

## Tracheostomy & Oxygen Device Guide

### Oxygen Devices:

1. **Low Flow Nasal Cannula:** “An oxygen delivery device delivering flow rates of 1-6LPM and FiO<sub>2</sub> ranging from 24%-45%”



2. **Pediatric High Flow Nasal Cannula** – An oxygen delivery device delivering flow rates of 1-50L (depending on the interface) and FiO<sub>2</sub> range from 21-100%. If any pediatric patient requires >15 LPM and 50% FiO<sub>2</sub> on this specific device they must be admitted to PICU.
3. **Green High Flow Nasal Cannula** – An oxygen delivery device delivering flow rates of 6-15LPM and FiO<sub>2</sub> range from 45%-80%. Allows for increased FiO<sub>2</sub> for stable patients who want to eat, drink, talk, and take oral medications.



4. **Venturi Mask** – Delivers a flow range from 4-10 LPM, FiO<sub>2</sub> 35-50%. Device is used by turning the arrow to the FiO<sub>2</sub> that you want to deliver, then matching the corresponding LPM printed above the setting to achieve FiO<sub>2</sub>.



5. **Non-rebreather Face Mask**- delivers higher concentrations of O<sub>2</sub> due to the one way valve in the mask. The minimum flow rate for the mask is 10L/min, which delivers 60% FiO<sub>2</sub>. Flow rate can be increased to 15L/min, which may deliver 90% FiO<sub>2</sub>.



6. **Trach Collar:** RCS to set up humidified O<sub>2</sub>. RN to select the appropriate FiO<sub>2</sub>.



7. **High Oxygen Requirement:** Need for  $\geq 50\%$  fraction of inspired oxygen (FiO<sub>2</sub>) to maintain adequate oxygen saturation per provider order (**Policy PC 48**)
- Floor patients:
    - In an emergency, a nurse, respiratory care practitioner may place a patient on oxygen by nasal cannula or face mask, as needed, to provide immediate respiratory support without an order, provided the licensed independent provider (LIP) is notified, an order is entered in the medical record within 30 minutes of the application of oxygen therapy, and the clinical indication for emergency application of oxygen is documented in a note.
      - An emergency is defined as a new or worsening pulse oximetry reading of  $<90\%$ , in the setting of a dependable waveform, or any clinical evidence of hypoxemia or respiratory distress, such as cyanotic nail beds or lips, chest retractions, nasal flaring, or tripodging, in the absence of a dependable pulse oximetry waveform.
      - Subjective shortness of breath without any clinical indication of hypoxemia or respiratory distress does not constitute an emergency.
      - The LIP should be contacted for any new or worsening symptoms, regardless whether the criteria for emergency application of oxygen are met. In addition, the Rapid Response Team or Pediatric Emergency Team should be activated.

### **Additional Resources:**

- UCM Policy [PC48 Managing of New or Worsening Respiratory Insufficiency](#)
- [UCM Oxygen Devices Video](#)
- [High Flow Quick Video](#)
- Elsevier Skill [Noninvasive CPAP BiPAP](#)

# Tracheostomy:

## 1. Components:

- a. Trach and how to identify what size it is

These numbers are the inner diameter (ID) of the trach tube without the inner cannula, and the outer diameter (OD) of the trach

This number is the size of the trach tube that is generally used for reference

Shiley Flex trachs have this color-coded square for sizing reference, as listed below:

SKU#	I.D.	O.D.	INNER CANNULA I.D.	LENGTH	INNER CANNULA SKU#
4CN65H	6.5 mm	9.4 mm	5.5 mm	62 mm	4IC65
5CN70H	7.0 mm	10.1 mm	6.0 mm	66 mm	5IC70
6CN75H	7.5 mm	10.8 mm	6.5 mm	74 mm	6IC75
7CN80H	8.0 mm	11.4 mm	7.0 mm	77 mm	7IC80
8CN85H	8.5 mm	12.2 mm	7.5 mm	79 mm	8IC85
9CN90H	9.0 mm	12.7 mm	8.0 mm	79 mm	9IC90
10CN10H	10.0 mm	13.8 mm	9.0 mm	79 mm	10IC10

This complete number is the product reference number, also called the catalogue number, or SKU #

