Respiratory – Nursing Management of the Ventilator-Dependent Patient In The Home

PURPOSE:
To safely maintain the ventilator-dependent patient in a home setting through comprehensive nursing assessment and intervention.

CONSIDERATIONS:
1. Mechanical ventilation is never used on a patient with unresolved pneumothorax.
2. The medical equipment supplier is expected to provide/ensure that:
   a. A respiratory therapist is available 24 hours per day.
   b. Electrical equipment is properly grounded. Extension cords are not acceptable unless approved by the manufacturer or supplier.
   c. A back-up ventilator and suction unit should be in the home. Judgement may be used to determine if a back-up ventilator is necessary. Some factors which should be considered are:
      (1) Patient’s degree of dependence on mechanical ventilation.
      (2) Skill and reliability of caregivers.
      (3) Proximity/accessibility of equipment supplier.
   d. Only equipment recommended by the manufacturer is used.
   e. Any defective equipment is replaced in a timely manner.
   f. A manual resuscitation bag is maintained in the home.
   g. Instructions are placed in the home for use, maintenance and emergency measures in case of mechanical or power failure.
   h. Education to the patient/caregiver regarding use and maintenance of equipment and safety measures.
3. Oxygen precautions must be observed.
4. The patient is never ventilated with dry gas.
5. The ventilator tubing must be kept free of condensation.
6. Proper cleaning of equipment reduces the risk of infections.
7. A system of communication should be established with the patient.
8. Potential medical complications requiring observation and reporting are:
   a. Airway obstruction.
   b. Tracheal damage.
   c. Pulmonary infection.
   d. Pneumothorax.
   e. Subcutaneous emphysema.
   f. Cardiac instability.
   g. Atelectasis.
   h. Gastrointestinal malfunction.
   i. Renal malfunction.
   j. Central nervous system malfunction.
   k. Psychiatric trauma.
9. Mechanical ventilation for the patient is initiated in the hospital. Criteria for homecare of the ventilator dependent patient includes:
   a. A willing and able patient and caregiver(s).
   b. Demonstrated capabilities of both patient and caregiver(s).
   c. A plan for 24 hour availability of caregiver(s).
   d. A home appropriate for the ventilator dependent patient:
      (1) Adequate space for placement of the equipment.
      (2) Water.
      (3) Electricity.
      (4) Telephone service.
      (5) Clean environment.
   e. A plan for periodic medical care and laboratory studies.
   f. Funding source(s) for professional services, supplies and equipment.
   g. Back-up emergency equipment and source of electricity.
10. Prior to hospital discharge, careful planning is necessary to return the ventilator-dependent patient to the home setting.
   a. Patient should be medically stable, secure artificial airway, adequately oxygenated with < 40% FiO2, and maintain adequate ventilation on standard ventilator settings.
   b. The patient should be using the same type of ventilator in the hospital as ordered for homecare.
   c. The homecare nurse should make a hospital visit to meet the patient and participate in the care planning process with the multidisciplinary hospital team.
11. Preparing for the first day at home includes all the considerations unique to the ventilator-dependent patient. Special planning is required to transport the patient home with portable ventilator equipment. Prior to attaching the patient’s airway to the home ventilator, all systems must be carefully checked per manufacturer’s directions.
12. All essential equipment including oxygen source must be in home when patient arrives.
13. Local emergency contacts should be listed for patient/family.
14. Letters should be sent to telephone and local electrical companies notifying them that patient should be on the priority reconnect list. Emergency Medical Systems should be contacted.

