

Respiratory Therapy Workflows Specific to COVID-19

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See "VCMC / SPH Aerosol Generating Procedures (AGPs)" list on [Medical Staff Office Website](#).

A. Personal Protective Equipment for COVID Positive or COVID Suspected patients:

- Full PPE for Airborne + contact + eye protection for COVID positive patients that are undergoing aerosol-generating procedures or who are on the ventilator:
 - Bouffant, eye protection, N95, gown and gloves
 - N95 covered by a faceshield may be stored in paper bag and reused if it is not soiled, for a total of 8 hours of use or a total of 5 uses
 - N95 may also be covered by procedure mask, taking great care that the procedure mask does not alter the fit of the N95 rendering it less effective
 - High risk aerosol-generating procedures include intubation, extubation, bronchoscopy, nebulizers, EZPap, Metaneb, high flow nasal cannula, CPAP, BiPAP, NG Tube insertion, CPR should be done in negative pressure rooms if available. Preferred to be performed in a negative pressure room. May be performed in non-negative pressure room with door closed if negative pressure room unavailable.
 - Airborne precautions should also be maintained for patients that are on the ventilator and already intubated due to risk of disconnection, need for filter changes. Note: closed suctioning on the ventilator is not a high risk aerosol generating procedure, but the patient still needs to be in airborne precautions
- Droplet + contact + eye protection for COVID positive patients not undergoing the above
 - gown, gloves, eye protection, and procedure mask if not undergoing any of the above and patient not intubated
- Donning and doffing should be performed with a hygienist or a buddy
 - Donning buddy makes sure as much skin as possible is protected
 - Doffing buddy ensures that PPE is removed without the provider contaminating themselves
- Minimize entries and exits into COVID suspect or confirmed infected rooms
 - Bundle care when possible, including asking RN to obtain blood samples for ABG/VBG
 - Note: RT may need to obtain ABG via arterial puncture if patient does not have arterial line as arterial puncture is likely beyond the scope of nursing care
 - RT may be asked to do some RN tasks if within their scope of care if RT has to go in the room
- Have patient wear a procedure mask on themselves to minimize droplets being dispersed by the patient when you are in the room, even in negative pressure rooms

B. Respiratory Therapies

- Every shift, all ordered Respiratory Therapy modalities should be evaluated for necessity; minimizing entry into rooms is a central goal to minimizing risk to health care providers
- Incentive spirometer is to be promoted at every interaction with the patient
- Self-proning for hypoxic patients (“adult tummy time”) helps hypoxia in COVID
 - Initial trial period of one hour on stomach supported by pillows
 - Encourage patient to adopt prone position as much as tolerated an able when in bed; goal is more time prone than supine
- Nebulizers should be avoided on non-intubated patients. MDIs should be used instead if at all possible.

- Nebulizers for intubated patients may be utilized via “Aerogen” device which does not aerosolize in a closed system; Aerogen to be put in-line of respiratory circuit prior to patient connection to that circuit
- Venturi mask with cool aerosol humidification is considered aerosol generating and should be avoided
 - Venturi mask without cool aerosol is NOT aerosol generating
- Oxymask is considered aerosol generating and should be avoided
- Heated High Flow Nasal Cannula (HFNC) oxygen is considered aerosol generating but may avert intubation in a subset of patients with ARDS
 - Trial of Heated High Flow oxygen may be attempted in a negative pressure room, negative pressure tent, or on a COVID ward
 - May be considered after thoroughly discussing at Attending level
 - More likely to be of benefit to the “Happy Hypoxic”
 - If using high flow oxygen, the least amount of flow possible, definitely less than 30-40 liters per minute, but probably 15 liters or less per minute, is preferred
 - Estimated viral particle dispersal 4.8 cm to 17 cm;
- Non-rebreather mask also has the potential to aerosolize at high flow rates
 - Consider lower flow rates if tolerated (~ 6 liters per minute); up to 15 liters per minute not considered aerosolizing
 - Consider non-rebreather with viral filter to reduce aerosolization if available (see photo [Appendix A](#))
 - Estimated viral dispersal 2 cm at lower flow rates, particularly with good mask fit
- EZ pap is utilized to help with atelectasis and improve overall respiratory mechanics. It also aerosolizes. While incidence of COVID + patients is relatively low, EZ pap may be considered if ALL of the following criteria are met:
 - Patient requires pulmonary toilet in order to prevent respiratory deterioration and less-invasive methods (i.e. Incentive Spirometer) have been ineffective
 - Patient is cooperative with all aspects of the treatment
 - Staff wears bonnet, eye protection, N95 with covering as listed in section A (so you can reuse the N95), gown and gloves for the treatment
 - Mouthpiece is used with a good seal and good understanding
 - Facemask is contraindicated for COVID positive patients for risk of aerosolizing.
 - Use only for lung expansion; the nebulizer portion of the treatment is to be avoided
 - if wheeze present, consider MDIs separately
 - Utilize flow rates of 6 liters or less to minimize aerosolization
 - If employing EZPap, consider putting in-line viral filter (see Appendix C)
- Meta-nebs are not to be used at this time as they aerosolize extensively
- Chest Physiotherapy (Chest PT, CPT) and other methods to induce cough and aerosolize are not recommended for COVID suspected or COVID confirmed patients
- Non-invasive Positive Pressure Ventilation (NIPPV): BiPap and CPAP should generally be avoided for COVID suspected and COVID positive patients
 - Inevitable leak around mask and exhalation port → aerosolization. Case-by-case with ICU consult. If using, minimize leak around mask as much as possible

