Abstract

This clinical practice outlines the perioperative management of patients with COVID-19 and those who are under investigation for it. Additionally, this clinical practice outlines how perioperative clinicians can best protect themselves during procedures involving patients who test positive for COVID-19 or are under investigation. Finally, this clinical practice outlines current best practice for surgical scheduling, patient screening, patient transport, operating room set up, intubation, extubation, the use of noninvasive ventilation, care of the obstetric patient, and the basic management of COVID-19 patients with hypoxia. COVID-19 specific updated AHA adult, pediatric, and neonatal BLS and ACLS algorithms are included.
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**Clinical Practice Title:** Perioperative Management of Adult and Pediatric, Inpatients and Outpatients, With COVID-19 or Persons Under Investigation for COVID-19

**Clinical Practice Number:** 1, Version 10

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<thead>
<tr>
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5-6-2020
This clinical practice outlines the perioperative management of patients with COVID-19 and those who are under investigation for it. Additionally, this clinical practice outlines how perioperative clinicians can best protect themselves during procedures involving patients who test positive for COVID-19 or are under investigation. Finally, this clinical practice outlines current best practice for surgical scheduling, patient screening, patient transport, operating room set up, intubation, extubation, the use of noninvasive ventilation, care of the obstetric patient, and the basic management of COVID-19 patients with hypoxia. This Clinical Practice does not supersede any Local, County, State, or Federal guidelines that are more stringent.

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<td>Communication</td>
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Title of Clinical Practice: Perioperative Management of Adult and Pediatric, Inpatients and Outpatients, With COVID-19 or Persons Under Investigation for COVID-19.

PRACTICE APPROACH:
This consensus based clinical practice represents best perioperative evidence as of APRIL 17, 2020, and is expected to be considered during the care of patients with COVID-19 or under investigation for COVID-19 infection. This Clinical Practice does NOT supersede any Local, County, State, or Federal guidelines that are more stringent.

PRACTICE STATEMENT:
This clinical practice applies to all perioperative patients being cared for in ambulatory surgery centers and hospital settings of any age and whether inpatients or outpatients. Surgical and Obstetric patients without COVID-19 infection, with COVID-19 infection, or under investigation for COVID-19 will be addressed as groups.

EVIDENCE-BASED RATIONALE:
COVID-19, also known as 2019 Novel Coronavirus also known as 2019-nCoV, is a highly infectious virus, which upon infection, presents a clinical spectrum from asymptomatic to critically ill. This pathogen is transmitted via inhalation of aerosolized virus laden droplets, especially when exposure is within 6 feet of the infected individual. Current unknowns include true mortality rate and whether exposure to contaminated surfaces represents risk to the clinician. The goal of this clinical practice is to provide pragmatic guidance relative to mitigating the risk to patients, their carers, practitioners, and facility.

This clinical practice is completely in line with CDC, ASA, AANA, AAAA, ACS, APSF, SOAP, SAMBA, and tJC guidelines, but will be superseded by facility, Municipality, County, State or Federal rules or regulations that are more stringent than those included within this clinical practice.

CLINICAL APPROACH:
Overview
A. Patient Care
   1. Preoperative Screening
   2. Elective Surgery and the use of the ACS Elective Surgical Acuity Screening (ESAS) Tool
   3. Urgent or Emergent Surgery in patients with COVID-19 or under investigation for COVID-19
   4. APSF Airway management recommendations
5. Extubation considerations
6. Patient Transport
7. Caring for the laboring patient who is either positive for COVID-19 or under investigation for COVID-19
8. Pediatric patients with known exposure, may be infected and asymptomatic.

B. Clinician Care
   1. PPE/PAPR use

C. Operating Room Considerations
   1. Team Huddle
   2. General room considerations
   3. Machine set up
   4. Circuit setup
   5. N95 mask Reuse

A. Patient Care
   1. Preoperative Screening.
      All patients should undergo immediate pre-anesthesia screening by one of the members of the anesthesiology care team. Table 1 outlines currently recommended screening questions. represent a minimum that should be asked.

   Table 1.0 Screening Questions for Respiratory Illness Signs and Symptoms (Yes / No)

<table>
<thead>
<tr>
<th>Question</th>
<th>Yes/No</th>
</tr>
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<tbody>
<tr>
<td>Have you recently felt feverish? Current or recent temperature greater than 100.4°F?</td>
<td></td>
</tr>
<tr>
<td>Do you have a cough (not related to chronic lung disease or allergy)?</td>
<td></td>
</tr>
<tr>
<td>Are you experiencing shortness of breath?</td>
<td></td>
</tr>
<tr>
<td>Have you been in close contact with any person who may be sick with an influenza like illness, coronavirus, Ebola, measles, MERS, SARS or TB?</td>
<td></td>
</tr>
<tr>
<td>Have you or anyone in close contact with you traveled outside the U.S. within the last 30 days?</td>
<td></td>
</tr>
<tr>
<td>If yes, which country?</td>
<td></td>
</tr>
</tbody>
</table>

If the patient or carer answers “YES” to any of the above questions, POSTPONEMENT of elective surgery should be considered.

