PURPOSE:
To provide a standard, rational approach to ventilator care and eventual liberation from the ventilator in a safe and efficient manner. Rather than being solely physician driven, this protocol will involve the entire critical care team including respiratory therapists and registered nurses. It is well established in the literature that using non physicians in this manner reduces the time on mechanical ventilation, thereby reducing the chances of ventilator complications and reducing the length of stay and substantial costs associated with ventilator care.

APPLIES TO:
This policy applies to all mechanically ventilated adult patients

GENERAL STATEMENT OF POLICY AND GOALS:
This policy provides a standard, evidence supported approach to ventilator care, discontinuation from the ventilator and extubation in a safe efficient manner. This protocol involves the entire critical care team, which includes physicians, respiratory therapists and registered nurses.

GENERAL DEFINITIONS:

Phases of Ventilator Care:
1. Initial Stabilization phase of the critically ill patient with attention to correcting the causes of respiratory failure such as: infection, metabolic derangements, congestive heart failure, coronary ischemia, bronchospasm, and changes in ventilatory drive i.e. neurological status.
2. Post Stabilization Phase which will be initiated as soon as the patient is stable; this will involve usually transitioning the patient from a controlled mode (ex. Assist control) to a lower level of support allowing for the patient to rest, and at the same time begin taking over spontaneous ventilation. This aspect of ventilator care will usually be more physician directed, but may be prompted by non physicians as well. There is no time limit for this phase; it may occur within hours of admission.
3. Extubation Phase will involve a spontaneous breathing trial (SBT) that can be initiated by the health care team according to this protocol. It is anticipated that if the patient does well with the SBT then extubation should occur under the direction of the physician.

Procedure:

1. Stabilization Phase:
   A. The nurse and respiratory therapist may initiate titration of the FiO2 with the goal of maintaining oxygen saturation greater than or equal to 95% and striving for a FiO2 of 50% or less.
   B. The ventilation support is likely to remain high during this time to prevent respiratory muscle fatigue and minimize oxygen consumption. During this time the nurse will review ventilator sedation with the physician.

2. Post Stabilization Phase: **A Physician order is required to proceed with this phase**
   A. May be initiated once the patient has stabilized :BP>90 sys., HR <130, RR < 30 with adequate respiratory drive, correction of any acidosis-pH > 7.3.
   B. The nurse and/or respiratory therapist, with the guidance of the attending may attempt to change the ventilator support from a totally controlled mode to an assist mode that is comfortable for the patient.
   C. The team may ventilate using a combination ventilator modes that are most comfortable yet supportive for the patient. The respiratory therapist is encouraged to optimize the ventilator settings which will allow both for patient comfort and rest. Any evidence of respiratory distress or rapid shallow breathing with these changes will be reported to the physician. During this phase, ventilator sedation should be modified to allow the patient to wake up.
3. **Extubation Phase:**

   A. All patients that are on a ventilator will be evaluated at least once per day for readiness for a Spontaneous Breathing Trial. The patient will be assessed against the following criteria:

   - FI02 at $\leq 50\%$
   - SP02 $> 92\%$
   - PEEP $< 5$ cmH20
   - RR $< 30$ per minute
   - HR $< 110$
   - Not requiring vasoactive or inotropic agents – an infusion of up to 5 micrograms per kilogram per minute of Dopamine or Dobutamine is acceptable
   - Temperature $< 102$ degrees
   - Absence of paralytics / the capability to initiate an inspiratory effort
   - Evidence of reversal of underlying cause that placed the patient on the ventilator

   B. If all the above criteria are documented as being met the Respiratory Therapist will perform the Rapid Shallow Breathing Index (RSBI or Tobin Index). This needs to be less than 100 to continue with the protocol.

   **Performing the RSBI:**

   - Patient should be on PSV of 10 and PEEP of 5
   - Patient should breath spontaneously for 5 minutes
   - At the 5 minute mark of spontaneous breathing measure the patients respiratory rate and minute ventilation for the next minute
   - The average tidal volume is determined by dividing the minute volume by the respiratory rate
   - The RSBI is then calculated by dividing the respiratory rate by the tidal volume (L)

   C. If the patient does not fail any of the above assessments they should continue on with a Spontaneous Breathing Trial (SBT):

   - Pressure Support of 10 cm H20
   - PEEP of 5 cm H20
   - Current FI02

   D. The SBT should continue until either a stop point has been met or the patient tolerates for 2 hours.

   **Stop Points:**

   - RR $> 35$ for $> 5$ Minutes
   - SpO2 $< 90\%$
   - HR $> 120$
   - Systolic BP $> 180$ or $< 90$
   - Temp $> 102$
   - Deterioration of neurologic status (obtain an ABG)
   - Call Physician if: Systolic BP $> 180$ or $< 90$

   If a stop point has been met the patient should be placed back on the prior ventilator settings and the physician contacted. If the patient is able to tolerate the SBT for 2 hours with no stop points a repeat RSBI (Tobin Index) should be performed. If the RSBI is $< 105$ the patient should be considered ready for extubation. The patients cough/ gag reflex should be assessed and the amount of secretions documented and the physician managing the ventilator should be contacted.

   E. The physician managing the ventilator must give orders for extubation. The patient should be returned to previous ventilator settings until the physician is contacted for orders to extubate.

   F. The entire assessment and SBT will be documented on the Ventilator Weaning Protocol sheet.

4. The physician managing the ventilator has the ability to make decisions regarding ventilation management that are outside of this protocol based on their clinical assessment of the patient.
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Chest, Volume 120, #6, December 2001: Evidence –Based Guidelines for Weaning and Discontinuing Ventilatory Support