

# Respiratory protocol for COVID-19

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- a. Goal O<sub>2</sub> sat 92-96%. Higher and lower O<sub>2</sub> associated with mortality.
  - i. Initiate humidified nasal cannula (up to 6 lts/min).
  - ii. For higher O<sub>2</sub> requirements use non-rebreather mask (10-15 lts/min, titrate FIO<sub>2</sub> up to 100%).
  - iii. If O<sub>2</sub> sats are persistently < 92% on 100% NRB mask, switch to high flow nasal cannula (HFNC) when available. Start HFNC at 30 lts/min, then increase FIO<sub>2</sub> up to 100%, if still hypoxic increase flow rate by 10lts/min up to 60 lts/min to achieve goal sats. Patient should wear a surgical mask at all times. Remove humidification if possible to minimize aerosolization and place patient in negative pressure room when available.
  - iv. Avoid using non-invasive ventilation (CPAP/BiPAP) in COVID-19 positive patients due to increased risk of aerosolization.
- b. Perform awake prone ventilation multiple times a day as tolerated.
  - i. Patient should be alert and able to do it voluntarily.
  - ii. Tape NC to nose. Allow patient to lay prone in bed as tolerated.
  - iii. Has shown improved oxygenation in COVID-19 patients regardless of ARDS due to improved aeration of dependent lung.
- c. **Call CCM in the following situations;**
  - i. Patient develops respiratory distress
  - ii. Patient is unable to maintain O<sub>2</sub> sats  $\geq 88\%$  on 100% non-rebreather mask or  $\geq 90\%$  on HFNC at 90% FIO<sub>2</sub>, 60 lts/min flow.
- d. In both intubated and non-intubated patients, bronchodilators should be given as metered-dose inhalers as nebulizers increase aerosolization.
- e. Nebulizer
  - i. No indication in COVID-19 patients without asthma/copd history
  - ii. Only use if there is no other option for drug delivery
- f. Airway clearance
  - i. Reports from China and Italy indicate that some patients develop copious thick secretions leading to mucus plugging and lung collapse. Options limited as bronchoscopy, nebulizers and airway clearance techniques are aerosol generating.
  - ii. Airway clearance and nebulizers should be used only in select ventilated patients (closed circuit) with thick secretions to avoid lung collapse that would require bronchoscopy.
  - iii. Can use nebulized hypertonic (3-7%) saline once daily in patients noted to have thick secretions. Will need to be done by a respiratory therapist.
    - a. Side effects can include bronchoconstriction
    - b. Pre-treat with albuterol 2.5mg just prior to delivery
    - c. Start with 3% to assess response and bronchoconstriction

- iv. Avoid N-acetylcysteine due to frequent dosing requirements.
- v. Chest PT
- vi. Avoid oscillating positive expiratory pressure and cough assist devices

## Ventilator protocol for COVID-19

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- 1. Ventilator Recommendations
  - a. ARDSnet protocol
    - i. Low tidal volume strategy (6 ccs/kg if IBW)

NIH PREDICTED BODY WEIGHT (PBW) / TIDAL VOLUME CHART															
MALES								FEMALES							
HEIGHT		PBW	4	5	6	7	8	HEIGHT		PBW	4	5	6	7	8
Feet	Inches	Male	ml/kg	ml/kg	ml/kg	ml/kg	ml/kg	Feet	Inches	Female	ml/kg	ml/kg	ml/kg	ml/kg	ml/kg
4' 10"	58	45.4	180	230	270	320	360	4' 7"	55	34	140	170	200	240	270
4' 11"	59	47.7	190	240	290	330	380	4' 8"	56	36.3	150	180	220	250	290
5' 0"	60	50	200	250	300	350	400	4' 9"	57	38.6	150	190	230	270	310
5' 1"	61	52.3	210	260	310	370	420	4' 10"	58	40.9	160	200	250	290	330
5' 2"	62	54.6	220	270	330	380	440	4' 11"	59	43.2	170	220	260	300	350
5' 3"	63	56.9	230	280	340	400	460	5' 0"	60	45.5	180	230	270	320	360
5' 4"	64	59.2	240	300	360	410	470	5' 1"	61	47.8	190	240	290	330	380
5' 5"	65	61.5	250	310	370	430	490	5' 2"	62	50.1	200	250	300	350	400
5' 6"	66	63.8	260	320	380	450	510	5' 3"	63	52.4	210	260	310	370	420
5' 7"	67	66.1	260	330	400	460	530	5' 4"	64	54.7	220	270	330	380	440
5' 8"	68	68.4	270	340	410	480	550	5' 5"	65	57	230	290	340	400	460
5' 9"	69	70.7	280	350	420	490	570	5' 6"	66	59.3	240	300	360	420	470
5' 10"	70	73	290	370	440	510	580	5' 7"	67	61.6	250	310	370	430	490
5' 11"	71	75.3	300	380	450	530	600	5' 8"	68	63.9	260	320	380	450	510
6' 0"	72	77.6	310	390	470	540	620	5' 9"	69	66.2	260	330	400	460	530
6' 1"	73	79.9	320	400	480	560	640	5' 10"	70	68.5	270	340	410	480	550
6' 2"	74	82.2	330	410	490	580	660	5' 11"	71	70.8	280	350	420	500	570
6' 3"	75	84.5	340	420	510	590	680	6' 0"	72	73.1	290	370	440	510	580
6' 4"	76	86.8	350	430	520	610	690	6' 1"	73	75.4	300	380	450	530	600
6' 5"	77	89.1	360	450	530	620	710	6' 2"	74	77.7	310	390	470	540	620
6' 6"	78	91.4	370	460	550	640	730	6' 3"	75	80	320	400	480	560	640

