

MMC ED COVID protocol

This protocol is meant to serve as guide to the MMC Emergency Department Staff in the management of patients who are critically ill due to COVID-19 infection. Using current evidence and consensus when evidence is not available, this document is meant to streamline, standardize, and optimize the care which we provide to these patients. The protocol may be updated as new data become available.

Arrival to the North Side (ED COVID UNIT)

Patients with known or suspected COVID-19 infection, by CT scan or symptomatology, who are hypoxemic w/ SpO₂ <90% on NRB should be given a HFNC if available. If a HFNC device is not available, CPAP can be used with appropriate precaution to avoid aerosolization, preferentially in isolation Rooms 20, 71 or 38. Attempts should be made to admit patients on HFNC or CPAP who would require emergent intubation if respiratory decompensation occurs to an inpatient bed with pulse oximetry monitoring. If no HFNC or CPAP is immediately available, standard non-rebreather with nasal cannula 5L/min should be applied, with a superimposed NRB mask, if necessary.

Management of HFNC

For patient's on HFNC, FiO₂ should always be set at 100%. Initial LPM should be set at 20LPM. LPM should be titrated up with a maximum of 50LPM as needed in order to achieve an SpO₂ >88%. Once on 50LPM, patients saturating <85% should be considered AT HIGH RISK for intubation. They should be identified as PRIORITY 1 (see below). These patients are likely entirely dependent on the oxygen provided and will quickly decompensate if HFNC is removed accidentally or intentionally.

Management of NPPV

For patient's that demonstrate hypoxemia on standard oxygen < 90%, and HFNC is not available, CPAP should be considered. Every patient on CPAP that is a candidate for intubation should be designated PRIORITY 1. The high risk posed by dislodgment of the mask is such that all CPAP patient require close supervision with backup plan for intubation if decompensation or agitation occurs.

Standard Oxygen

When HFNC and CPAP are not available for patient on a nonrebreather w/ SpO₂ < 90%, a nasal cannula should be applied under the nonrebreather at 5L/min. When a patient on nonrebreather and NC is saturating < 85%, they should be considered PRIORITY 1.

Proning

Priority 1 patients are those identified at very high risk of failing noninvasive oxygenation and requiring mechanical ventilation. Proning may be considered;

however, providers should be aware that proning appears to induce a non-sustained improvement in SpO₂. Proning should be seen therefore as “buying time” rather than “recruiting.” Whether improvement occurs or not, a patient that requires proning due to a Sat < 85% should remain a PRIORITY 1 patient.

Transition to Mechanical Ventilation

Our experience suggests that one of the most critical management decisions for our COVID+ patients is whether they require intubation. Many demonstrate “silent hypoxemia,” such that they are hypoxemic < 88% however do not exhibit symptoms of shortness of breath. Even those who have tachypnea often deny overt symptoms of shortness of breath. Our shared experience tells us that this provider decision, to place on a ventilator, is quite distressing for both the patient and the provider. We make this decision faced with competing notions:

- The successful extubation rate globally of patients on mechanical ventilation is < 50%
- Hypoxemia likely begets hypoxemia, as experts suggest that hypoxemia is due to regional pulmonary vasoconstriction induced by hypoxemia and leading to further hypoxemia.

We do not want to intubate a hypoxemic patient who would survive without it, and we do not want to *not* intubate a hypoxemic patient who needs it and would survive with it.

We recognize this is a difficult choice informed at the moment on theory and anecdote rather than science, and so leave some room for shared decision-making and clinical judgment.

As a general guideline, the following clinical condition should prompt a serious consideration of transition to mechanical ventilation:

- Hypoxemic patient on maximal non-invasive oxygen with SpO₂ <85 – 88% w/ distress. (Presenting typically in the form of anxiety and distress).
- Hypoxemic patient on maximal non-invasive oxygen with sustained SpO₂<80%

Intubation

The intubation procedure will proceed as has been previously described. Ideally, intubations should take place either in the resuscitation bays or in one of the isolation rooms. Two staff, usually an attending and a resident, will be involved with the intubation. Both will be in full PPE. The nurse will provide any needed RSI medications, and RT will set up the ventilator. Both of these staff will then move away from the patient, but will still be available to assist, if needed.