- If using NIPPV, must use non-invasive mode on Servo-i ventilator (dedicated exhalation limb that can be filtered) and not V-60 (no exhalation limb, exhalation out the mask → aerosolization)
- Must be in negative pressure room if using, all staff in full PPE
- CPAP favored over Bipap if choosing to use, less likely to aerosolize and little evidence that BiPap improves hypoxic respiratory failure with COVID
- Consider BiPap helmet or CPAP bubble (i.e. Sea Long CPAP)

C. Guidelines for Intubation

- Equipment to bring into the room so as not to have to enter and exit multiple times
 - Ventilator, with a clear Equipment Cover covering it
 - Ventilator circuit with Aerogen in-line along with viral filter and Ballard also in-line (see [Appendix C](#))
 - Blood gas kit if ABG will be needed
 - Lukens trap for COVID sputum test
 - 2 patient addressograph (white) labels
 - Biohazard bags
 - Rubber-tipped clamp or Kelly clamp with tape around tips to make them softer
- Pre-oxygenate with nasal cannula or non-rebreather (NRB)
 - NRB lower flow rates less likely to aerosolize
 - 6 liters per minute on non-rebreather x 20 minutes prior to intubation if patient does not desaturate with that flow rate will decrease aerosolization
 - higher flow rates can be given if needed but will lead to more aerosolization
- Place Hepa filter on Resuscitation bag but avoid bagging
 - Option #1: Passive bag valve mask (BVM) with viral filter (if bag valve mask already has viral filter, no need to apply an external separate viral filter), PEEP valve, O2 flow—avoid actual bagging when patient not yet intubated if possible (see [Appendix B](#))
 - Option #2: Facemask to ventilator set to CPAP
- Prior to removal of facemask, assure patient is paralyzed and sedated
- Use video laryngoscope with disposable blade
 - Some anesthesiologists may prefer direct laryngoscopy; disposable blades preferred in this case
- After intubation, place Hepa filter inline at ET tube hub and then connect to the ventilator. Immediately place patient on ventilator, with Ballard in-place for ability to suction. Do not clamp ET Tube. (See photo [Appendix C](#)).
- Keep Hepa filter inline at ETT hub until patient is settled in ICU room
 - Remove Hepa filter upon arrival to ICU if too much weight/ drag on vent circuit caused by filter vs. at time of first filter change (24 hours after intubation) if no weight/drag concern
 - Change filter after all other staff have left the room to minimize exposure
 - Must ensure that patient is sedated and paralyzed prior to clamping ET tube
 - Clamp ET tube with either rubber-tipped clamp or wrap tape around plastic or metal clamp teeth to soften the potential damage to ET tube by clamping it → pause ventilator → exchange one or both filters depending on timing → unclamp ET tube → restart ventilator

D. Guidelines for Care of intubated and ventilated patients

- Minimize entries into the room of a COVID positive patient
- Bundle care when appropriate (i.e. nursing or physician does some RT functions, vice versa)
- Perform Oral care per standards
- Pause or place vent in Standby mode before any disconnection, including for filter changes
- Assure alarms are on highest audio setting
- Change expiratory Hepa filter every 24 hours per recommendation of Dr. Bajwa