EQUIPMENT:
Portable ventilator with alarms
Adequate power source
Cascade heating elements
Humidifying system
Breathing circuit tubing and hose assemblies
Strength of Evidence Level: 3

Supplemental oxygen source
Main hose
Tracheal tube adapters
Exhalation valve
Flex tubing
Suction unit and equipment
Two 12-volt leak-proof batteries, cases and cables
One 8-hour capability
One 6-hour capability
Battery recharger
Non-sterile gloves
Obturator
Tracheal tubes with cuff
Tracheostomy care kit (optional)
Sterile wrap
Basins (3)
Forceps
Drape
Flexible nylon bristle brush
Pipe cleaners (3)
30" twill tape or velcro ties
Gauze sponges (4)
Precut non-woven trach dressings (3)
Sterile gloves
Sphygmomanometer
Stethoscope
Normal saline solution
Hydrogen peroxide
Sterile distilled water
Disinfectant
Manual resuscitation bag, required for portability and power failure
Daily checklist for caregiver(s)
Weekly checklist
Oxygen (if required)
Back-up ventilator (optional)
Nebulizer unit (if ordered)
In-line adapter to ventilator circuit or Pulmo-Aid unit
Surge protector
Medication
Communication means

PROCEDURE:
1. Adhere to Standard Precautions.
2. Don any necessary protective equipment.
3. Explain procedure to patient.
4. Review physician’s order:
   a. Ventilator type.
   b. Ventilator rate.
   c. Ventilation mode (e.g., intermittent mandatory ventilation (IMV), synchronized intermittent mandatory ventilation (SIMV), assist/control).
   d. Tidal volume.
   e. Fraction of inspired oxygen concentration.
   f. Sigh rate, sigh volume if applicable.
   g. Oxygen tension setting (PEEP).
   h. Low and high pressure alarm settings.
   i. Duration of treatment.
   k. Flow rate (optional).
   l. Medication and diluent (optional).
5. Evaluate pulmonary status:
   a. Check home ventilator to determine that all settings are per physician’s orders, connections and tubing are intact.
   b. Evaluate patient’s pressure reading for normal values.
   c. Assess patient for symmetrical chest expansion.
   d. Auscultate lung fields.
   e. Suction trachea as needed to maintain an open airway. (See Respiratory - Tracheal Suctioning.)
   f. Provide routine tracheostomy care. (See Respiratory - Tracheostomy Care.)
   g. Provide periodic sighing or deep breathing with ventilator mechanism or manual resuscitation bag.
   h. Check humidification system to ensure patient is never ventilated with dry gas.
   i. Keep tubing free of condensation.
   j. Monitor and record level of oxygen in tank.
   k. Check that back-up ventilator and batteries are in home and operational.
   l. Check and test alarm limits.
6. Evaluate gastrointestinal status:
   a. Auscultate bowel sounds.
   b. Palpate abdomen.
   c. Measure abdominal girth.
   d. Monitor bowel functioning.
7. Evaluate cardiovascular status:
   a. Auscultate heart sounds.
   b. Assess for jugular neck vein distention.
   c. Observe for peripheral edema.
   d. Monitor blood pressure and pulse.
8. Evaluate fluid balance:
   a. Assess intake and output.
   b. Assess skin turgor and mucous membranes for signs of dehydration.
9. Evaluate nutritional status:
   a. Assess oral intake.
   b. Observe for possible dysphagia and/or aspiration.
10. Assess for signs/symptoms of infection:
    a. Monitor temperature.
    b. Observe for increases in heart rate.
c. Observe for changes in tracheal secretions.

11. Identify and establish methods of communication.

12. Assess adequacy of rest/sleep periods:
   a. Instruct patient/caregiver to schedule activities to allow patient adequate rest/sleep periods.
   b. Instruct patient/caregiver in relaxation techniques.


15. Clean ventilator equipment. (See Respiratory - Cleaning and Disinfection of Respiratory Equipment.)

16. Reassemble equipment.

17. Discard soiled supplies in appropriate containers.

**AFTER CARE:**

1. Document in patient's record:
   a. Nursing assessment.
   b. Operation of home ventilator system including alarms.
   c. Caregiver's ability to meet patient's needs.
   d. Instructions to patient/caregiver.
   e. Patient/caregiver returns demonstration responses.
   f. Communication with physician, medical equipment supplier and respiratory therapist.
   g. Patient/caregiver coping strategies with the plan of care.