HIGH FLOW NASAL CANNULA

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HEATED AND HUMIDIFIED

- Standard oxygen therapy delivered through a nasal cannula or another device such as a non-rebreather, is cold (not warmed) and dry (not humidified).
  - This can lead to airway inflammation, which can increase airway resistance and impair mucociliary function possibly leading to decrease secretion clearance.
  - A significant amount of calories can also be expended in individuals to both warm and humidify gas during normal breathing
- HFNC can warm (to 37^{o}C) and humidify gas, which can decrease airway inflammation, maintain mucociliary function, improve mucous clearance and reduce the caloric expenditure in acute respiratory failure.

INSPIRATORY DEMANDS

- Flow can be adjusted to match patient's peak inspiratory flow rate (PIF)
- Normal PIF is 30-60ml/min
- Sick patients can be above 120ml/min

- Dead spaces increases with acute illness
  - Higher flows can "wash out" dead space

PEEP?

- Can vary between patient
  - Depends on size of patient, liter flow and open vs closed mouth breathing
  - Physiologic studies show HFNC improves FRC likely by PEEP

COMFORT

- More comfortable than bipap
- Better for pure oxygenation issues
- Can eat if not too dyspneic

- Lu et al. Medicine: May 22, 2020 - Volume 99 - Issue 21 - p e20393
- Review of non-IVU patient with covid 19 in Wuhan
- Signs of failing optiflow needing intubation
  - 1. respiratory rate >40 bpm;
  - 2. no sign of improvement in high respiratory load;
  - 3. large quantity of airway secretions;
  - 4. respiratory acidosis (pH < 7.35); or
  - 5. <90% SpO_2 for at least 5 min.

WHO FAILS?

- Clinical status: RR> 30, altered mental status, increased work of breathing,pO2< 60
- ROX Index
  - ROX Index = SpO_2/FiO_2*, % / Respiratory rate, breaths/min

Result:

Please fill out required fields.

» Next Steps | **Evidence** | Creator Insights

Type of O_2 delivery	Flow rates, L/min	FiO_2
Nasal cannula	1-6	~4% FiO_2 added above room air* per 1 L/min • Room air = 21% • 1 L/min = 25% • 2 L/min = 29% • 3 L/min = 33% • 4 L/min = 37% • 5 L/min = 41% • 6 L/min = 45%
Simple face mask	~6-12	35-60%*
Non-rebreather mask	10-15	~70-90%
High-flow nasal cannula	Up to 60	30-100%

*Varies based on respiratory rate and minute ventilation.

FACTS & FIGURES

Interpretation:

PITFALLS

- Rox index does not account for pO2 difference
- Patients with sats of 88% but one with pO2 55 and one with pO2 90

- Happy hypoxics

- Pneumomediastinum

UH GUIDANCE

- Prepandemic
  - ICU: All HFNC and higher levels of respiratory support in ICU
  - PCU; O2 including face mask/NRB without end organ effects
- Pandemic Care:
  - Little disruption of limited resources, minimal change staffing levels
  - ICU: HFNC more than 35/80 and full code
  - PCU: HFNC less than 35/80 for acute hypoxic respiratory failure, stable hemodynamically, absent end organ damage, OR any level DNR

UH GUIDANCE

- Contingency (current level)
  - Limited access to staff, beds, etc but not at Crisis Standards
  - ICU: HFNC more than 50/100 or less than 50/100 with worsening vitals, AMS, end organ damage and full code
  - PCU: HFNC less than 50/100, stable hemodynamics, absent end organ damage, OR DNI any level of flow

SRMC OPTIFLOW

- Goal flow < 50 liters, 80% fio2 and do not have other ICU level of care needs
- Rounded on routinely/scheduled by RT
  - Q2hours by RN, MD and/or RT x 6 hours then q4h afterward
- Confirmed DNR/I may be above 50 liters, 80% with order from physician
- ICU assistance should be obtained for rapidly escalating needs, initiation of optiflow, or increasing level of support
- Exclusion: obtunded/comatose, RR > 30, rapid decline in status

BIPAP

- Prepandemic
  - All bipap for acute hypercarbic or hypoxic respiratory failure in ICU

BPAP

- Consideration ICU consult if one or more exclusion criteria present.
- Inclusion criteria: pH > 7.25, covid or non-covid, alert, RR < 30
  - Post-extubation – should be monitored in ICU for > 12-24 hours after extubation to bipap, if possible
  - DNR patients may be initiated on SAC unit if don't meet inclusion criteria after discussion with SAC physician and ICU physician
- Exclusion criteria: combative or comatose, RR > 30, other ICU indications (drips, more frequent than q2h care)

BPAP CARE

- Must be “SAC” status (not floor)
- Rounded on by RT q4h
- Physician must order bipap under “RT Bipap” specifying rate, I:E, fio2
  - Ask RT for assistance in determining parameters
- After initiation, must be monitored q2h x 6 hours to determine if responding appropriately