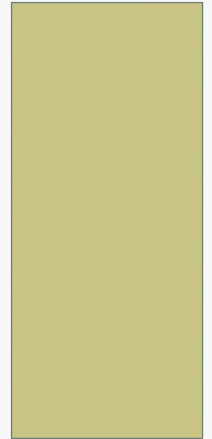


UPDATES ON COVID-19: PERI-OPERATIVE CONSIDERATIONS

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GENERAL INFO:

- **Reproduction number***: : 2.2 -3.6
(similar to SARS, higher than MERS)
- **Case Fatality**: 2%
(SARS = 10%; MERS = 40%, H1N1 = 0.026%)
- Expect final over all percentage to be lower

**(number of cases generated after exposure to one patient)*

MECHANISM OF TRANSMISSION

- Contact/droplet
- Airborne during aerosolizing procedures:
 - Bag Mask ventilation
 - Non invasive Ventilation
 - Intubation/Extubation
- Possibly in stools (inconclusive evidence)

INFECTION PROGRESSION:

- Incubation Period: 4-7 days before symptom onset
 - Possible transmission during asymptomatic period
(however controversial, no conclusive evidence)
- Fever (17% did not present with fever)
- Respiratory symptoms (mainly cough)
- Can rapidly quickly to ARDS like state

INFECTION PROGRESSION

- **Silent hypoxemia**: asymptomatic but have hypoxemia. *(these patients quickly deteriorate and should not be approached lightly)*
- **Organ Dysfunction**:
 - Cardiac injury (23%)
 - Liver Injury (29%)
 - AKI (29%)
 - Neurocognitive impairments >1/3rd of severe cases

SOME STATISTICS FROM WUHAN:

- ARDS: 17% of infected patients
- ICU Admission: 23%
- Non invasive ventilation: 13%
- Mechanical Ventilation: 4%
- ECMO: 3%

INTUBATION CRITERIA:

- Preferably to be done **early and electively** (not as salvage therapy) to prevent increase in oxygen debt
 - *No final consensus if this reduces overall mortality*

Criteria:

- Tachypnea >30 ,
- SpO₂ $<93\%$,
- PaO₂/FiO₂ <300 (or <150 after 2 hours of high flow oxygen therapy)
- Lung infiltrates $>50\%$ within 48 hours.

VENTILATION RECOMMENDATIONS

- Tidal Volume: 6-8ml/kg predicted body weight
- RR <35/min
- Plateau Pressure <30cm H₂O
- SaO₂: 88-95%
- pH: 7.25
- PEEP >5 cm H₂O; (poor tolerance to high peep levels.
- Filter Exhaled gas from ventilator

PERIOPERATIVE CONSIDERATIONS:

Elective surgery of non- corona known patient:

- PAU: Extensively screen patient for possible symptoms or exposure.
- If febrile/symptomatic or any suspicion, refer patient to infection control in your institution and consider postponing surgery.
- Rescreen Patient on day of surgery to ensure no new symptoms or risk of developing the disease

IF COVID (+) PATIENT NEEDS SURGERY:

- Designated OR with negative pressure (or eliminate positive pressure)
- Label all doors and minimized entry/exit of personnel
- If no intubation will take place: keep patients N95 mask on.
 - Oxygen therapy can be provided through the mask if necessary
 - OB Anesthesia: spinal still primary recommendation
- Intubation: Proper airborne + contact precautions
- Ensure discarding all used material in recommended waste areas to prevent cross contamination
- SARS outbreak: some hospitals performed surgical procedures in ICU room.

EXTUBATION PRECAUTIONS

- Prevent agitation, coughing, bucking
- Cover patients nose and mouth with wet gauzes (or a large plastic sheath) to prevent spread of secretions upon extubating.
- Giving the following shortly before extubation can help reduce cough reflexes:
 - Dexmedetomidine (0.4mcg/kg/hr),
 - Remifentanyl Infusion,
 - Lidocaine (1-1.5mg/kg),
 - Alfentanil (15mcg/kg)

ADDITIONAL RECOMMENDATIONS

- Do not use pressure regulated ventilation (volumes can exceed lung protective values)
- Prone position: improves lung volumes.
- Recruitment maneuvers: don't necessarily improve outcomes (insufficient evidence) and may irritate airways
- Use of muscle relaxants along with sedation is still controversial: can be helpful if vent dyssnchrony occurs. But no improvement of morbidity outcomes.

