PROTOCOL

TITLE: VENTILATOR DISCONTINUATION PROTOCOL

Purpose: To define the steps used for discontinuation of mechanical ventilation in the patient exhibiting improvement in respiratory status.

Level: ____ Dependent ____ Independent __x__ Interdependent

Supportive Data:

- Patients receive mechanical ventilator support when their own ventilatory and/or gas exchange capabilities are unable to meet the demands placed on them by disease processes, injury or drugs. [1]

- As the conditions that warrant mechanical ventilation resolves, attention should be placed on removing endotracheal access as soon as possible. Evidence reveals that delays are clearly associated with excess morbidity and mortality. Clinical aggressiveness in the discontinuation process, however, must be tempered by the realization that premature removal of support can also be harmful to a patient. [1]

- The best indicator of ventilator discontinuance potential is the clinical assessment of the patient during a spontaneous breathing trial (SBT). There is limited evidence that "weaning parameters" are helpful in predicting discontinuance potential. [1]

- If a patient fails a SBT, another trial should not be performed for 24 hours. Other weaning strategies employed between every 24 hours SBT's offer no benefits in shortening the time on the ventilator. [1,2]

- Non-physician health care personnel (especially RRTs and RNs) can achieve ventilator discontinuance when operating under a well- designed protocol. [1,2]

CONTENT:

A. Goals:

The goals of this procedure are:

1. Timely identification of patients who may be candidates for ventilator discontinuance.
2. Timely discontinuance of mechanical ventilation when patients successfully tolerate **SBT**. [1]

B. Definitions:

The definition of Successful SBT:

1. Objective Measurement:

a. Oxygenation= $SaO_2 \geq 92\%$
b. Stable Respiratory Rate (RR) = RR $\leq$ 30 breaths/minutes and >50% change from the baseline value.[1]
c. Hemodynamic Stability:
   - Heart Rate < 120 bpm OR > 20% change from the baseline value. [1]
   - Systolic BP > 90mmHG and < 180mmHg and> 20% change from baseline value.[1]
   - No addition or increase of vasopressors required to maintain hemodynamic stability. [1]

2. Subjective Measurements:

a. No change in mental status.[1]

b. No signs of increased or labored breathing (accessory muscle breathing)[1]

c. No diaphoresis[1] (No new onset)

C. Procedure:

Automatic exclusions to this procedural evaluation will be:

- Patients with protected airways in place for anaphylactic shock
- Patients with a specific physician's order not to "wean" with reason.
- Patients on any type of paralytic agent.

1. After 24 hours of mechanical ventilation, a patient with respiratory failure will be considered a candidate for a SBT. To determine if the patient would tolerate the SBT the following assessment is performed. This assessment is to be done while the patient is on his/her current level of mechanical ventilation.[1]

   - Evidence of improvement related to the underlying cause for intubation (i.e. improved x-ray)
   - O2 saturation $\geq$ 92% with an FIO2 $\leq$ 50%.
   - PEEP $\leq$ 5 cm H2O
   - Minute Ventilation $\leq$ 12 Liters per minute
   - Rapid Shallow Breathing Index (RR/TV) < 105 for patients under age 65 years
     < 130 over age of 65 years
   - PaO2/FIO2 ratio > 150-200 (ABG Drawn)
   - pH $\geq$ 7.34 (ABG drawn, no significant acidosis)
   - Temperature $\leq$101 Fahrenheit
   - Heart Rate < 120 bpm
   - Systolic BP > 90mmHg and < 180mmHg
   - Adequate inspiratory effort. (Negative Inspiratory Force (NIF) $\geq$ 25)
   - Able to manage secretions, adequate cough.
   - Score 2 or less on the Ramsey Sedation Scale.

2. If the patient meets all or part of the above criteria, call pulmonary physician. Get an order to proceed with Ventilator Discontinuation assessment process or document rationale for not proceeding to SBT.

3. If patient does not meet SBT criteria or fails SBT for 3 days, consider tracheotomy.

4. Spontaneous breathing trial if ordered.
   a. Explain SBT procedure to the patient providing reassurance
   b. Place the patient in a fowlers or semi fowler's position (Head of Bed 30-45 Degrees) when possible to optimize ventilation and gas exchange. [4]
   c. Maintain clear airway via suctioning and/or encourage the patient to clear the airway via deep breathing and coughing.
   d. Optimize bronchodilator therapy as indicated.
   e. Set SBT parameters as ordered by the physician
      - Place the patient on a T-piece with the same FIO2 used during pre-SBT mechanical ventilation.

