Respiratory care modalities

**Oxygen therapy**
- Administration of oxygen at greater than 21% (room air) to provide adequate transport of O2 in the blood, decrease the workload of breathing, reduce stress on the myocardium.
- O2 is considered a medication and requires an order from a Dr. unless its an emergency / life/death situation.
- Make sure to give COPD patients enough O2 to bring stats up

**Hypoxia/hypoxemia**
*Hypoxemia* decrease in the arterial oxygen in the blood
*S/sx:* dyspnea, increased BP, cool extremities, decreased level consciousness(f first sign), agitation, coma, central cyanosis (late manifestation). Hypoxemia leads to hypoxia.

*Hypoxia:* Decreased oxygen perfusion to tissues and cells caused by problems outside of the respiratory system.
*S/sx:* (adults)Blue oral mucous membranes, drowsiness, inappropriate speech. Ask the physician about ordering an ABG
*Pediatrics:* feeding difficulty, inspiratory strider, nares flaring, expiratory grunting, eternal retractions.

**Oxygen administration devices**

*Low flow systems:*
* Nasal cannula: 6 max rate, 23-42%
* Simple mask: 6-8 max flow rate, 40-60%
* Partial non-rebreather: 8-11 max flow rate, 50-75%
* Non-rebreather mask: 12 max, 80-100%

*High flow systems:*
* Venturi mask: 4-6 max flow 26-28%, 6-8 max flow 30-40%

**Oxygen toxicity**
Caused by overproduction of oxygen free radicals which are by-products of cellular metabolism.
If oxygen toxicity is untreated these radicals can damage cells.

*S/sx:* Sub-sternal discomfort, paraesthesia, dyspnea, restlessness, fatigue, progressive respiratory difficulty, hypoxemia, atelectasis (can be seen on x-ray)

**Incentive spirometers**
Two types:
*volume:* measures amount of air on expiration
*Flow:* make sure they get the balls to move upward at the same time
- device encourages patient to inhale slowly and deeply to maximize lung inflation and alveolar expansion
  - used to prevent or treat atelectasis
  - Position patient up right, encourage use and set realistic goals (10 breaths/hour). You want to keep patients active in their recovery.
**Mini-nebulizer therapy**

- handheld apparatus that disperses a moisturizing agent or medication in the lungs. Makes a visible mist
- slow deep breaths through the mouth and hold a few seconds at the end of respiration
- coughing exercises to mobilize secretions
- diaphragmatic breathing/ pursed lipped breathing
- assess patient before tx and evaluate after.
  - the treatment is finished with mist is no longer coming out of the mask
  - Given to clear mucous
  - Generally ordered as a dose plus prn

**Postural drainage**

- each position contributes to effective drainage of different lobes of the lung
  - the secretions are removed by coughing
  - Instruct the pt to inhale bronchodilators and mucolytics before postural drainage begins because they improve drainage in the bronchial tree.
  - Reposition so gravity will make secretions more mobile
  - Precussion breaks up mucous:
    Assume a sitting position and bend slightly forward. This upright position permits a stronger cough.
    - Flex your knees and hips to promote relaxation and reduce the strain on the abdominal muscles while coughing.
    - Inhale slowly through the nose and exhale through pursed lips several times.
    - Cough twice during each exhalation while contracting (pulling in) the abdomen sharply with each cough.
    - Splint the incisional area, if any, with firm hand pressure or support it with a pillow or rolled blanket while
    - Vest physiotherapy helps increase compliance through high frequency wall oscillation. Not attached to a machine and works on batteries.

**Patient teaching : home oxygen**

No smoking around o2
Do not let the tank empty
Check flow rate
Talk with homecare about ordering enough o2
If patients is out of o2 you will see confusion and agitation
Perform family teaching and talk to the patients of their lifestyle and the changes that may be made.
**Endotracheal intubation**

**Indications:** anyone who can't maintain and open airway by themselves, coma patients

**Inserted by:** DR., EMT, A TRAINED NURSE, RESPIRATORY THERAPY

-you may put them in loose restraints so that they do not pull it out when they wake up.
-explain to them what's going on and why it's there
-communicate w/ blinks or writing board.