E. Guidelines for Extubation

- If patient is to be extubated while still positive for COVID-19, wear a PAPR or N95 + face shield + bouffant + gown + gloves
- Simple mask should be prepared for the patient prior to plan to extubate
- Proper steps for extubation to minimize aerosolization
 1. Complete oral care prior to plan for extubation
 2. Place chuck onto patient's chest
 3. Place nasal cannula onto patient's nares at 6 liters or less to reduce aerosolization
 4. Place procedure mask near patient's face for quick covering once extubated
 5. Suction patient tracheal and oral
 6. Turn off ventilator
 7. Rapidly extubate after ventilator turned off
 8. Place procedure mask on patient

F. Transportation of Vented Patients

- After intubation, consider waiting appropriate time for number of air exchanges to remove all aerosolized particles from the room prior to moving the patient if possible
 - 45 minutes in negative pressure room
 - 3.5 hours in non-negative pressure room at VCMC
 - 1.5 hours in non-negative pressure room at SPH
- After intubation and transportation for other reasons (i.e. CT scans)
 - Place clean sheet on patient from neck down prior to transportation
 - In case of accidental disconnection, during transportation:
 - If PVC pipe + clear curtain tent is available, place it over the patient's head
 - If tent is unavailable, use plastic equipment cover sheet to cover patient's head
 - Transportation is to be done with the same ventilator without breaking the circuit
 - Remove the equipment cover from the ventilator
 - Clean the equipment with appropriate wet time with wipe from purple top container
 - Replace new equipment cover over the ventilator for transportation

G. Transportation of Non-Vented Patients

- Patient who is not intubated wears procedure mask, and has clean sheet covering from neck down during transport

- For patients on more than 6 liters per minute flow of oxygen by either nasal cannula or simple facemask or non-rebreather (any method), the patient is at risk for aerosolizing during the transport.
 - To reduce aerosolizing during transport, patient is to have clear plastic hood placed over them, followed by large plastic sheet covering from above the head to at below abdomen (see [Appendix E](#))
 - plastic equipment covers can be used if there is no other drape large enough
 - all edges of the plastic drape must be touching the bed

H. Considerations for Tracheostomy Patients

- Simple facemask should be worn by patients with tracheostomy who are COVID positive or COVID suspected
- For non-ICU patients who are not vented but are COVID positive or COVID suspected, there are two options for management:
 - Preferred: Place patient on ventilator:
 - Cuffed tracheostomy should be inflated and patient should be attached to ventilator to close their respiratory circuit and allow for closed suctioning
 - Minimal CPAP settings are reasonable
 - ICU consult if patient is not ICU status
 - Less preferred but still reasonable: Humidified trach mask up to 20 liters per minute with in-line suction is NOT considered aerosol-generating
 - Open suction of tracheostomy is considered aerosol generating
- Routine trach care (e.g. replacing trach mask, changing trach dressings) is NOT considered aerosol-generating

I. Equipment and Equipment Care

- Use disposable equipment when possible
- If disposable equipment is not available, cover the equipment with a clear Equipment Cover plastic to prevent aerosolized particles from landing on the equipment as much as possible
 - Dispose of the plastic cover prior to the equipment leaving the room
 - Clean the equipment as per current workflow for cleaning / disinfection
- A disposable stethoscope shall be placed in patient room
- Continue current workflow for cleaning/disinfecting of equipment

J. ABG or Sputum Sample Processing for Negative Pressure/ Isolation Room

- Ask for assistance from staff to have donned gloves and a clean biohazard bag that is open and ready outside of the room to receive the biohazard bag with specimen in it once sample is obtained (so, 2 biohazard bags, one from in the room with collecting provider and one outside the room with another staff member)
- Prior to donning PPE, write Cerner name of collector, date, time, and type of specimen on a white addressograph label
- Don PPE, and bring equipment to collect specimen along with one specimen collection bag and the addressograph label into the room

- Collect sample from patient and label specimen at bedside
- Use sanitizer on gloves, allow wet time for 20 seconds, then open patient room door a crack
- Drop sample into clean biohazard bag – provider accepting the specimen is careful not to let the bag with the specimen touch the outside of the outer clean biohazard bag
 - Provider accepting the specimen closes the bag and transports the sample to the ABG room for processing
- Close door, use hand sanitizer on gloves again, allowing at least 20 seconds of wet time
- Specimen collector adheres to Doffing guidelines upon exiting the room
- Again use foam sanitizer onto gloves, allowing at least 20 seconds of wet time

K. Handling of Sputum

- Sputum sample obtained will be sent to lab in original container collected in.
- Lab is to manipulate sample per policy and guidelines. Respiratory therapist is to never open a sputum container.