CN = Cuffed  
UN = Uncuffed  
75=The ISO (International Standard Organization) size, also the size of the inner diameter of the trach without the inner cannula in place. Will vary depending on trach size  
H=Disposable inner cannula (R would indicate reusable)

- b. Obturator & its purpose
  - i. Used in initial insertion and for emergency reinsertion
- c. Inner cannula
  - i. Note difference between disposable and reusable
- d. Trach collar
  - i. The first tracheostomy tube and tie change must be performed by the primary surgical service or their designees.
- e. Difference between cuffed and non-cuffed trachs
  - i. Cuffed- facilitates ventilator support and protection from aspiration

- ii. Non-cuffed- for spontaneously breathing patients and can aid in weaning
- f. Difference between tracheostomy and laryngectomy
  - i. Tracheostomy- Breathing hole in neck. Upper airway intact. Can intubate although may be difficult.
  - ii. Obligate Trach/Laryngectomy- Upper airway removed. Stoma is the only airway for the patient! Cannot be intubated or have oxygen given by mouth!!

**2. Emergency equipment list to have at bedside. This equipment is needed in addition to equipment needed for daily care**

- a. Oxygen- Set up
- b. Appropriate-sized resuscitation bag and mask
- c. Suction equipment and catheters
- d. Spare tracheostomy tube of same size and brand or similar size/brand, if available
- e. Step down tracheostomy tube of same or similar size/brand, if available, template of the custom tracheostomy tube, individualized alternative airway device
- f. Obturator for current tracheostomy tube
- g. Water-based lubricant
- h. Scissors
- i. Tracheostomy ties
- j. Syringe, if cuffed tracheostomy present

**3. Mucus Plug**

- a. Presents as poor ventilation
- b. Attempt to pass suction catheter
  - i. If able to pass suction catheter
    - 1. Suction and then change inner cannula
    - 2. Reassess
  - ii. If unable to pass suction catheter
    - 1. Prepare to replace trach tube
    - 2. Escalate to appropriate team based on patient's presenting condition
- c. **\*Prevent mucous plugs through good trach care: suctioning, humidity, nebulizers, and Chest PT\***

**4. Trach decannulation: This protocol is in development for all inpatient areas.**

- Assess:
  - 1. Is the patient in distress?
    - a. **No**—initiate RRT for reinsertion
      - i. Sit patient up >45 degrees

- ii. Gather and prep emergency equipment for RRT or Respiratory Care Services
- iii. Oxygenate via mouth (with stoma occluded) or via stoma (obligate trach) as appropriate

*\*Pediatric RNs are expected to change the trach routinely on Fridays q week and also during emergencies/distress. Always with 2 trained providers (RNs, RTs, or Caregivers).*

- b. **Yes-** Call Dr. Cart or Anesthesia as appropriate
  - i. Sit patient up >45 degrees
  - ii. Ventilate mouth vs. stoma as appropriate.
  - iii. Known difficult airway can be escalated to a Dr. Airway
  - iv. Gather and prep emergency equipment

## 5. Trach Care

- a. Clean stoma site and surrounding skin on neck with soap and water Q shift and PRN. Avoid allowing soap to enter the airway. Rinse and pat dry.
- b. Replace dressing (split gauze) q shift and PRN
- c. Change Inner Cannula: **Have staff members demonstrate**
  - a. If disposable inner cannula present, change Q shift
  - b. If non-disposable inner cannula present, cleanse Q shift and PRN with sterile water
- d. Tracheostomy ties should be changed at least every 48 hours and PRN for adult patients. Tracheostomy ties should be changed at least every 24 hours and PRN for pediatric patients.
- e. Suction patient PRN: **Have staff member demonstrate**
  - i. Ensure the suction vacuum regulator is less than 150 mm Hg
  - ii. Do not apply suction during insertion.
  - iii. Ensure that each suction pass does not last longer than 15 seconds to minimize decreases in oxygen saturation.
  - iv. Perform one additional pass of the suction catheter if secretions remain in the airway and the patient is tolerating the procedure. Allow a minimum of 60 seconds between passes for the patient to recover before the next pass.
  - v. Consider administering 100% oxygen to the patient between each pass of the suction catheter. At the completion of the suctioning procedure, consider administering 100% oxygen for 60 seconds.
  - vi. Return supplemental oxygen to the baseline level.
- f. Respiratory Therapist (or RN in pediatrics) will change tracheostomy tube as ordered.

