Name of Policy:	**Systems Alarms, Settings Checks and Documentation for Mechanical Ventilation**
Policy Number:	3364-136-07-01
Department:	Respiratory Care
Approving Officer:	Chief Nursing Officer
Responsible Agent:	Director, Respiratory Care
Scope:	The University of Toledo Medical Center Respiratory Care Department

THE UNIVERSITY OF TOLEDO

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_____ New policy proposal	_____ Minor/technical revision of existing policy
X Major revision of existing policy	_____ Reaffirmation of existing policy

(A) Policy Statement

Initiating mechanical ventilator settings, ventilator safety checks, and establishing ventilator alarm settings, shall be in accordance to the following procedure.

(B) Purpose of Policy

To provide guidelines for the assembly and function testing of mechanical ventilators, and to establish guidelines for the initial ventilation and safety alarm settings, after receiving orders from the appropriate physician.

Indications: for mechanical ventilation include, but are not limited to, uncompensated respiratory acidosis, refractory oxygenation failure, central or obstructive apnea, increased work of breathing (paradoxical respiration), narcotic overdose, and cerebral edema.

Goal: of mechanical ventilation is to augment or to assist the respiratory function of patients with ventilatory or oxygenation failure.

Contraindications: include patients who have a written "No Mechanical Ventilation" status, as established per appropriate physician.

Hazards: of mechanical ventilation include, but are not limited to, hyperventilation, hypoventilation, pneumothorax, hypotension, over/under pulmonary hydration, mechanical malfunction and/or accidental disconnection, loss of airway, oxygen toxicity and nosocomial infections.

(C) Procedure

Use of Patient-Owned Home Ventilator

If a patient is admitted and currently ventilated using a home ventilator or external health care facility ventilator, the patient will be switched over to a hospital ventilator. In the event the patient refuses to switch to a hospital ventilator, or if the patient is better able to synchronize with the home ventilator, the patient may remain on the home ventilator. If this situation arises, the following actions will take place:

- Ventilator settings will be ordered by the physician based on the patient's current need. The order will also state that the patient is to remain on the home ventilator.

- Biomedical Engineering will be contacted to perform a safety test on the home ventilator. If Biomed is not immediately available, the RCP will perform a visual inspection of the electrical cord and the external structure of the ventilator to assure no visible sign of damage is observed. This will be documented in the patient's EMR.

- A hospital owned ventilator will be made readily available as backup.

- The RCP will help the patient apply the unit every night (if ordered HS only) as needed.

- The RCP will observe that the home ventilator appears to be functioning properly and that the patient is being effectively ventilated.

- The RCP will monitor and document basic ventilator settings such as FIO2, tidal volume, respiratory rate, PEEP, and peak inflating pressure. Other parameters, such as alarm settings, may be documented if easily observed. The RCP will not provide adjustment(s) to the home ventilator. Primary care of the home ventilator will be the responsibility of the patient, the patient's family, or the home care provider as appropriate.

- If, in the judgement of hospital staff, the patient is not effectively ventilating on the home ventilator, the RCP will place the patient on a hospital owned ventilator on settings closely matching current ventilator settings and call the patient's physician for updated orders.

Use of Hospital Ventilator

Please also refer to Nursing Service Standard of Care and Practice: Management of the Intubated Patient and Daily Spontaneous Breathing Trial.

1. **Equipment and documents** for mechanical ventilation shall consist of:
   a. Positive pressure ventilator set up with appropriate ventilator tubing and heat-moisture exchanger (HME).
   b. Self-inflating resuscitation bag with O2 tubing and flowmeter.
   c. Disposable PEEP valve
   d. Hollister ET tube fastener
   e. In-line suction catheter
   f. Normal saline packets
   g. Suction tubing and canister
   h. Vacuum regulator
   i. Oral care kits
   j. Additional back-up trach tube (if applicable)

