BiLevel Pressure Device

Purpose

Define indications and care settings for acute and chronic initiation of Noninvasive Positive Pressure Ventilation. Identify the role of Respiratory Care Service and Nursing Service in providing noninvasive ventilatory support with or without supplemental oxygenation for the spontaneous breathing patient.

Scope

Respiratory Care Services will initiate specified noninvasive positive pressure ventilation as ordered by a physician. A licensed Respiratory Care Practitioner in accordance with a Physician Order will perform initial set up. A licensed Respiratory Care Practitioner trained and certified in the proper setup procedure will do noninvasive positive pressure ventilation setting adjustments. A registered nurse and Respiratory Therapist will provide ongoing assessment and documentation of the patient condition.

Classes/ Goals

Respiratory Care Services limits the use of noninvasive positive pressure ventilation to patients requiring non-continuous ventilation and is intended to augment patient breathing. It will not be used on patients with artificial airways. Refer to Policy 7.3.43.

The goal of NiPPV may include the following:

1. To maintain the patient's pH between 7.30 and 7.50
2. To maintain the patient's $PaCO_2$ below 80 torr
3. To maintain the patient between SpO_2 88 and 95%
4. Provide for patient comfort.

Patients will be classified by the Noninvasive Positive Pressure Ventilation Usage and Monitoring (triage) Classifications as follows:

Class 1 = Past history or home use of noninvasive positive pressure ventilation with Chronic Respiratory Failure and nocturnal use with stable ventilatory status. This would include newly initiated NiPPV for nocturnal use only. These patients are not expected to require increased observation or intensive care. Class 1 patients are patients who use NiPPV device to improve ventilation, and generally for less than 12 hours per day. Examples include: patients with chronic, stable ventilatory failure; patients with obesity hypoventilation syndrome/obstructive sleep apnea or patient with NiPPV initiated in ICU setting stable for transfer to a non-ICU setting.

- Lab = based on clinical picture

- Consults= at physician discretion

- Nursing Assessment & vital signs = routine

- Respiratory Assessment & care = routine

- Other monitoring = based upon clinical picture

- Patient location = standard hospital room

Patients who bring their noninvasive positive pressure ventilation device from home will have that device inspected by the Clinical Equipment Services, will be monitored by Respiratory Care Services and provided with supplemental oxygen as prescribed by a physician. Patients with home noninvasive positive pressure ventilation devices will need to have appropriate orders written by their assigned inpatient physician. All setting adjustments require a physician's order prior to respiratory therapists making changes.

Respiratory Care Services will track patients with a home noninvasive positive pressure ventilation device. An assessment note will be written in the Progress Note section of the patient's chart. Refer to Policy 9.13.3 Patient Owned Medical Equipment/Devices regarding the disposition.

Class II = Impending or Acute respiratory failure or if a Class 1 patient decompensates or demonstrates Class II criteria. Criteria include: respiratory distress with moderate to severe dyspnea; use of accessory muscles or paradoxical chest movement; tachypnea; pH <7.30 with $PaCO_2$ > 60 torr; $PaO2/FIO_2$< 150 (i.e. COPD exacerbations, acute hypoxemic respiratory failure, and cardiogenic

pulmonary edema); or patients that require NiPPV for > 12 hours a day.

- Lab = ABG values (parameters above) a blood gas should be obtained within the first 30 minutes of initiation to evaluate effectiveness

- Consults= Pulmonary consult or admission to an intensive care unit

- Nursing Assessment & vital signs = as indicated

- Respiratory Assessment & care = as indicated

- Other monitoring = EKG, pulse oximetry

- Patient location = patients must be in clinical setting where he/she can be closely monitored (i.e. Intensive Care Unit, Emergency Room, Post Anesthesia Care Unit.)

A physician MUST stay with any primary care patient on noninvasive positive pressure ventilation until the patient can be moved to an ICU bed.

- **Class III** = Palliative Care measures. The application of NiPPV for "end of life support and comfort": in a patient with an irreversible lung disease or other medical condition, in which the patient has expressed their wishes to "Do Not Intubate", is documented in the medical record. Patients in this category may transfer to the general care area. Respiratory Care Services will provide education on the device and care of the patient. Use of noninvasive positive pressure ventilation should be evaluated on a case by case basis for each patient and utilized for comfort measures only.

Physician's Order

A written order by a physician is required and must specify:

1. The level/type of NiPPV support (Class I, II, III)

2. Frequency and specific hours of use

3. Noninvasive positive pressure ventilation setting:

a) IPAP – Inspiratory Positive Airway Pressure

b) EPAP – Expiratory Positive Airway Pressure

c) BPM – Breaths Per Minute

d) Inspiratory Time or Inspiratory Time Percent.

e) Modality (spontaneous, spontaneous timed, timed)

f) Supplemental oxygen in liters per minute or FiO2

4. Bronchodilator therapy if indicated

5. If patient allergic to mask, use duoderm to keep mask from touching the patients skin

Noninvasive positive pressure ventilation classification will be on Physician Order Entry along with prompts for physician ordering. Areas not on Electronic Order Entry will have hand written orders following the guidelines above placed in the medical record.

Indications

Noninvasive positive pressure ventilation devices are indicated in patients who exhibit alveolar hypoventilation, chronic ventilatory muscle fatigue or impending fatigue, nocturnal sleep-apnea syndrome, and refractory hypoxemia.