**Prevention of complications:** Administer adequate warmed humidity.

- Maintain cuff pressure at appropriate level.
- Suction as needed per assessment findings.
- Maintain skin integrity. Change tape and dressing as needed or per protocol.
- Auscultate lung sounds.
- Monitor for signs and symptoms of infection, including temperature and white blood cell count.
- Administer prescribed oxygen and monitor oxygen saturation.
- Monitor for cyanosis.
- Maintain adequate hydration of the patient.
- Use sterile technique when suctioning and performing tracheostomy

Guidelines for patient care/ suction
See chart 21-9 or see your skills manual.

**Tracheotomy:**
A surgical procedure where they make an opening into the trachea

**Tracheostomy tube:** The in-dwelling tube that is inserted into the trachea

**Tracheostomy:** the stoma that is left of the procedure, this may be temporary or permanent.
**Mechanical ventilation**

Most common infection is pneumonia V.A.P

-POSITIVE or Negative pressure device to maintain pressure and oxygenation.

**Indications**

Laboratory Values

- PaO2 $< 55$ mm Hg
- PaCO2 $> 50$ mm Hg and pH $< 7.32$
- Vital capacity $< 10$ mL/kg
- Negative inspiratory force $< 25$ cm H2O
- FEV1 $< 10$ mL/kg

Clinical Manifestations

- Apnea or bradypnea
- Respiratory distressed with confusion
- Increased work of breathing not relieved by other interventions
- Confusion with need for airway protection
- Circulatory shock

**INITIAL SETTINGS:** Set the machine to deliver the tidal volume required (10–15 mL/kg).

1. Adjust the machine to deliver the oxygen to maintain normal PaO2 (80–100 mm Hg). This setting may be high initially but will gradually be reduced based on arterial blood gas results.
2. Record peak inspiratory pressure.
3. Set mode (assist-control or synchronized intermittent mandatory ventilation) and rate according to the order given by the primary provider. (See the glossary for definitions of modes of mechanical ventilation.)
4. Set positive end-expiratory pressure (PEEP) and pressure support if ordered.
5. Adjust sensitivity so that the patient can trigger the ventilator with a minimal effort (usually 2 mm Hg negative inspiratory force).
6. Record minute volume and obtain arterial blood gases (ABGs) to measure carbon dioxide partial pressure (PaCO2), pH, and PaO2 after 20 minutes of continuous mechanical ventilation.
7. Adjust setting (FiO2 and rate) according to results of ABG analysis to provide normal values or those set by the primary provider.
8. If there is poor coordination between the breathing rhythms of the patient and the ventilator (i.e., if the patient is “fighting” or “bucking the ventilator”), assess for hypoxia and manually ventilate on 100% oxygen with a resuscitation bag.

**Prevention of VAP:**

Elevation of the head of the bed (30–45 degrees)

- Daily “sedation vacations” and assessment of readiness to extubate (see below)
- Peptic ulcer disease prophylaxis (with histamine-2 receptor antagonists, such as ranitidine [Zantac])
- Deep venous thrombosis (DVT) prophylaxis (see below)
- Daily oral care with chlorhexidine (0.12% oral rinses)

What is meant by daily “sedation vacations,” and how does this tie into assessing readiness to extubate?

- Protocols should be developed so that sedative doses are purposely decreased at a time of the day when it is possible to assess the patient’s neurologic readiness for extubation.
- Vigilance must be employed during the time that sedative doses are lower to ensure that the patient does not selfextubate.

What effect does DVT prophylaxis have on preventing VAP?