- IV fluid therapy: conservative approach
- Steroids: shown to increase mortality

Physiologic goals

PAO ₂	55–80 mmHg ^{31*}	The lower limit is much lower than the normal range
Spo ₂	88–95% ^{31*}	The lower limit is lower than the normal range
pH	7.30–7.45*	The lower limit is mildly acidotic
Paco ₂	Permissive hypercapnia	For patients without intracranial hypertension and adjust per the pH goal

Ventilation mode

Preferred mode	No recommendation ³⁴	Insufficient data to make a recommendation ³⁴
High-frequency oscillatory ventilation	Not recommended ²³	Potential to generate aerosols ¹⁵ ; no evidence of benefits ²³

Ventilator setup

Tidal volume	≤ 6 ml/kg predicted body weight ^{28,30}	Adjust per pH and plateau pressure goals
Respiratory rate	≤ 35 breaths/min	Adjust per pH and plateau pressure goals
Airway pressure	Plateau pressure ≤ 30 cm H ₂ O ^{28,30}	Maintain > 25 cm H ₂ O to open alveoli
PEEP	Higher PEEP over lower PEEP ²⁸	Adjust per PAO ₂ and Spo ₂ goals ³¹
Fio ₂	0.3–1.0	Adjust per PAO ₂ and Spo ₂ goals ³¹

Patient position

Prone position	Recommended ²⁸	Conflicting data regarding the benefits ^{28,40,67} vs. no benefits ^{38,59}
Semirecumbent position (≥ 30°)	Recommended ^{28,60}	To reduce the risk of aspiration and ventilator-associated pneumonia ^{28,60}

Adjunct therapies

Sedation and analgesia	Recommended	For anxious patients, patients with ventilation overdrive and patients with patient-ventilator dyssynchrony
Muscle relaxation	No recommendation	Benefits ⁴³ vs. no benefits ⁴⁴ ; case-by-case decision making
Systematic corticosteroid	Not recommended ^{46,48}	Associated with increased mortality and hospital-acquired infections ^{46,48}
β-2 agonists	Not recommended ²⁹	For patients without bronchospasm ²⁸
Conservative fluid strategy	Recommended ²⁸	For patients who do not have evidence of tissue hypoperfusion ²⁸
Recruitment maneuvers	Recommended ²⁹	Perform cautiously; avoid patient coughing
PA catheter	Not recommended ²³	No evidence of benefits
ECMO	No recommendation	Evidence based on observational study ⁶⁰ and case report ⁶¹ ; selectively use
Weaning		
Spontaneous breathing trial	Recommended ²⁸	For patients who are ready for weaning ²⁸
Weaning protocol	Recommended ²⁸	For patients who can tolerate weaning

PROTOCOL

The airway team

- ICU nurse
 - Inhalation therapist
 - Anesthesia resident
 - Anesthesia therapist (outside the room)
 - Anesthesia attending in case of difficult airway
- Daily Communication between ICU attending + Anesthesia first call for anticipated intubations (elective intubations done by us)
 - If patient is crashing/cardiac arrest: Inhalation Therapist will perform intubation

AVAILABLE IN UNIT

- **Intubation equipment already available in covid ICU unit**
- Face mask (different sizes)
- MAC 3 & 4 blades + handle
- ETT size 6-9
- Yankauer Suction
- Closed loop suction for ETT suctioning
- 1 bag for disposal of contaminated equipment
- **Medication kits** (stored in the unit by the ICU nurse)
- Propofol
- Ketamine/Etomidate
- Rocuronium
- Succinylcholine
- Fentanyl
- Glycopyrrolate
- Lidocaine 2%
- Sugammadex
- **Emergency drugs:** ephedrine, atropine, neosynephrine

**ALL the above is available in the ICU emergency trolley. Drugs will be prepared by the ICU nurse/resident outside the room*

**Same AND additional items also available in anesthesia trolley stationed outside the room*

AVAILABLE IN ANESTHESIA TROLLEY

Keep Trolley outside room to prevent contamination

- Drawer 1: Additional medications except controlled substances, syringes, needles
- Drawer 2: Different sizes oral airway, suction catheters
- Drawer 3: LMAs of all sizes, ETT of all sizes, intubating stylets, bougies (METTI), blades of all sizes
- Drawer 4: Ambu bags and face masks of all sizes
- **Drawer 5**: PPE kits, T piece circuits

The Cmac videolaryngoscope will be stationed in the covid ICU unit.

