ventilator strategy will require effective communication to the current team, including the patient's bedside RN and respiratory therapist (RT), as well as one member of the SICU care team - SICU Fellow, advanced practice provider (APP), resident and/or attending physician.

B. Maintaining continuity of care and communication plan:

- Day shift - RT reviews all patients 'ventilator orders and plan for the day with the critical care team, ideally during rounds and PRN.

- Night shift - RT reviews all patients 'ventilator orders and plan for the night with the SICU Fellow and/or APP after evening rounds and PRN.

Settings

A. Mode:

- Pressure regulated volume control (PRVC) with synchronized intermittent mandatory ventilation (SIMV) and pressure support (PS) is the preferred mode of ventilation.

- Alternative modes of ventilation may be used if patient acuity dictates.

B. Tidal Volume (Vt):

- 6 ml/kg (IBW) initially, ensure plateau pressure (Pplat) is 30 cmH2O or less.

- If Pplat is > 30, decrease Vt by 1ml/kg to a minimum of 4 ml/kg. **Notify SICU care team member**.

- Use ideal body weight (IBW) to determine tidal volume:
    - Female patients IBW (kg) = (height in inches – 60) * 2.3 + 45.5
    - Male patients IBW (kg) = (height in inches – 60) * 2.3 + 50

C. Respiratory rate (RR):

- 12 breaths per minute initially. Change respiratory rate to target a normal range of pH (7.35-7.45), ideally while maintaining $PaCO_2$ < 55mmHg.
- **Notify SICU care team member** if unable to maintain PCO_2 < 55 to achieve a normal pH.

D. Pressure/volume support (PS, VS):

- To support patients spontaneous breathing efforts, these settings should be titrated to maintain supported tidal volume minimum of 4-6 ml/kg.

E. Inspired fraction of oxygen (FiO_2):

- Initiate at 100% and titrate FiO_2 as allowed to maintain SpO_2 > 92%.
- In some patients higher or lower oxygen saturation or FiO_2 may be targeted. It is expected that the SICU care team member and the RT will discuss the goals and strategies.

F. Positive end-expiratory pressure (PEEP):

- Initiate PEEP at 8 cmH_2O. Compliance measurements should be utilized as a reference point for further PEEP adjustments.
- Changes to PEEP may be necessary or desired given the clinical status or needs of the patient.
- For escalation or decreases to PEEP to facilitate improvement in oxygenation or weaning from ventilation, consider referring to PEEP table (e.g. https://i0.wp.com/emcrit.org/wp-content/uploads/2021/09/peeptables5.jpg?resize=375%2C486&ssl=1)

Weaning mechanical ventilation

A. Spontaneous breathing readiness assessment:

- Should be completed prior to or during morning rounds by the RT and RN (530am) based on the following criteria:
- Successful spontaneous breathing trial (SBT) screen
    - Patient is not agitated. No orders for RASS goal -3, -4 or -5
    - No neuromuscular blockade
    - Oxygen saturation ≥ 88%, $FiO_2 \leq 50\%$, PEEP ≤ 8 cm H_2O
    - No myocardial ischemia or worsening shock
    - Stable vasopressor use (typically norepinephrine < 8 mcg/min)
    - Evidence of spontaneous patient inspiratory efforts

B. Spontaneous breathing trial (SBT):

- Setting: PS/CPAP, pressure support 5 cmH_2O, PEEP 5 cmH_2O, 40% FiO_2
- Evaluate patient during SBT, **<u>failure of SBT if</u>:**
    - Respiratory rate > 35/min
    - Respiratory rate < 8/min
    - Oxygen saturation < 88%
    - Respiratory distress
    - Mental status change
    - Acute cardiac arrhythmia

C. Weaning and/or SBT Success

- **<u>Notify SICU care team member</u>** for extubation order if patient meets the following criteria:

- Respiratory rate < 35 BPM
- Tidal volume (Vt) greater than or equal to 5 ml/kg (IBW)
- Patient tolerates SBT/settings for 30-120 minutes without any failure criteria
- ABG within acceptable limits (discuss with SICU care team member)

D. Weaning and/or SBT Failure

- If any of the following occur, document SBT failure and place the patient back on previous ventilator settings. Document reason for SBT failure in Epic. **Notify SICU care team member**. Some examples of failure:
  - Respiratory rate < 35 BPM
  - Minute Volume > 10 l/min
  - SpO_2 < 90%
  - Systolic Blood Pressure > 180 or < 90 mmHg
  - Respiratory Distress
  - HR > 120% of baseline
  - Marked use of accessory muscles
  - Diaphoresis
  - Marked subjective dyspnea
  - Apnea

Authors:
C. Patrick Henson, DO

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