## 6. Speaking Valve

- a. Speech and swallow should be consulted if a TSV is ordered.
- b. When a patient uses a TSV, the tracheostomy cuff must be deflated.**
- c. TSVs should not be worn while the patient is sleeping or if the patient is short of breath. Patients who tolerate wearing a TSV should wear the TSV while eating. If the patient is allowed to eat per medical order, the tracheostomy cuff should be deflated (unless otherwise ordered).

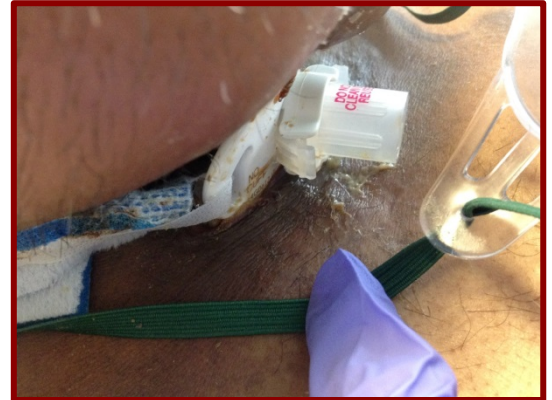
## Additional Resources:

- [Tracheostomy Inservice Video](#)

# Trach Care: Prevention and Management of Common Skin Conditions and Pressure Injuries

**Moisture Associated Skin Damage (MASD):** moisture on the skin from any source, including mucous secretions from trachs, can lead to MASD. MASD can result superficial erythema or lead to partial – or full-thickness skin loss. **Prevention** includes limiting the exposure of the skin to moisture. For copious secretions or when humidity is needed, more frequent care of the trach (including dressing changes) may be necessary.

**Management:** Taking care to avoid trach opening, protective dressings or a thin layer of clear zinc could be applied below the trach opening. With every shift trach care, the secretions would be cleansed and apply new dressing.



**Medical Device Related Pressure Injury (MDRPI):** occur secondary to pressure from a device, risk is increased in the presence of MASD. **Prevention** includes ensuring the trach ties are secure enough to protect the airway, but not so tight as to create intense pressure. In most cases, you should be able to insert a finger between the tie and skin.

The trach plate is another concern for MDRPI, particularly if facial/neck edema. A non-adhesive foam dressing can be cut to mimic split gauze dressings and used to reduce pressure.

**Management:** Initiate wound care according to UCM guidelines, a wound care nurse consult is also advised for any pressure injury. Refer to PC 159.



**Sutures:** newly created tracheostomies are sutured into place. Typically these sutures are removed by ENT/service in 7 days. If you note sutures in longer than 7 days, please page provider to request removal. Prolonged suture use can limit the ability to provide interventions and increase MDRPI



## Routine Trach Care

- 1) Clean the site and stoma and non-disposable inner cannula, if present, of a tracheostomy with sterile water (unless otherwise ordered) using aseptic technique every shift and PRN. If inner cannula is disposable, change out every shift and PRN. Dry the peri-stoma area.
- 2) Change the dressing every shift and PRN (if frequent secretions). Trach ties are changed every 48 hours and PRN.
- 3) Ensure the trach ties are secure but not overly tight.

Refer to Elsevier Skills for additional information regarding trach care, if needed.



## UCM Nursing Tip Sheet: Respironics V60 BiPAP/CPAP

### V60 BiPAP/CPAP Screen Layout

Measured parameters →

Adjusting IPAP will impact volumes →

Adjusting EPAP/FiO2 will impact oxygenation →

Backup rate for safety. (Your patient will be spontaneous on this therapy.) ←

### To activate Standby

1. Press the **Standby** tab. The **Entering Standby** window appears.
2. Disconnect the patient from the ventilator.

The ventilator will not enter Standby until the patient is disconnected. It continues ventilation while waiting for the patient to be disconnected. The Standby mode gives the clinician up to 60 seconds to disconnect the patient from the ventilator. If after 60 seconds no disconnection is detected, the Standby mode cancels.

## Interfaces



Apply “two-finger” rule to application of the straps.