2. Elective Surgery and the use of the ACS Elective Surgical Acuity Screening (ESAS) Tool
   Facilities should use caution when making decisions as to continuing or postponing elective surgery based on their local situation, staffing, resources, in addition to local, state, and federal guidance.
• Work with your local public health officials to determine if it is appropriate to postpone surgeries to assure that resources are available should increased demands on the healthcare system become apparent.

• Encourage surgeons to follow the American College of Surgeons (ACS) recommendations for elective surgery and its ESAS tool. (Table 2)

Table 2. ACS ESAS Tool. The ESAS tool should be considered a recommendation and will be superseded by facility, local, state, and federal rules and regulations.

Elective Surgery Acuity Scale (ESAS)

Reprinted with permission: Sameer Siddiqui MD, FACS, St Louis University

<table>
<thead>
<tr>
<th>Tiers/Description</th>
<th>Definition</th>
<th>Locations</th>
<th>Examples</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tier 1a</td>
<td>Low acuity surgery/healthy patient Outpatient surgery Not life threatening illness</td>
<td>HOPD ASC Hospital with low/no COVID-19 census</td>
<td>Carpal tunnel release Penile prosthesis EGD Colonoscopy</td>
<td>Postpone surgery or perform at ASC</td>
</tr>
<tr>
<td>Tier 1b</td>
<td>Low acuity surgery/unhealthy patient</td>
<td>HOPD ASC Hospital with low/no COVID-19 census</td>
<td></td>
<td>Postpone surgery or perform at ASC</td>
</tr>
<tr>
<td>Tier 2a</td>
<td>Intermediate acuity surgery/healthy patient Not life threatening but potential for future morbidity and mortality Requires in hospital stay</td>
<td>HOPD ASC Hospital with low/no COVID-19 census</td>
<td>Low risk cancer Non urgent spine Ureteral colic</td>
<td>Postpone surgery if possible or consider ASC</td>
</tr>
<tr>
<td>Tier 2b</td>
<td>Intermediate acuity surgery/unhealthy patient</td>
<td>HOPD ASC Hospital with low/no COVID-19 census</td>
<td></td>
<td>Postpone surgery if possible or consider ASC</td>
</tr>
<tr>
<td>Tier 3a</td>
<td>High acuity surgery/healthy patient</td>
<td>Hospital</td>
<td>Most cancers Highly symptomatic patients</td>
<td>Do not postpone</td>
</tr>
<tr>
<td>Tier 3b</td>
<td>High acuity surgery/unhealthy patient</td>
<td>Hospital</td>
<td></td>
<td>Do not postpone</td>
</tr>
</tbody>
</table>

HOPD – Hospital Outpatient Department
ASC – Ambulatory Surgery Center
3. **Triage of Surgical Patients with COVID-19 or PUI Who Require Urgent or Emergent Surgery.**

   [Figure 1] The OrlandoHealth’s **Perioperative COVID-19 Testing for Operative and Endoscopic Procedures** algorithm should be considered when caring for patients requiring surgery or endoscopy.  

   [Figure 2]

   **Figure 1.** Emergency Triage of the COVID+ / PUI Surgical Patient

   Adapted: From Table 4: Zhao S, et al. JCVa 000 (2020) 1-2

   *Second screening for non-suspicious patients is critical and must include evaluation of all new data that may be available, labs, temperatures, CT results, etc.*

   *This Clinical Practice supports the ASA/ AANA/ AAAA/ APSF updated recommendation (3-23-2020) that “all anesthesia professionals should utilize PPE appropriate for aerosol-generating procedures for all patients when working near the airway.” Additionally, appropriate PPE including the use of N95 (or better) when, in their best judgment, a clinician deems that donning an N95 mask (or better) enhances their own safety during patient care.*
Figure 2. OrlandoHealth Algorithm for Periprocedural COVID-19 Testing.

Perioperative Covid-19 Testing for Operative & Endoscopic Procedures

- Necessary operation/procedure

  - Is it an EMERGENCY?

