

ARDS in COVID-19 Overview for Hospitalists

Clinical Features

Rate of progression

- Onset of dyspnea median 6.5 days after symptom onset
- Progression to ARDS can be swift (median 2.5 days after dyspnea onset)

Risk factors for progression

- Age
- Comorbidities (CV disease, DM, HTN, chronic lung dz, cancer, CKD)
- High fever ($\geq 39^{\circ}$ C)
- History of smoking
- Select lab features (lymphopenia, elevated LFTs, LDH, CRP, ferritin, D-dimer, PT, troponin, CPK, AKI)

ARDS in COVID-19 results in profound hypoxemic respiratory failure. Hypercapnia is rare.

Complications

- AKI
- LFT elevations
- Cardiac injury- late complication often occurring after respiratory illness improves
 - CM, pericarditis, pericardial effusion, arrhythmia, sudden cardiac death
- Sepsis, shock, multi-organ failure is less common

Management in Non-Intubated Patients

- Use the lowest possible FiO₂ to maintain sats 90-96%.
- If pt has higher O₂ needs than low flow O₂, use high-flow O₂ via NC (HFNC) or noninvasive ventilation (NIV). NIV would primarily be CPAP if hypoxia the main issue. BiPAP could cause higher tidal volumes than desired resulting in worsening lung injury. Only use BiPAP if hypercapnia also an issue. Which modality to use (HFNC vs NIV) is a subject of ongoing debate. Both have been used variably.
- What to do if a patient is deteriorating is an evolving topic
 - Initial thoughts were that it is best to proceed to mechanical ventilation rather than NIV.
 - Now using NIV is suggested in selected patients (younger patients without comorbidities) rather than proceeding directly to intubation.
 - In higher risk patients (elderly or confused pt with comorbidities and several risk factors for progression), proceeding directly to intubation may be warranted.

ARDS in COVID-19 Overview for Hospitalists

- Some experts recommend spending as much time as feasible in the prone position even when just on O₂. This is based on anecdotal reports and success of prone positioning in ventilated pts.
- Use MDIs rather than nebs to avoid aerosolization

Intubate if:

- Rapid progression over hours
- Lack of improvement on >40 L/min HFNC and a FiO₂ >0.6
- Evolving hypercapnia
- Hemodynamic instability or multiorgan failure
- PaO₂/FiO₂ ≤ 300 consider intubation
- PaO₂/FiO₂ ≤ 200 intubate (higher mortality if intubation delayed)

Note: Intubation requires airborne precautions

Management of Patients on the Ventilator

Vent management

- Use Low Tidal Volume Ventilation (LTVV) strategy using the ARDSnet protocol (management is spelled out nicely)
- Generally, there is decreased lung compliance in ARDS (lungs become stiff)
 - Interestingly, lung compliance in COVID-19 appears to be high compared to other etiologies of ARDS
 - As a result, we've seen low rate of barotrauma (2% compared to 25% in the original SARS-CoV)
 - Given this relatively high lung compliance, achieving a plateau pressure ≤ 30 cm H₂O hasn't been difficult.
- COVID-19 appears to be responsive to high PEEP
 - Starting at a PEEP of 10 to 15 may be reasonable.

What to do if fails LTVV:

- Next step is prone ventilation
 - Criteria to prone:
 - PaO₂:FiO₂ ratio < 150 mmHg, an FiO₂ ≥ 0.6, and PEEP ≥ 5 cm H₂O, excessively high airway pressures, or recalcitrant hypoxemia
 - Keep prone for 12 to 16 hours per day
- Next steps if proning fails
 - Recruitment/high PEEP strategies

ARDS in COVID-19 Overview for Hospitalists

- Pulmonary vasodilators (Nitric oxide less likely than prostacyclin to clog bacterial/viral filters in the vent. Results in decreased need to change the filters which is a risky procedure for staff)
- Paralytics - UTD recommends it as a last resort (they don't favor their routine use)
- ECMO

Fluid management

- Use a conservative fluid mgmt strategy. Try to run patient on the dry side.

Steroids

- Do not give steroids for this cause of ARDS unless a separate indication exists (COPD, refractory septic shock, adrenal insufficiency)

General care on the vent (FAST HUGS BID)

- Same as for any intubated patient

Complications

- Monitor daily for complications
 - Daily CBC, BMP, LFTs, INR, ABG, lactate
 - Periodic troponins. If elevating, low threshold for TTE
 - Tele

Stats

- Once on the vent mortality is 52-67% with highest rates in those ≥ 64 years
- Length of ICU stay long with many patients remaining intubated for over 14 days