Ensure a good seal is achieved without applying excessive pressure to skin. (a slight leak is preferred).



## Contraindications for NPPV for Acute Respiratory Failure

ALOC (cannot remove mask independently)

## RESTRAINTS!!!

Inability to protect airway

Copious secretions

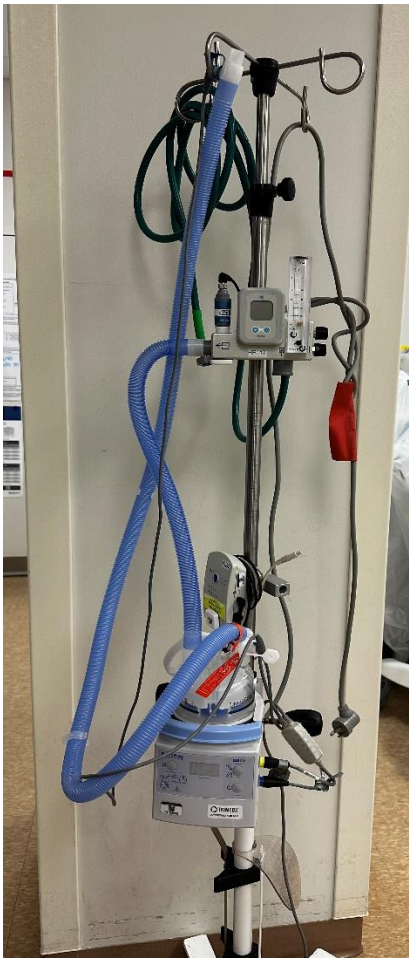
Respiratory arrest

Recent upper airway/ upper GI surgery





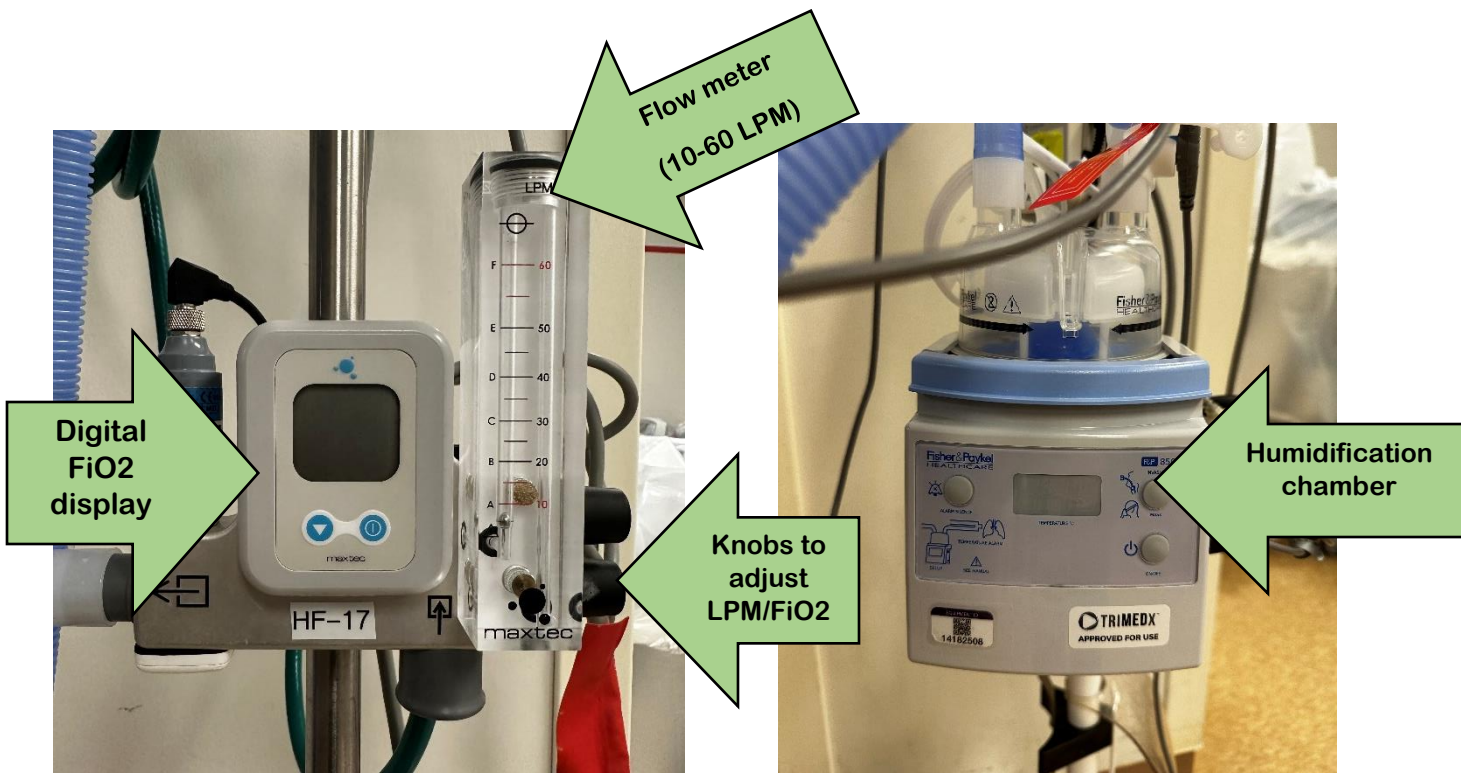
# UCM Nursing Tip Sheet: Heated and Humidified High Flow Oxygen Therapy