- The exact relationship is unclear. However, when appropriate, evidence-based methods to ensure DVT prophylaxis are applied

**NON INVASIVE POSITIVE PRESSURE VENTILATION**
USE OF MASK OR OTHER DEVICE TO MAINTAIN A SEAL AND PERMIT VENTILATION

CPAP: Pushes POS pressure into upper airway (pt can normally breathe independently)

Bipap: bilevel positive airway pressure: used for COPD patients having breathing issues at night. Last non invasive intervention before intubation.

- systematic assessment of all body systems
- In depth respiratory assessment including oxygen status
- Comfort/ rest/ communication needs
Assess equipment and settings

**Diagnosis**
- impaired gas exchange/ ineffective airway clearance/ risk for trauma/ impaired physical mobility/ impaired verbal communication/ defensive coping/ powerlessness.

**Collaborative problems:**
alterations in cardiac function: decreased cardiac output/ decreased perfusion/ decreased o2 levels

Barotrauma: "lung trauma" pneumothorax, compromise venous return

Pulmonary infection: increased WBC count, green sputum/ fever

**Planning**
Make goals! Maintenance of patent airway: you do not want the patient on the vent longer than needed
  - optimal gas exchange
  - absence of trauma
  - Adjustment to non verbal communication methods
  - Successful coping
  - Optimal mobility

**Interventions**

R/T enhancing gas exchange
- Monitor ABG and s/s/x of hypoxia
- auscultation of lung sound frequently
- analgesics
- monitor fluid balance (fluid overload with chf or copd)
  - you may need a collaborative approach

Effective airway clearance
  - assess lung sounds q2-4h
  - Auctioning, CPT, position changes, mobility
  - Humidification/medications
Trauma and infection
- Infection control measures
- Tube care*
- Cuff management
- Oral care*
- Elevate head of bed

Other interventions
Rom and mobility
Communication methods
Stress reduction: music / massage
Family teaching, emotional and coping support

Home care
Assess patient for weaning criteria:
- Vital capacity: 10–15 mL/kg
- Maximum inspiratory pressure (MIP) at least –20 cm H2O
- Tidal volume: 7–9 mL/kg
- Minute ventilation: 6 L/min
- Rapid/shallow breathing index: Below 100 breaths/minute/L; PaO2 >60 mm Hg with FiO2 <40%
- Monitor activity level, assess dietary intake, and monitor results of laboratory tests of nutritional status. Reestablishing independent spontaneous ventilation can be physically exhausting. It is crucial that the patient have enough energy reserves to succeed.
- Assess the patient’s and family’s understanding of the weaning process, and address any concerns about the process. Explain that the patient may feel short of breath initially and provide encouragement as needed. Reassure the patient that he or she will be attended closely and that if the weaning attempt is not successful, it can be tried again later.
- Implement the weaning method as prescribed (e.g., continuous positive airway pressure [CPAP], T-piece).
- Monitor vital signs, pulse oximetry, electrocardiogram, and respiratory pattern constantly for the first 20–30 minutes and every 5 minutes after that until weaning is complete. Monitoring the patient closely provides ongoing indications of success or failure.
- Maintain a patent airway; monitor arterial blood gas levels and pulmonary function tests. Suction the airway as needed.
- In collaboration with the primary provider, terminate the weaning process if adverse reactions occur. These include a heart rate increase of 20 bpm, systolic blood pressure increase of 20 mm Hg, a decrease in oxygen saturation to <90%, respiratory rate <8 or >20 breaths/min, ventricular dysrhythmias, fatigue, panic, cyanosis, erratic or labored breathing, paradoxical chest movement.
- If the weaning process continues, measure tidal volume and minute ventilation every 20–30 minutes; compare with the patient’s desired values, which have been determined in collaboration with the primary provider.
- Assess for psychological dependence if the physiologic parameters indicate that weaning is feasible and the patient still resists. Possible causes of psychological dependence include fear of dying and depression from chronic illness. It is important to address this issue before the next weaning attempt.