- ii. Goal O2 sat 92-96% (higher and lower sats associated with mortality).
- iii. Goal plateau pressure < 30 cms of H2O.
- iv. Goal pH > 7.3. If pH 7.15-7.30: Increase RR until pH > 7.30 or PaCO2 < 25 (Maximum set RR = 35).
- v. Conservative fluid strategy. Goal urine output > 0.5ml/kg/hr
- b. Sedation: Goal RASS for intubated patients is 0 to -1. Goal is to minimize sedation while ensuring oxygenation along with keeping the patient from self-extubation.

Score	Classification	(RASS)
+4	Combative	Overtly combative or violent; immediate danger to staff
+3	Very agitated	Pulls on or removes tube(s) or catheter(s) or has aggressive behavior toward staff
+2	Agitated	Frequent non-purposeful movement or patient-ventilator dyssynchrony
+1	Restless	Anxious or apprehensive but movements not aggressive or vigorous
0	Alert and calm	Spontaneously pays attention to caregiver
-1	Drowsy	Not fully alert, but has sustained (more than 10 seconds) awakening, with eye contact, to voice
-2	Light sedation	Briefly (less than 10 seconds) awakens with eye contact to voice
-3	Moderate sedation	Any movement (but no eye contact) to voice
-4	Deep sedation	No response to voice, but any movement to physical stimulation
-5	Unarousable	No response to voice or physical stimulation

c. Weaning

- i. Wean FIO<sub>2</sub> and PEEP based on table below. Preferentially wean FIO<sub>2</sub> first before PEEP to maintain sats between 92-96%. **Discuss with pulmonary consult for clarification on questions.**

**Higher PEEP/lower FiO<sub>2</sub>**

<b>FiO<sub>2</sub></b>	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.5
<b>PEEP</b>	5	8	10	12	14	14	16	16

<b>FiO<sub>2</sub></b>	0.5	0.5-0.8	0.8	0.9	1.0	1.0
<b>PEEP</b>	18	20	22	22	22	24

- ii. Conduct a Spontaneous Breathing Trial daily when;
1. The cause of the respiratory failure has improved
  2. Patient awake and following commands
  3. Minimal secretions
  4. FiO<sub>2</sub> ≤ 0.40 and PEEP ≤ 5 and SpO<sub>2</sub> ≥ 90
  5. pH > 7.25
  6. Hemodynamic stability (no or low dose vasopressor medications)

d. Spontaneous Breathing Trial

- i. Trial of up to 120 minutes of spontaneous breathing with FiO<sub>2</sub> ≤ 0.40 and PEEP 5
- ii. Place on CPAP ≤ 5 cmH<sub>2</sub>O with PS 5
- iii. Assess for tolerance as below
  1. SpO<sub>2</sub> ≥ 90 and/or PaO<sub>2</sub> ≥ 60 mmHg
  2. Spontaneous tidal volume ≥ 4 mL/kg PBW
  3. RR between 12-35 pm
  4. No respiratory distress (≥ 2 of the following)
    - a. HR > 120% baseline
    - b. Marked accessory muscle use
    - c. Abdominal paradox
    - d. Diaphoresis
    - e. Marked Dyspnea
- iv. If does not tolerate, resume pre-weaning settings
- v. If patient passes spontaneous breathing trial, **consult pulmonary for consideration for extubation.**