\*Interface comes in S,M and L

\*For sizing, nasal prongs should occlude approx. 50% of nares

\*Straps should sit on crown of head to avoid pressure injuries on or around ears



## The University of Chicago Medical Center Policy and Procedure Manual

Policy: PC 48 Management of New or Worsening Respiratory Insufficiency Outside an ICU

Issued: October 2000

Revised: November 2022

### **Policy:**

It is the policy of the Medical Center and Medical Staff that the following be implemented as it relates to the management of new or worsening respiratory insufficiency outside of the intensive care unit (ICU):

- A medical order must be entered for all patients requiring oxygen therapy.
- Patients with new or worsening respiratory insufficiency requiring positive pressure ventilation, to maintain adequate ventilation and/or oxygenation must be managed in a critical care area.
- Pediatric patients should be managed in a critical care area if:
  1. Requiring  $FiO_2 > 50\%$  and/or
  2. Above the recommended initial flow rate for pediatric High Flow Nasal Cannula (HFNC), calculated as 1L/kg/min, to a maximum of 15L/min.

Refer to pediatric guidelines and Agile MD pathways for details on pediatric management.

### **Definitions:**

1. Non-invasive positive pressure ventilation (NIPPV): Continuous positive airway pressure (CPAP) or bi-level positive airway pressure (e.g. BiPAP) delivered via face mask, nasal mask, or other device that ensures delivery of positive end-expiratory pressure
2. Low Flow Nasal Cannula: “An oxygen delivery device delivering flow rates of 1-6LPM and  $FiO_2$  ranging from 24%-45%”
3. Green High Flow Nasal Cannula – An oxygen delivery device delivering flow rates of 6-15LPM and  $FiO_2$  range from 45%-80%. Allows for increased  $FiO_2$  for stable patients who want to eat, drink, talk, take oral medications
4. High Flow Nasal Cannula (HFNC): an alternative means of non-invasive positive pressure respiratory support. The apparatus comprises an air/oxygen blender, an active heated humidifier, a single limbed heated circuit, and a nasal cannula specifically designed for high flow therapy (See appendix A)  
Adult flow rates: 10-60L/min  
Pediatric flow rates: Up to 2L/kg/min
5. High Oxygen Requirement:

- Need for  $\geq 50\%$  fraction of inspired oxygen (FIO<sub>2</sub>) to maintain adequate oxygen saturation per provider order

## 6. Critical Care Area: All Intensive Care Units and Emergency Departments

### Procedure:

#### 1. Stable patients that may be managed in the general care areas include:

- Adult and Pediatric patients with high oxygen requirements receiving comfort care
- Pediatric patients on Comer 5 receiving HFNC at 1 L/kg/min, to a maximum of 15L/min of HFNC and/or  $\leq$ FiO<sub>2</sub> 0.5
- Adult patients with an established program of CPAP or NIPPV for obstructive sleep apnea
- Adult patients being evaluated for obstructive sleep apnea with an auto-titrating NIPPV device
- Adult patients with chronic high oxygen requirements responsive to titration per provider's orders.
- Adult patients with stable or decreasing levels of oxygen administration by nasal cannula, Venturi mask, face mask, non-rebreather mask, trach collar or HFNC.