    - NO
      - Can the patient be screened for symptoms?
        - YES
          - Is the patient symptomatic?
            - YES
              - Perform a COVID-19 PCR Test
            - NO
              - Postpone the procedure until patient is asymptomatic
        - NO
          - Can COVID-19 PCR testing be performed?
            - YES
              - COVID-19 POSITIVE PROTOCOL
                - N95 mask
                - Goggles or face shield
                - Fluid-resistant gown
                - Head covering
                - Double gloves
            - NO
              - YES
                - COVID-19 NEGATIVE PROTOCOL
                  - Standard surgical attire
- NO
  - Is this a HIGH-RISK* Procedure?

  - NO
    - Patient is asymptomatic
  - YES
    - Is the COVID-19 PCR test POSITIVE?

Source: OrlandoHealth 5597-239662 4-11-20 © 2020
Airway Management Recommendations [Patient]

Intubation

This clinical practice endorses the Society of Critical Care Anesthesiologists (SOCCA), Anesthesia Patient Safety Foundation (APSF), and Society for Critical Care Medicine (SCCM) recommendations for Airway Management in patients who have or who are currently under investigation for COVID-19. (Figure 3, Addendum 5, page 28) Additionally, this Clinical Practice supports the ASA/ AANA/ AAAA/ APSF updated recommendation (3-23-2020) that “all anesthesia professionals should utilize PPE appropriate for aerosol-generating procedures for all patients when working near the airway.”

Most operating rooms and delivery rooms are POSITIVE PRESSURE. Identify whether your facility has NEGATIVE PRESSURE Operating Rooms and/or Delivery Rooms and use these for all COVID-19 and PUI.

Extubation and Transport

- Patients should be extubated in a negative pressure room within the PACU if possible.
- If no Neg pressure room available in PACU, then extubate and recover them in the operating room
- Minimize O2 nasal cannula flow, consider not using at all if clinically appropriate
- Pts who are being transported back to their rooms need to wear a surgical mask in transport, as clinically indicated
- When transporting COVID-19 positive patients between hospital units, if available, consider using adult isoletes

If the patient is already Intubated: (ICU->OR)

- Transport from ICU to Operating Room
- Verify that you are wearing the appropriate PPE for transport.
- Verify that there is a Halyard closed suction (or similar) system connected to the endotracheal tube
- Verify that there is a HEPA HME with gas sampling port connected to the Halyard closed suction system on the filter side.

Suggest transport with ICU ventilator. Prior to leaving ICU room attach CO2 connector and sample line while maintaining PPE. Consider TIVA whilst in the OR and keeping the patient on the ICU ventilator, to minimize exposure that might occur with connecting to the anesthesia machine. Additionally, this will keep the anesthesia machine “CLEAN.”

If the ICU ventilator cannot be used in the OR, proceed as below.

- Reduce flow to off, disconnect circuit from ventilator, clamp ETT. (Lian Kah Ti, 2020)
Connect the AMBU bag to the HEPA HME for transport UNCLAMP ETT and proceed with ventilation use reverse clamp process to disconnect AMBU HME HEPA and reconnect to anesthesia machine.

Use the ICU vital sign data module on the patient’s monitor (if available) as the transport monitor during transport.

On arrival to the operating room, connect the anesthesia breathing system to the HEPA HME and connect the gas sampling line to the sampling port on the HEPA HME.

Never disconnect the continuous suction/HEPA HME from the patient’s endotracheal tube.

Never connect the gas sampling line between the patient and the HEPA HME.

Connect the ICU vital sign data module to monitor if possible in OR to begin monitoring.

Return the patient to the ICU using the same procedure used for transport to the operating room, but in reverse order.

Figure 3. APSF Recommendations for Airway Management in Patients with COVID-19 or PUI.
4. **Caring for the Laboring COVID-19 Positive Patient**
   
   This clinical practice endorses all ACOG and SOAP guidelines for the management of laboring patients with COVID-19 or who are under investigation for COVID-19. [Table 3]

### Table 3.0 OB Anesthesia Specific Considerations [SOAP]

OB Anesthesia specific considerations:

These general recommendations follow the APSF (Anesthesia Patient Safety Foundation) guidelines for management of women who tested positive for COVID19 or who are persons under investigation (PUI).

1. Admit to isolation room, preferably a negative pressure room, and limit the number of care providers to the strict minimum.

2. ALL healthcare workers should implement airborne and contact precautions with eye protection upon entering delivery or operating room (gown, gloves, mask, eye protection).