2. **Ventilator system** pre-initiation operational check.
   a. Ventilators to be used shall be cleaned then disinfected per manufacturer's recommendations before connection of a disposable ventilator circuit. *After the ventilator is cleaned, and a new circuit put on, a successful SST procedure will be performed, alarm volume turned all the way up, then covered and placed in the storage area for ventilators.*
   b. Adjust the ventilator settings according to the physician's orders and the following guidelines:
      1) Set respiratory rate should be between 8 and 20 breaths/minute.
      2) Tidal volume should be between 4 mL/kg and 8 mL/kg as appropriate. Any order outside this range should be verified with the physician.
      3) Set FiO2 as prescribed by physician.
      4) PEEP will be set at a baseline of 8 cmH2O unless ordered differently by physician.
      5) Peak flow should be set to deliver no less than a 1:2 I:E ratio, unless specified per physician.
      6) Sensitivity should be set so that the patient has to generate no more than -1 to -2cm H2O pressure to initiate flow from the machine.
      7) Alarm settings: Alarm settings should be tailored to the individual patient
         (a) Low pressure alarm will be adjusted to approximately 10 cm H2O below the patient's peak inspiratory pressure.
         (b) Low tidal volume alarm will be adjusted to 50% below desired exhaled tidal volume, or spontaneous tidal volume, if on a low SIMV rate, 6 or below.
         (c) Low minute volume alarm will be adjusted 2 – 5 L/min below minimum SIMV or assist-control back-up minute ventilation.
         (d) The high pressure alarm limit will be initially set at 50 cm H2O then adjusted to 10 – 20 cm H2O above PIP.
         (e) **All alarms must be sufficiently audible with respect to distances and competing noises.**
         (f) **Alarm response: for all audible ventilator alarms, the nearest available therapist, or if appropriate, nurse, will respond immediately to the patient's bedside and assess for a disconnection or respiratory distress.**
      8) Humidification (if using heated): initial setting of 2.0 on the Concha heater, check airway temperature in 30 minutes and adjust to maintain 32 - 34 degrees C.

3. Procedure for ventilator initiation:
   a. The RCP will check and document the following after connecting the patient to the ventilator:
      1) Breath sounds.
      2) Exhaled tidal volume.
      3) Respiratory rate.
      4) Sensitivity and synchronization.
      5) Chest movement.
      6) Airway pressure.
      7) Inspiratory time and flow.
      8) I:E ratio.
      9) Stability of tube (check for need to re-secure). Evaluation of endotracheal tube stability, integrity, and tube position will be done q4 hr and PRN. A Hollister tube fastening device will be used to secure the ET tube. Position of the tube will be moved right, middle, left on a rotating basis. Twill tape for securing the ET tube may also be used especially when the patient is in a prone position.

10) Evaluation and documentation of endotracheal tube cuff integrity should be done upon initiation of mechanical ventilation (may check cuff pressure; adequate return volumes), and PRN. Follow up any endotracheal tube cuff leaks with appropriate cuff pressures of 20-30 cmH2O using a cuff measuring device.
11) Patients will be evaluated for suctioning on a PRN basis. The procedure for suctioning is described in policy #3364-136-04-04 of this manual.
12) Arterial blood gases shall be drawn and analyzed with a physician order.
13) Oral care, ET tube position, correct positioning of patient and suction equipment change out should be documented in the patient's EMR

4. **Ventilator Assessment:** the ventilator downloads information through the DAS to the electronic medical record; the therapist ascertains the information is correct and complete, then saves the ventilator data, as appropriate, then signs the ventilator check electronically. A ventilator flow sheet will be used to document all ventilator settings and patient airway data if the EMR is unavailable or "down". Routine ventilator assessments will be completed q4 hours, and after a patient transport to verify alarm settings.

5. **The Respiratory Care Charge Therapist or Supervisor will be informed** of the initiation of all ventilators, as soon as practical.

6. *If a patient should present with any of the adverse reactions to mechanical ventilation listed in RC departmental policy #3364-136-05-01, the practitioner is responsible for proper documentation in the electronic medical record or on a respiratory flow sheet as to his/her corrective action/involvement.* ***If due to mechanical malfunction or practitioner error****, after the appropriate corrective action has been taken, the respiratory supervisor, nurse, and physician on-call should be notified and an occurrence report generated.*

Approved by:		**Review/Revision Date:**
		08/10/2001
		08/07/2002
/s/	10/25/2018	04/30/2003
Michael Taylor	Date	12/03/2003
Director, Respiratory Care		04/01/2004
		12/06/2006
		12/28/2009
/s/	10/25/2018	04/15/2011
Monecca Smith	Date	09/23/2013
Chief Nursing Officer		05/01/2017
		11/01/2018
Review/Revision Completed By:		
Director, Respiratory Care		**Next Review Date:** November 1, 2021
Policies Superseded by This Policy:		