#### 2. In an emergency, a nurse, respiratory care practitioner may place a patient on oxygen by nasal cannula or face mask, as needed, to provide immediate respiratory support without an order, provided the licensed independent provider (LIP) is notified, an order is entered in the medical record within 30 minutes of the application of oxygen therapy, and the clinical indication for emergency application of oxygen is documented in a note.

- An emergency is defined as a new or worsening pulse oximetry reading of  $<90\%$ , in the setting of a dependable waveform, or any clinical evidence of hypoxemia or respiratory distress, such as cyanotic nail beds or lips, chest retractions, nasal flaring, or tripodding, in the absence of a dependable pulse oximetry waveform.
- Subjective shortness of breath without any clinical indication of hypoxemia or respiratory distress does not constitute an emergency.
- The LIP should be contacted for any new or worsening symptoms, regardless whether the criteria for emergency application of oxygen are met. In addition, the Rapid Response Team or Pediatric Emergency Team should be activated.

#### 3. A patient with new or worsening respiratory insufficiency requiring NIPPV must have an order for transfer to a critical care area (e.g. ICU).

#### 4. A patient with new or worsening respiratory insufficiency outside a critical care area who requires NIPPV must have 1:1 care by an appropriately educated and competent staff member (critical care nurse, licensed independent provider or respiratory therapist) until transferred to a critical care area.

#### 5. Stable patients with high oxygen requirements, HFNC or NIPPV (see definition # 5) may be managed on a general floor with continuous pulse oximetry monitoring. Medical orders are required to clarify patient specific oxygen requirements and goals of therapy. See noted limitations for pediatric patients on Comer 5 indicated above.

#### 6. Deviations from the policy must be approved by physicians with privileges in Critical Care

Medicine and documented in the patient's medical record.

The placement of chronic ventilated patients on a general medical floor is not permitted.  
Any exception to this policy requires nursing executive director approval.

**Interpretation, Implementation and Revision:**

The Departments of Nursing, Critical Care Medicine, and Respiratory Care are responsible for the interpretation, implementation and revision of this policy.

**Attachments:**

Attachment A: High Flow Nasal Cannula Apparatus  
Attachment B: Supplemental Oxygen Mask Devices  
Attachment C: Oxygen Tank Flow Rate and Capacity

**Cross References:**

Pediatric Acute Inpatient Bronchiolitis Guidelines, non-ICU

Pediatric High Flow Nasal Cannula Guideline

Agile MD Pathway, Comer Emergency Department/Comer 5, High Flow Nasal Cannula Initiation for Non-ICU Settings

Agile MD Pathway, Comer Inpatient High Flow Nasal Cannula Maintenance and Weaning

**References:**

1. Lee JH, Rehder JK, Williford L, Cheifetz IM, Turner DA. Use of high flow nasal cannula in critically ill infants, children, and adults: a critical review of the literature. *Intensive Care Med* 2013;39:247-257
2. Kernick J., & Magarey, J. (2010). What is the evidence for the use of high flow nasal cannula oxygen in adult patients admitted to critical care units? A systemic review. *Australian Critical Care*. 23,(2), 53-70.
3. Nishimura, Masaji. "High-flow nasal cannula oxygen therapy in adults." *Journal of intensive care* 3.1 (2015): 1.
4. Roca, O., Torres, F., & Mascians, J.R. (2010). High flow oxygen therapy in acute respiratory failure. *Respiratory Care*. 55,(4), 408-413.
5. Boyer, A., Vargas, F., Delacre, M., Saint-Leger, M., Clouzeau, B., Hilbert, G., & Gruson, D. (2010). Prognostic impact of high flow nasal cannula oxygen supply in an ICU patient with pulmonary fibrosis complicated by acute respiratory failure. *Intensive Care Medicine*, Sept 18, 2010.
6. Walsh, B. K., Czervinske, M. P., & DiBlasi, R. M. (2010). *Perinatal and Pediatric Respiratory Care*, 3rd Ed. St. Louis, MS: Saunders Elsevier.