3. Donning and doffing takes time. Avoid crash situations by anticipating needs.
   - Early epidural analgesia may reduce the need for general anesthesia for emergent cesarean delivery.
   - A COVID 19 diagnosis itself is NOT considered a contraindication for neuraxial anesthesia.
   - Avoid emergent cesarean deliveries as much as possible - proactive communication with obstetrical and nursing teams. For respiratory distress intubate early using appropriate PPE.
   - Assign the most experienced anesthesia provider whenever possible for procedures (neuraxial, intubation)
   - Consider minimizing use of trainees in direct care of COVID19 patients. Minimize the number of personnel in the room.
   - PPE for labor epidural placement is not SPECIFICALLY addressed in the SOAP guideline, however, the OB Anesthesia Specific Considerations section states that "ALL healthcare workers should implement airborne and contact precautions with eye protection upon entering either a delivery or operating room (gown, gloves, mask, eye protection)". To the extent that SOAP endorses the APSF airway recommendations, the use of N95 masks would be appropriate in this situation given that emergent C/S may follow epidural initiation.
It stands to reason that "precautions with eye protection upon entering delivery or operating room (gown, gloves, mask, eye protection) " should be considered at a minimum during labor epidural placement.

4. If general anesthesia and intubation is required;

- Anesthesia providers and necessary assistants should wear N95 or PAPRs prior to pre-oxygenation
- Apply N95/PAPR or face shield (if PAPR is not used), impermeable gown, gloves, and head covers. Use donning and doffing check lists and trained observers. Double glove for ALL procedures and replace the outer layer of gloves after intubation.
- Minimize to only essential personnel during intubation - use your best judgement, while making sure you have some assistance readily available
- If GA indicated, and it is a life-threatening situation, wear PPE/N95 mask - All personnel in the OR at the time of intubation should also wear an N95 and, if not wearing a N95 or PAPR should contact occupational health
- Pre-oxygenation (>5 L/min flow) should occur with a circuit extension and HEPA filter at the patient side of the circuit
- Use a closed suction system (if available).
- Intubation should occur via a means to maximize success on first attempt and minimize any need to provide bag-mask ventilation (video-laryngoscope)
- Extubation is equally, if not more of a risk for aerosolization; minimize personnel, utilize N95/PAPR and PPE precautions. If proceeding with extubation at the end of case, extubate in the OR, keep PPE (PAPR/N95) on until after extubation. Consider transporting intubated to a negative pressure room (e.g. ICU) for emergence/ extubation.

5. In accordance with the rational use guidance issued by the World Health Organization (WHO), hospitals are recommending N95’s only for special procedures, e.g. aerosolizing procedures such as intubations. Institutions may have different institutional guidelines for donning (addendum 3, page 27) and doffing (addendum 4, page 29) unless less stringent than those supported by this clinical practice.

6. In view of alternative pain modalities for labor, the use of nitrous should be limited and possibly held in view of respiratory droplet risk.

7. Since the care of a COVID19 patient, including the time for donning and doffing, is time intensive, additional staffing may be needed, and back-up strategies may need to be developed.

Drafted by Mihaela Podovei, Kyra Bernstein, Ronald George, Ashraf Habib, Rachel Kacmar, Brian Bateman and Ruth Landau. - Found in SOAP Interim Considerations for Obstetric Anesthesia Care related to COVID19
B. Clinician Care and Experience with PPE

This Clinical Practice supports the ASA/ AANA/ AAAA/ APSF updated recommendation (3-23-2020) that “all anesthesia professionals utilize PPE appropriate for aerosol-generating procedures for all patients when working near the airway” Additionally, PPE, including an N95 mask (or better) should be donned when, in their best judgment, a clinician deems that wearing an N95 mask (or better) enhances their own safety during patient care. Sample OrlandoHealth checklists for appropriate PPE in known or suspected COVID-19 patients can be found in tables 4 and 5.

Non-Facility Issued PPE

We believe that the most valuable resource in combatting COVID-19 and taking care of patients is our healthcare workers. It is clear that with community spread and with the varied presentations of coronavirus, healthcare providers should use appropriate PPE when taking care of every patient. This includes surgical masks, eye protection, gloves and other protective equipment. Higher level PPE is needed during high risk contact situations and aerosol generating procedures. Due to the incredible increased demand, the normal supply chains for hospitals are taxed. To protect their health and safety, healthcare providers have been sourcing their own PPE from other industries, their own searches, and their loved ones. Envision recognizes the valuable resource that is our healthcare providers and the need to protect them. On behalf of the safety and well-being of healthcare providers nationwide, we urge hospitals and health care facilities to allow healthcare providers to use appropriate PPE that is alternatively sourced, provided that none are available through normal channels. This Clinical Practice is in complete alignment with the American Society of Anesthesiology (ASA), the American Association of Nurse Anesthetists (AANA), American College of Emergency Physicians (ACEP, and the Joint Commission position statements endorsing the use of non-facility issued PPE when otherwise not facility provided.
Table 4. OrlandoHealth PPE Recommendations for Invasive Procedures.