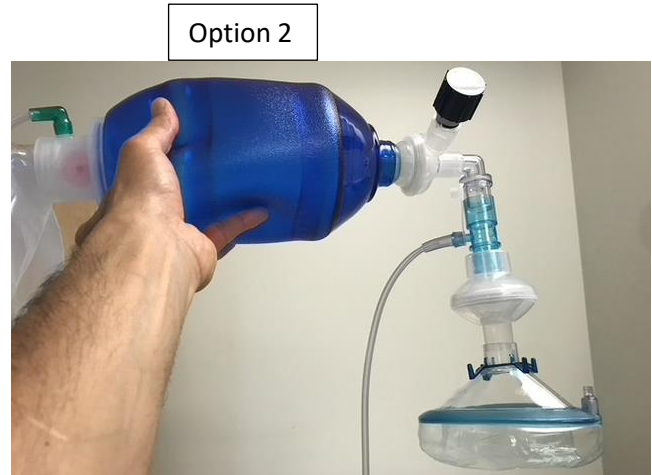
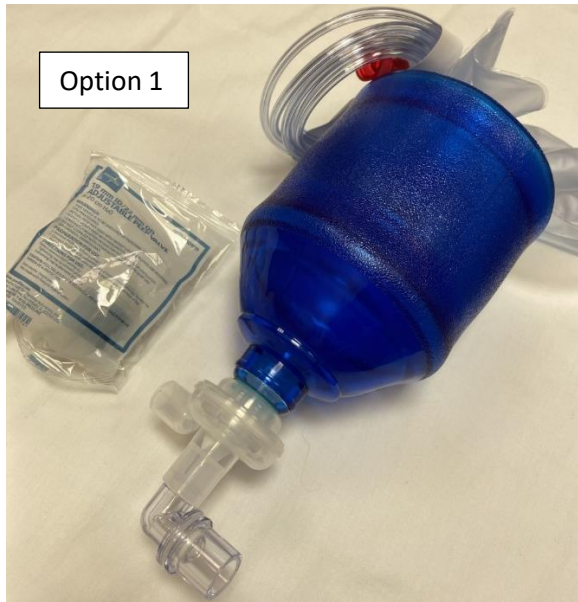
L. Staff Floating