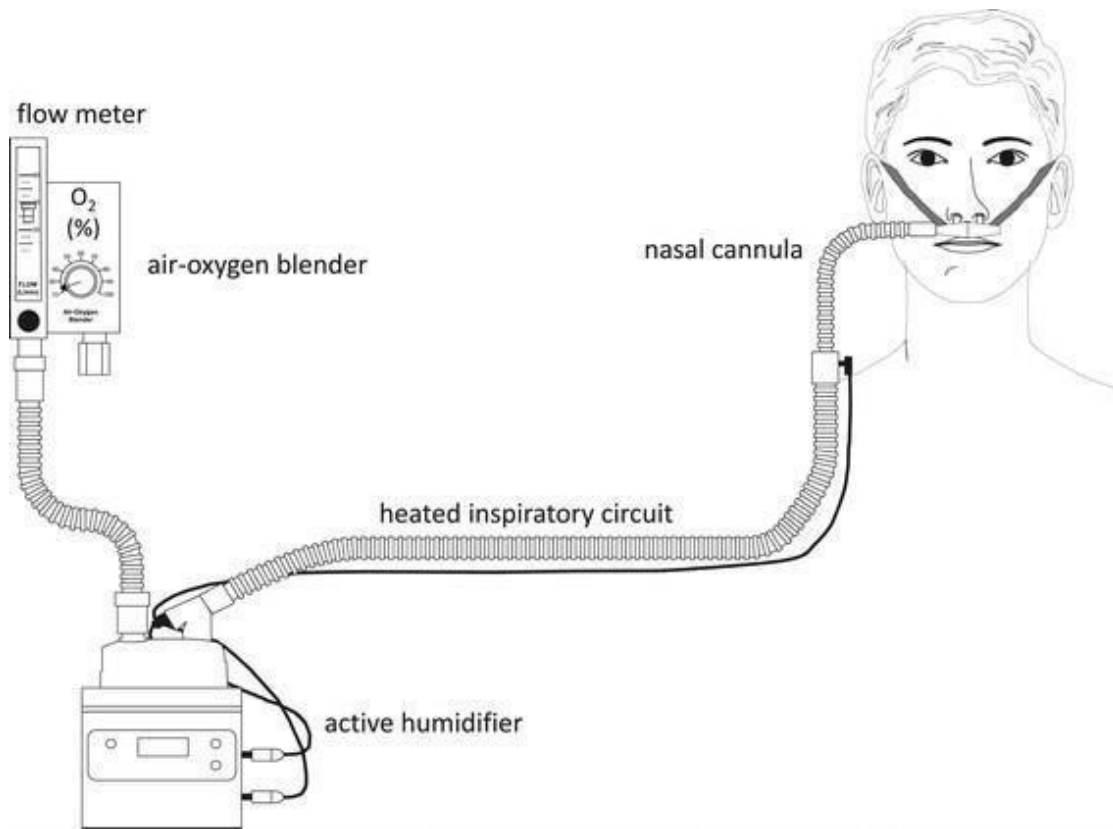
**Applicable Elsevier Skills:**

High-Flow Nasal Oxygen Therapy (Respiratory Therapy)