<table>
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<tr>
<th>Appropriate Personal Protective Equipment (PPE) for Invasive Procedures</th>
<th>In Known or Suspected COVID-19 Patients</th>
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<tr>
<td><strong>Low Risk of Respiratory Aerosols – Droplet Precautions</strong></td>
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<tr>
<td>Routine patient care</td>
<td>Level III surgical</td>
</tr>
<tr>
<td><strong>High Risk of Respiratory Aerosols – Airborne Precautions</strong></td>
<td>(This list should not be considered all-inclusive)</td>
</tr>
<tr>
<td>Naso/oropharyngeal specimen collection</td>
<td>N-95</td>
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<tr>
<td>Open airway suctioning</td>
<td>N-95</td>
</tr>
<tr>
<td>Aerosolized respiratory treatments (nebulization)</td>
<td>N-95</td>
</tr>
<tr>
<td>Intubation</td>
<td>N-95</td>
</tr>
<tr>
<td>Bronchoscopy</td>
<td>N-95</td>
</tr>
<tr>
<td>Cardiac arrest</td>
<td>N-95 or PAPR</td>
</tr>
<tr>
<td>Autopsy of suspected or confirmed COVID-19</td>
<td>N-95 or PAPR</td>
</tr>
</tbody>
</table>

* Disposable surgical hood head covering, Tyvek™ suit, or similar covering

** Certain aerosol generating procedures (AGP) may require a specific type of eye protection (i.e., tight-fitting goggles)

Goggles or face shield are not required when using a PAPR.

North reusable N-100 masks or valve N-95 respirators MAY be used in sterile procedures at the bedside as long as a Level II or Level III surgical face mask is worn over the exhalation port of these masks to protect the patient's wounds from the proceduralist's exhaled air.

Source: OrlandoHealth 5597-239662 4-11-20 © 2020
Table 5. OrlandoHealth PPE Recommendations for operative and Endoscopic Procedures.

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Anesthesia Provider PPE</th>
<th>Surgery / Nursing / Scrub PPE</th>
<th>Notes</th>
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<tr>
<td>COVID-19 POSITIVE patient OR COVID-19 suspected patient</td>
<td>• N-95 mask</td>
<td>• N-95 mask</td>
<td>• PPE to be worn by all members throughout procedure.</td>
</tr>
<tr>
<td></td>
<td>• Goggles or face shield</td>
<td>• Goggles or face shield</td>
<td>• Minimize number of providers present.</td>
</tr>
<tr>
<td></td>
<td>• Fluid-resistant gown</td>
<td>• Fluid-resistant gown</td>
<td>• Evacuate electrocautery smoke and laparoscopic insufflation gas.</td>
</tr>
<tr>
<td></td>
<td>• Head covering</td>
<td>• Head covering</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Double gloves</td>
<td>• Double gloves</td>
<td></td>
</tr>
<tr>
<td>Emergent procedure OR Symptom screening / PCR testing unavailable</td>
<td>• N-95 mask</td>
<td>• N-95 mask</td>
<td>• PPE to be worn by all members throughout procedure.</td>
</tr>
<tr>
<td></td>
<td>• Goggles or face shield</td>
<td>• Goggles or face shield</td>
<td>• Minimize number of providers present.</td>
</tr>
<tr>
<td></td>
<td>• Fluid-resistant gown</td>
<td>• Fluid-resistant gown</td>
<td>• Evacuate electrocautery smoke and laparoscopic insufflation gas.</td>
</tr>
<tr>
<td></td>
<td>• Head covering</td>
<td>• Head covering</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Double gloves</td>
<td>• Double gloves</td>
<td></td>
</tr>
<tr>
<td>Asymptomatic patient OR NEGATIVE COVID-19 PCR testing</td>
<td>• Standard PPE</td>
<td>• Standard PPE</td>
<td></td>
</tr>
</tbody>
</table>

North reusable N-100 masks orvalved N-95 respirators MAY be used in sterile procedures in the operating room as long as a Level II or Level III surgical face mask is worn over the exhalation port of these masks to protect the patient's wounds from the proceduralist's exhaled air.

Source: OrlandoHealth 5597-239662 4-11-20 © 2020
Table 6. APSF Personal Protective Equipment Review:

- Personal protective equipment (PPE) should be available for all providers. Providers and their organizations should review protocols for correct donning and doffing PPE.

- