

For more information on respiratory failure, visit <https://covidprotocols.org/protocols/respiratory>.
See also: **Inpatient**, **Outpatient**, and **ICU Patient** guides at <https://covidprotocols.org/quick-guides>

Supplemental Oxygenation

GOAL = SpO₂ 92–96% (88–94% if COPD)

Recommended path

- Start humidified NC 1–6 L/min
- Escalate to oxymizer 6–12 L/min or Venturi mask 40–60%
 - if oxymizer 10 L/min or Venturi at 50%, transfer to ICU (p39999)
 - if oxymizer 12 L/min or Venturi at 60% and within GOC, intubate (p39265)

Noninvasive ventilation

- CPAP/BIPAP (NIPPV): use as normal (OSA, TBM, COPD, flash pulmonary edema, etc.)
 - use hospital's machines with HEPA filters and AGP precautions
- HFNC: Use as normal with AGP precautions

Awake Proning (Self-Prone)

Any willing patients with the ability to unprone themselves if needed

- Recommend swimmer position; alternatives okay if more comfortable for patient
- Okay with NC, NIPPV, or HFNC
- Maximum time tolerated per day

Ventilator Adjustments

VENTILATION

GOAL = pH of roughly 7.25–7.45 while maintaining low tidal volumes

1. Start with tidal volumes
 - 4–6 cc/kg ideal body weight
2. Then adjust respiratory rate
 - adjust to achieve pH goal (typical range 20–35 breaths/min)

OXYGENATION

GOAL = SpO₂ 92–96% (88–94% if COPD)

1. Start with PEEP

- Initial settings on intubation
 - BMI < 40: PEEP 5
 - BMI ≥ 40: PEEP 10

• Adjust PEEP

Use optimal PEEP study or PV tool if available and trained; otherwise use ARDSnet tables at right:

- BMI < 40: Low PEEP table
- BMI ≥ 40: High PEEP table

2. Adjust FiO₂

- Minimum tolerated for SpO₂ 92–96% (88–94% if COPD) after adjusting PEEP
 - if FiO₂ > 60%, see *Refractory Hypoxemia* on page 2 of this guide

MECHANICS

- Measure static compliance (CStat) and plateau pressure (PPlat)
- If PPlat > 30: decrease TV (min 4 cc/kg ideal body weight)

ARDSNET TABLES

Use a minimum PEEP of 5 cm H₂O. Consider use of incremental FiO₂/PEEP combinations as follows:

LOW PEEP (BMI < 40)

FiO ₂	PEEP
0.3	5
0.4	5
0.5	8
0.5	8
0.6	10
0.7	10
0.7	12
0.7	14
0.8	14
0.9	14
0.9	16
0.9	18
1.0	18–24

HIGH PEEP (BMI ≥ 40)

FiO ₂	PEEP
0.3	5
0.3	8
0.3	10
0.3	12
0.3	14
0.4	14
0.4	16
0.5	16
0.5	18
0.5 to 0.8	20
0.8	22
0.9	22
1.0	22
1.0	24

Sedation / NMB

Start with sedation

Use minimum doses to achieve ventilator synchrony

Assess and treat in sequence:

1. Pain

- Assess for goals: NRS <4, CPOT <3
- Treat: Dilaudid or Fentanyl, prefer bolus, switch to drip PRN, try PO options if IV shortages

2. Agitation

- Assess for goals: RASS 0 to -1, or BIS 60 if on neuromuscular blockade
- Treat: Propofol drip preferred, benzodiazepine second line (delirium risk), dexmedetomidine only if weaning (tachyphylaxis after 3 days)

3. Delirium

- Assess: CAM-ICU
- Treat: quetiapine, olanzapine, haloperidol

Consider neuromuscular blockade if:

- Not synchronous with RASS -4 to -5
– or –
- Need to improve gas exchange:
 - decreased skeletal muscle metabolism (lowers O₂ demand and CO₂ production)
 - increased abdomen and chest compliance

METHOD

- Sedate to RASS -3 to -4 prior to initiating
 - then goal BIS -60 after (BIS inaccurate prior to paralysis)
- Bolus dose rocuronium or cisatracurium (start drip only if needed)
- Discontinue as soon as possible and minimize steroids to reduce risk of myopathy

Ventilated Proning

- Ideally: < 36 hours from ARDS onset
- Contraindicated in spinal cord injury, open chest or abdomen, unstable airway (BMI, RRT are not contraindications)

METHOD

- Hold tube feeds 1 hour prior to turns, otherwise they can be continued
- Place in swimmer position
 - Proning Team (p34433) if needed
 - bolus paralytic PRN for turns; *not required* to prone
- Obtain ABG and mechanics 1 hour after proning or re-supinating
- Keep proned for 16 – 20 hrs per 24 h

DISCONTINUE IF

- Minimal improvement to P/F with proning
- P/F >200 on FiO₂ <60% when supine
- Unsafe hemodynamic changes on turns, or if concern that patient may require ECMO

Refractory Hypoxemia

If PaO₂ <75 with FiO₂ ≥ 0.6 there is concern for oxygen toxicity; try:

1. Optimize PEEP and vent synchrony (flow, triggers, volumes; page RT or pulmonary consult PRN)
2. Optimize volume (RRT or diuretic)
3. Trial proning
4. Deeply sedate (to RASS -3 to -5)
5. Trial inhaled epoprostenol or iNO (contraindicated in pulmonary hemorrhage, LV failure)
6. Trial neuromuscular blockade
7. Consider ECMO (p35010)

Extubation Readiness

In patients who meet all four of:

- SpO₂ > 92% or PaO₂ > 75
- FiO₂ ≤ 50%
- PEEP ≤ 10
- PPlat < 30

1. Daily SAT (RASS 0)

- Do not attempt if paralyzed, proned, or HD unstable

2. If passing SAT, daily SBT

- Trial PSV 5/5 × 30 minutes
- Discontinue if:
 - RR >30, SpO₂ <92%, HD unstable, Rapid Shallow Breathing Index (RSBI) = RR/TV > 105

3. If passing SAT and SBT, consider extubation if also:

- Following commands, ideally RASS 0 to +1
- Able to cough
- Requiring suctioning less frequently than q2h

TIP: Place NG tube or Dobhoff prior to extubation

If failing SAT and SBT consider:

- Volume status/diuresis
- Bronchoconstriction and airway edema
- Sputum production/VAP
- Neuromuscular weakness including malnutrition and electrolytes (phos)
- Delirium, sedation