Ventilation: CPAP, NIPPV, and HFNC (Neonatal)- CE






Oxygen Therapy and Oxygen Delivery (Pediatric)- CE

## Attachment A: High Flow Nasal Cannula Apparatus



## Attachment B: Supplemental Oxygen Devices

DEVICE	FiO2	O2 FLOW RANG	COMMENTS	CURRENTLY AVAILABLE?	
				ADULT	PEDIATRIC
LOW FLOW NASAL CANNULA	24-44%	1-6 LPM	Can use Bubble Humidifier for flows > 4 lpm; no supporting studies for bubble humidifier use; HAPU on ears, nares; widely varied FiO2 delivered, depending on inspiratory demand	YES	YES
HIGH FLOW – GREEN 	45-80%	6-15 LPM	High Flow cannula allowing for up to 15 liters of flow and the ability to talk, eat, drink, and take medications.	YES	NO
HIGH FLOW NASAL CANNULA See attachment A for image	21%-100%	1-60 LPM	High Flow Nasal Cannula (HFNC): the administration of air (=/- supplemental oxygen) at flow rates that exceed the inspiratory demand of the patient. The air is heated (37°C) and humidified (100%)	YES	YES
SIMPLE MASK 	35-50%	5-10 LPM	Fit dependent; Rebreathing of exhaled CO2 at flow rates < 10LPM; May build mask from 3-in-1 mask; closed mask causes feelings of claustrophobia leading to poor compliance; must be removed to drink, eat, talk, take pills; risk of aspiration of emesis.	YES	YES-ONLY PEDIATRIC SIZE
PARTIAL-REBREATHER FACEMASK 	40-70%	6-10 LPM	Fit dependent; Rebreathing of exhaled CO2 at flow rates < 10LPM; Must build mask by removing valve-flaps on Non-Rebreather mask; closed mask causes feelings of claustrophobia leading to poor compliance; must be removed to drink, eat, talk, take pills; risk of aspiration of emesis; Regulate flow to keep reservoir bag 1/3 to 1/2 full.	YES	YES-ONLY PEDIATRIC SIZE
NON-REBREATHER FACEMASK 	60-100%	10-15 LPM	Fit dependent; Rebreathing of exhaled CO2 at flow rates < 10LPM; Closed mask causes feelings of claustrophobia leading to poor compliance; must be removed to drink, eat, talk, take pills; risk of aspiration of emesis; Regulate flow to keep reservoir bag full. May provide minimal positive-pressure at high flows.	YES	YES-ONLY PEDIATRIC SIZE

<b>VENTURI MASK</b> 	24-31%; 30-55%	2-4 LPM; 4-14 LPM	Fit dependent; Closed mask causes feelings of claustrophobia leading to poor compliance; must be removed to drink, eat, talk, take pills; risk of aspiration of emesis; add aerosol ring-adapter to protect venturi-ports to allow for room-air entrainment, high-flow room-air entrainment can be noisy; must change adapters for correct FiO2 delivery.	<b>YES</b>	<b>YES-ONLY PEDIATRIC SIZE</b>
<b>COOL AEROSOL MASK</b> 	28-90%	15+LPM	Aerosol mask attached to corrugated tubing and large O2 Nebulizer. Fits over nose and mouth. Low gas-flow at higher FiO2s.	<b>YES</b>	<b>YES</b>
<b>FACE TENT</b> 	28-90%	15+LPM	Under-the-chin style aerosol mask attached to corrugated tubing and large O2 Nebulizer. This style mask is used when a regular aerosol mask can't be used to sit on the face. Low gas-flow at higher FiO2s.	<b>YES</b>	<b>YES</b>
<b>TRACH COLLAR</b> 	28-90%	15+LPM	Aerosol mask that fits over tracheostomy tube with corrugated tubing and large O2 Nebulizer. Low gas-flow at higher FiO2s.	<b>YES</b>	<b>YES</b>
<b>OXYMASK*</b> 	24-90%	1-15LPM	Aerosol mask that fits over nose and mouth, Openings for fluids and oral medication, No buildup of heat or humidity under the mask, Unrestricted communication, FIO2 dependent on work of breathing.	<b>YES</b>	<b>NO</b>

\* GI Procedures will have access to Oxymask

Last Reviewed: July | 2021



## Attachment C: Oxygen Tank Flow Rate and Capacity

**Example:** If a cylinder has **1500 PSI** remaining and the flow is **5 liters per minute**, the cylinder will last **84 minutes**.

RESULTS ARE IN MINUTES		OXYGEN LITER FLOW									
		1	2	3	4	5	6	8	10	12	15
E-Cyl TANK PRESSURE	2200	616	308	205	154	123	103	77	62	51	41
	2000	560	280	187	140	112	93	70	56	47	37
	1750	490	245	163	123	98	82	61	49	41	33
	1500	420	210	140	105	84	70	53	42	35	28
	1250	350	175	117	88	70	58	44	35	29	23
	1000	280	140	93	70	56	47	35	28	23	19
	750	210	105	70	53	42	35	26	21	18	14
	700	196	98	65	49	39	33	25	20	16	13
**RESULTS ARE IN MINUTES**											

Remaining pressure (PSI) in E-size cylinder.

Please use all O<sub>2</sub> tanks down to 700psi (red area) if possible.

Oxygen flow (liters per minute)

Number of minutes the cylinder will last, based on remaining PSI and oxygen flow.