- -D Blade with stylet (difficult airway)
- Macintosh

- Wear gloves and mask when entering Unit
- Obtain your size fit N95 mask

Wear PPE in the following order

- Wash hands
- Wear Tyvek suit
- Wear protective gown
- Apply N95, perform fit check
- Put the face mask with face shield above the N95 mask or wear goggles
- Put on the hood of the Tyvek suit
- Double gloves, must be above gown, make sure hands are all covered

Assess the airway

- Decide on items to be used for intubation (stylet, bougie..)
- Prepare Cmac videolaryngoscope appropriate blade and stylet
 - D Blade with stylet (difficult airway)
 - Macintosh
- Prepare Medications for RSI + emergency medications
- If Difficult airway: Call for back up attending

CHECKLIST BEFORE ATTEMPTING INTUBATION

Preparation for intubation:

- IV Line
- Medications
- Equipment check by inhalational therapist and anesthesia resident:
 - Ambu bag or T-piece circuit connected,
 - O₂ supply,
 - Suction + Yankauer (closed suctioning systems preferred)
 - oral airway,
 - ETT ready,
 - Standby direct laryngoscope check (size, light bulb)
- ASA monitors should be applied

Useful Acronym:

OH – MS – MAID

Oxygen, **H**elper
Monitor, **S**uction
Machine, **A**irway
Supplies, **I**V access,
Drugs

- Optimize **positioning** to maximize 1st attempt success
- **Preoxygenation** with 100% for at least 5 min
- **RSI** by anesthesia resident with propofol and succinylcholine or rocuronium (preferable)
 - No ventilation
 - If needed, administer fentanyl after propofol to avoid fentanyl-induced cough
- After 60 secs or witnessed fasciculations, when ready to intubate, **turn off gas flow to decrease contamination from face mask, and remove face mask from patient**
- Intubate
- After tube is in, directly **inflate** the cuff, **connect** to ventilator as quickly as possible, ventilate and **confirm** tube placement by capnography
- Therapist will dispose the Cmac blade in the bag and send to CSD (1 hour before available again)
- **Remove** outer set of gloves to avoid contamination and put another set immediately.
- The Cmac videolaryngoscope will be present in the unit. It will be covered with nylon during use and cleaned by the inhalation therapist after each use

If saturation is dropping and you need to ventilate:

- use an oral airway and low tidal volume ventilation and ensure adequate mask seal (2 hands mask to provide a good seal) to minimize aerosolizing the secretions.
- Recommended use of HEPA filters between mask and Ambu Bag or T-piece circuit

If difficult airway, can't ventilate, can't intubate,

- LMA
- Or Wake up the patient (sugammadex)

If a **disconnection in the circuit is needed, make sure it is done beyond the filter while the ventilator is put on standby

** If **CPR** is being performed, ask to hold chest compressions while intubating to minimize aerosolization of the virus and room contamination

- Dispose used and all disposable items in trash cans in patient's room

Inside Room: (at least 6 feet away from the patient inside room)

- Remove gloves – from outside to inside – *make sure you do not contaminate your hands*
- Wash hands
- Remove protective gown, (*untie first, fold gown inside out and fold it and dispose it*)
- Wash hands
- Remove face shield
- Wash hands

Outside Room:

- Remove N95 ([link included](#))
- Wash hands with soap and water
- Remove Tyvek outside room before exiting the unit
- Take a shower with your washable crocs before leaving the unit and going back to main hospital
- Documentation of the airway procedure can be done from outside the unit

Protective gown, gloves and regular face mask changed between cases if more than one intubation is anticipated

ADDITIONAL USEFUL LINKS:

- <https://youtu.be/OF6dMhRvD8M>
- **PPE tutorial in 90s**
- https://youtu.be/agu79EUPe7U?list=PLAKISH_EKdL8eJYLjIYUv7Llejkn7WCuW
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- N95 fitting instructions
- <https://youtu.be/XPOzCG4DrgQ>

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