Post-intubation Mechanical Ventilation Strategy

We accept Gattinoni's position that COVID-19 typically has two different phenotypes requiring two different respiratory treatment approaches. Once intubated, patient typically start in a state of HIGH LUNG COMPLIANCE prior to transition to a state of LOW LUNG COMPLIANCE. The post-intubation strategy will therefore target lungs with HIGH compliance with a high oxygen, "lowest PEEP possible" approach.

Immediately after intubation:

- Set FiO₂ to 100%.
- Set PEEP initially to 5 - 8.
- Tidal volume 6 - 8cc/kg ideal body weight
- Target SpO₂ > 80% (higher the better)

Our shared experience suggests that immediately after intubation, a quick desaturation occurs. Once intubated, patients are often saturating < 70% on 100% FiO₂, PEEP 5 - 8. These are SpO₂ values which we would not normally tolerate and make us generally uncomfortable. However, our experience suggests that within a couple of hours, patient's saturations will return to levels equal to or higher than those prior to intubation. We accept the proposed notion by Gattinoni, supported by the Chinese experience, that with every increase in PEEP during this HIGH compliance state, we risk lung injury. We will increase PEEP as needed in 1 hr to achieve an SpO₂ > 80% with a maximum PEEP of 8 - 10. If SpO₂ < 70 with PEEP of 8 - 10, we will carefully consider the clinical context and determine as best we can whether increased PEEP or low SpO₂ is more injurious to our patient. While SpO₂ may initially be low, once on the ventilator, patients often return to an SpO₂ level at which they were comfortable prior to intubation while on 100% FiO₂ with LOW PEEP.

Post-intubation Sedation

Post intubation, COVID+ patient will be sedated and paralyzed for 24 hrs, at which point their pulmonary mechanics and overall condition will be reassessed. After intubation, using "COVID post-intubation order set" the following should be ordered:

- Sedative/pain drips
- Paralytic drip
- 1 dose of paralytic, e.g. 100mg Rocuronium 30 min - 1 hr after intubation, to ensure no period of vent dyssynchrony.

PRIORITY 1 - Patient on standard oxygen, HFNC, or NPPV at high risk for requiring intubation. They are entirely dependent on oxygen, must be closely monitored, in a location easily visible, and should be frequently reassessed to determine if intubation required.

COVID+ by CT scan or symptoms

Increase O2 for SpO2 > 90%

Hypoxemia SpO2 < 90% on nonrebreather

Physician does not believe pt will tolerate non-invasive

Intubation - go to vent and sedation protocol

HFNC

HFNC Management

- FiO2 should always be sent at 100%.
- Initial LPM should be set at 20LPM.
- LPM should be titrated up with a maximum of 50LPM as needed in order to achieve an

NPPV

NPPV Management

- ****Should be performed in negative pressure room. If this is not possible, should be performed behind closed curtains with HEPA filter bedside.****
- FiO2 should always be set at 100%

NRB w/ 5L NC

When HFNC and CPAP are not available for patient on a nonrebreather w/ SpO2 < 90%, a nasal cannula should be applied under the nonrebreather at 5L/min. should be considered

Requiring 90% to achieve sat 88-90%

ALL PATIENTS ON NPPV

On NRB w/ 5L NC w/ SpO2 < 85

PRIORITY 1 - Patient's at HIGH risk for requiring intubation

Proning

Proning should be encouraged in all patients and may be considered in PRIORITY 1 patients however Physician should be aware that proning appears to induce a **non-sustainable** improvement in SpO2. Proning should therefore be seen as "buying time" rather than "recruiting." Regardless of SpO2 improvement, PRIORITY status should not change based on SpO2 improvement during proning.

Consider intubation:

- Hypoxemic patient on maximal non-invasive oxygen with SpO2 <85 - 88% w/ distress. (Presenting typically in the form of anxiety and distress).
- Hypoxemic patient on maximal non-invasive oxygen with sustained SpO2 <80%

Post intubation Vent Settings

- FiO2 100%
- TV 6- 8 cc/kg
- PEEP 5 - 10
- Target Sat > 80 % (higher the better)

If SpO2 < 80%, carefully consider the clinical context and determine as best we can whether increased PEEP (vent lung injury) or low SpO2 is more injurious to the patient

If hypotensive post-ETI, consider decreasing PEEP

Post-intubation sedation

- **Sedatives/Pain drip**
- **Paralytic drip**
- **Rocuronium 100mg 30 min - 1hr after intubation**

Patient should ideally have the following placed:

- NG tube
- Central line (L IJ preferred site)
- Arterial line
- Foley