Or

- Keep the patient attached to the ventilator on following settings:

Pressure Support	5cm
CPAP	5cm
FIO2	Same level as when on ventilator
Apnea Settings:	
Apnea Interval	20 seconds
Mode	PRVC
Tidal Volume	10cc/kg body weight
Rate	16bpm
FIO2	100%

Or

- As ordered by physician

f. Assess SBT parameters at initiation, at 2 minutes and again at 5 minutes. Both the respiratory therapist and primary care nurse will be at the patient's bedside continuously during the first 5 minutes.
g. If at any time during this trial major changes are noted, the SBT is discontinued, notify the pulmonologist. The patient will be placed back on the level of mechanical ventilation that was provided prior to the initiation of SBT. If needed the patient will be resedated as per original/last set of mechanical ventilation sedation orders. The rationale is documented in the SBT record. The major changes include the following:
    - Respiratory rate change $\geq$ 50% of baseline
    - Heart rate change $\geq$ 20%of baseline
    - Systolic blood pressure change $\geq$ 20% of baseline
    - Patient has a change in mental status
    - Patient's breathing becomes labored
h. If no major changes are noted, the SBT will continue.

5. Continue to assess SBT parameters at intervals listed (10 minutes, 20, 40, 60 and 90 minutes). [1] The RN does not need to be continuously at the patient's bedside but will be notified by RT if any major changes are noted during the trial.

6. With each interval continue to compare parameters to baseline. Document assessment findings under appropriate intervals.

7. If at any time during this trial if major changes are noted, (major changes as stated above), the SBT is discontinued. The RN and pulmonologist are notified. The patient will be placed back on the level of mechanical ventilation that was provided prior to the initiation of SBT. If needed the patient will be resedated as per original/last set of mechanical ventilation sedation orders the rationale is documented in the SBT record.

8. If a full 90 minute trial has been successful, the respiratory therapist will obtain an arterial blood gas.

9. If the ABG result meets the criteria the patient has tolerated the SBT and is a candidate for extubation.[2]

10. Call pulmonologist with results of SBT and ABG. Obtain an order for extubation and place the patient on an aerosol mask with an FIO2 5-10% greater than the initial ventilator settings or as ordered by the physician.

11. If the patient's ABG is not within range of the criteria the patient has failed the SBT and will placed back on the level of mechanical ventilation that was provided prior to the initiation of SBT. **If needed** the patient will be resedated as per original/last set of mechanical ventilation sedation orders the rationale is documented in the SBT record. Call pulmonologist with results regardless of outcome.

D. Failure to wean:

- If a patient fails the SBT the physician is notified and an attempt should be made to find the cause for the failure and correct it. A SBT will be repeated each 24 hours provided the patient continues to qualify for the SBT by passing the pre SBT assessment. [1]

- Patients who continuously fail the SBTs and/or have been mechanically ventilated greater than 21 days may require slower paced modes of weaning which include gradually lengthening self breathing trials, such as Pressure Support Ventilation (PSV or PRVC. [1]

- Unless there is evidence for clearly irreversible disease (spinal cord injury or ALS), a patient requiring prolonged mechanical ventilatory support for respiratory failure should not be considered permanently ventilator dependent until 3 months of SBT's have failed.

E. Safety:

- Staff consisting of RNs and Respiratory Therapists must be aware that the SBT can place a significant amount of stress upon a patient. It is imperative that the patient be closely monitored.

- Apnea precautions and alarms must be carefully set on the ventilator for a patient who remains on the ventilator during a SBT.

- A Respiratory Therapist will be in the ICU at all times during any/all SBT.

- The Respiratory Therapist will be in the patient's room continuously at the initiation of SBT and through the first 5 minute interval. After that time the therapist will remain in the ICU and check each patient, consistent with SBT procedural intervals, until successful SBT is completed or patient failed SBT and is returned to previous ventilator support parameters.

- Some patients may tolerate the SBT so well that a physician may decide to extubate the patient before the 90 minute trial has concluded (if physician is present on the unit).

- It is imperative that protocols not be used to replace clinical judgment, but rather compliment it.

- Consider that a failed extubation followed by reintubation increases VAP rate.

G. Documentation:

- Patient data will be recorded on the Ventilator Discontinuance Sheet. This form will guide the respiratory therapist and the RN through the ventilator discontinuance process. The Respiratory Therapist is responsible to complete the documentation. The RN will be aware of the data collected.

- At a minimum, the daily screening criteria will be initiated and results called to physician.

- The Respiratory Therapist must sign the form at the conclusion of the SBT, whether the patient succeeds or fails.

- The SBT process is an interdisciplinary effort recognizing the clinical contributions of nursing, respiratory therapy and medicine.

- The Ventilator Discontinuance Protocol sheet will be placed with the patient's bedside chart. It is a 2 sided form that reflects both the discontinuation protocol on one side and ventilator maintenance documentation on the other.

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[1] Collective Task Force Facilitated by the American College of Chest Physicians. Evidenced-Based guideline for Weaning and Discontinuing Ventilatory Support. *Respiratory Care* 2002: 47 (1):L 69-90

[2] Ely W, Meade M, Haponick E. Mechanical Ventilator Weaning Protocols driven by Nonphysician Health-Care Professional, Evidence Based Clinical Practice Guideline. *Chest* 2001: 120:454S-463S

[3] Marelich G, et al. Protocol Weaning of Mechanical Ventilation in Medical and Surgical Patients by Respiratory Care Practitioners and Nurses. *Chest* 2000 118: 459-467

[4] Kunis K, Puntillo K. Ventilator- Associated Pneumonia in ICU. *AJN* 2003: 103(8) 64AA-64GG