1. Patients who use a noninvasive positive pressure ventilation device at home.

2. Patients with newly diagnosed obstructive sleep apnea who are not expected to require increased observation or intensive care

3. Patients without artificial airways who exhibit worsening alveolar hypoventilation, as reflected by elevated or rising $PaCO_2$

4. Patients with chronic ventilatory muscle fatigue, and/or those with an underlying medical problem and pathophysiology that makes ventilatory muscles fatigue or dysfunction likely.

(clinical signs of ventilatory muscle fatigue include tachypnea, use of accessory ventilatory muscles of ventilator, reduced tidal volume, and/or subjective complaints of fatigue which may be accompanied by rising $PaCO_2$)

5. Patients with worsening hypoxemia despite administration of supplemental oxygen

6. Patients who develop post extubation difficulty in which reintubation is felt to be avoidable with the use of NiPPV

7. Patients with upper airway obstruction due to such conditions as laryngeal, supra or subglottic edema in the post extubation period, strictures of the extra-thoracic trachea, or obstructing tracheal or glottic lesion in instances where initiation of invasive mechanical ventilation is to be avoided.

8. Palliative care measures for patients who have chosen not be intubated, see Class III.

Contra-indications

1. Patients unable to maintain spontaneous ventilation, or progressive airway compromise, such as a known difficult airway, infection, tumor or hematoma unless patient in an Intensive Care Unit

2. Untreated pneumothorax or cardiovascular instability

3. Inability to establish, maintain protect the airway

4. Acute facial trauma, maxillo-facial fractures, facial burns

5. Upper GI Bleed, epistaxis, or active hemoptysis

6. Altered mental status/combativeness or need for physical or chemical restraint.

7. Patients with artificial airways

8. Patients incapable of maintaining life-sustaining ventilation in the event of mal-positioning of the mask in a non-monitored ICU setting

9. Patients with excessive secretions, untreated nausea or active vomiting.

10. A history of allergy or hypersensitivity to the mask, unless protective barrier applied

11. ICP > 20 mmHg

Equipment

1. A noninvasive positive pressure ventilation machine and oxygen tubing for supplemental oxygen delivery.

2. Patient circuit, head strap, appropriate faces mask/nose spacer, chin strap if necessary.

3. Oxygen flow device, oxygen supply tubing, pressure line adapter.

Procedure

Step	Action
1	Review EPIC for order, diagnosis, indications, and other information, wash hands and check patient identification.
2	Explain procedure to patient; Demonstrate use of nasal facemask while determining proper size mask to obtain seal. The mask should fit from the end of the nasal bone to just below the nares. Be careful to insure the mask rests above the upper lip. Placement in the area immediately above or on the lip may increase the likelihood for leaks. The mask should fit the patient comfortably. The mask sizing gauge may be used to assist in selection.

Procedure

Continued

Step	Action
3	Assemble circuit and connect to the BiLevel Pressure Device. Ensure proper placement of the exhalation valve (facing outward and unobstructed). Connect oxygen tubing for supplemental oxygen (prescribed in liters per minute or O2 percentage to maintain SpO_2 in a specified range). Verify machine settings are in accordance with written orders.
4	Place the mask over the patient's nose and select proper spacer size. Attach spacer to the mask. Attach head strap to mask. Apply mask and head strap to patient. Adjust the straps until all significant leaks are eliminated. Avoid over-tightening, which may cause leaks and patient discomfort.
5	Chart specific parameters (IPAP, EPAP, BPM) and mode (spontaneous, spontaneous timed, timed). Note mask size and supplemental oxygen liter flow or FiO2, as well as appropriate clinical data, (i.e.) RR, HR, BS, etc. Adjustments of set parameters are made per physician order. Monitor clinical and physiological parameters.
6	Patients requiring continuous Bi-Level Pressure Device support (>8 hours per day), will be assessed every 4 hours by Respiratory Care Services. Documentation in EPIC will be required with each assessment. Because skin irritation or rashes may occur due to pressure from the mask and/or headgear, as part of this assessment, the therapist will: • Remove the mask and head gear to allow for pressure relief for as long as patient tolerates • Inspect skin integrity at key pressure points (including bridge of nose, cheeks, head, and neck) • Place a protective skin barrier to these pressure points as needed (note: protective skin barrier must be removed with each assessment to allow for proper inspection of skin integrity) • Perform oral care and provide suctioning as needed during these assessments • Re-secure the mask avoid a too-tight fit (therapist should be able to place 1-2 fingers under headgear)

Addendum

Patients who bring their BiLevel Pressure Device from home will be monitored by Respiratory Care Service and provided with supplemental

oxygen as prescribed by a physician. Patients with a home BiLevel Pressure Device will need to have appropriate orders written by their assigned inpatient physician. The unit must be inspected for electrical safety and a waiver must be signed and placed in medical record for inpatient use. All setting adjustments require a physician's order prior to respiratory therapists making changes.

Infection Control

Follow procedures outlined in Healthcare Epidemiology Policies and Procedures #2.24; Respiratory Care Services. http://www.utmb.edu/policy/hcepidem/search/02-24.pdf

Correspond-ing Policies

RCS Policy BiLevel Pressure Device Patient Selection, 7.3.31.

References

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