- Ideal state: Recommend to limit floating from adult to newborn to reduce risk

Appendix A: Non-rebreather with viral filter applied



Appendix B: Ambu Bag with Viral Filter



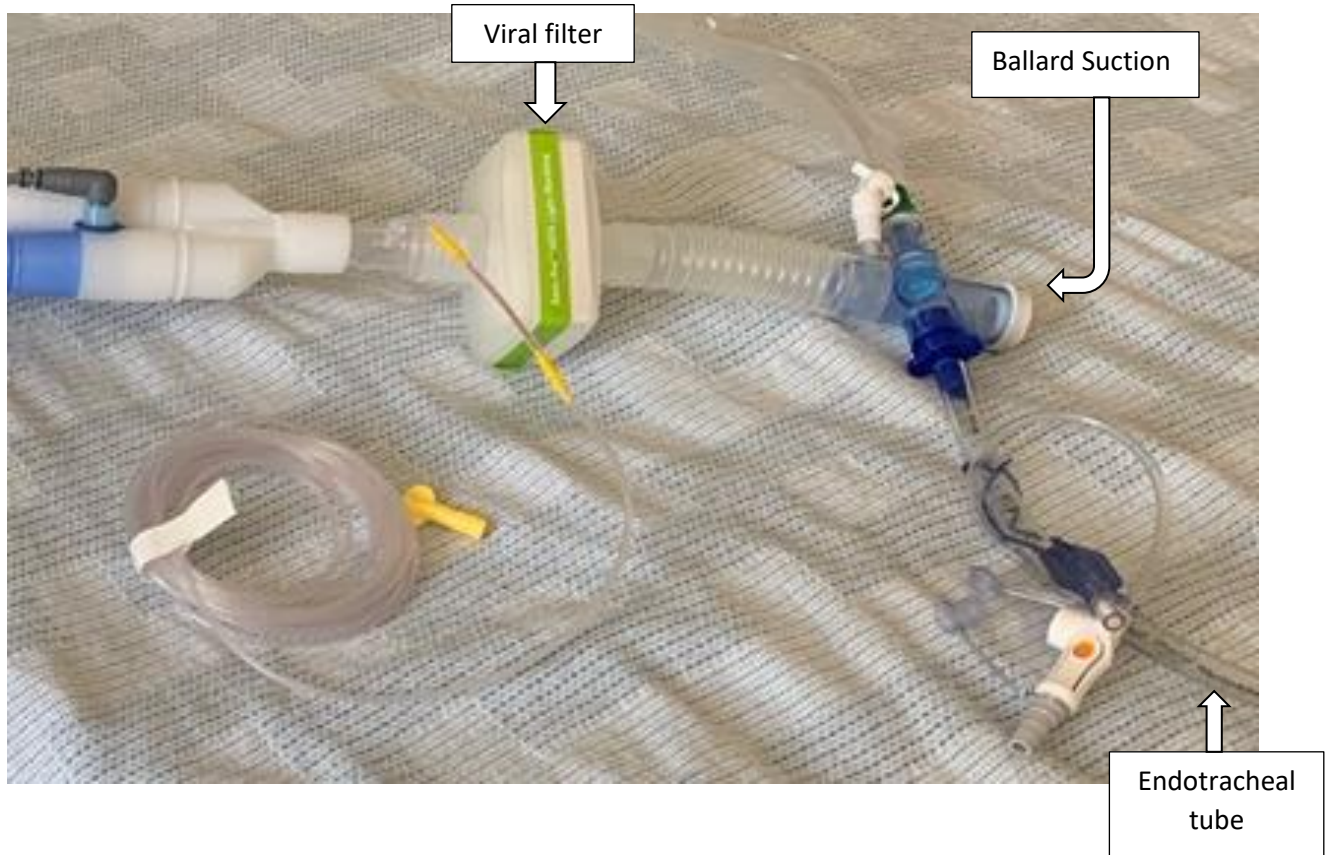
↙ Above Bag Valve Masks have been modified to place a viral filter in-line ↘

↙ Below Bag Valve Mask already has a viral filter in-line ↘



Appendix C: Suggested Ventilator Circuit Setup for Newly Intubated Patients

Viral filter close to hub, Ballard inline to allow for suctioning



Note: Include “Aerogen” device inline if nebulizers will be considered

Appendix D: Suggested placement of viral filter in-line with EZPap

See section B, Respiratory Therapies, on requirements for attempting EZ Pap.



Above with mouthpiece (preferred); Below with facemask (less preferred)



Appendix E: Suggested procedure for transport of non-intubated patients on more than 6 liters per minute oxygen flow to reduce aerosol in the environment during the transport:

1. 3 staff members are needed
 - a. 2 staff members are in full PPE including bouffant, eye protection, N95, gown and gloves
 - i. One driver of the gurney or bed
 - ii. One person to help keep the cover on the patient
 - b. 1 staff member with mask and gloves opens doors and verifies no surfaces are touched by staff in PPE
2. Staff member to keep cover on the patient places “intubation box” over the patient’s head taking care not to rest the box on the patient’s head as it is heavy; arm holes are used as handles in front of the patient’s head to keep the box in correct position (photo 1)
3. Large plastic sheet goes over the “intubation box” covering from above the head to patient’s abdomen;
 - a. plastic equipment covers with one slit down 1 side can be used if there is no other drape large enough
 - b. all edges of the plastic drape must be touching the bed and tucked in to reduce aerosol escape around the sheet (Photo 2)
4. Transport patient rapidly to destination (Photo 3) with 3rd staff member with mask and gloves opening doors and verifying that no surfaces are touched by staff in PPE
5. Plastic drape is removed and discarded on arrival to destination
6. Gurney and intubation box are returned to original destination for terminal cleaning by EVS Staff

Photo 1:



Photo 2:



Photo 3:

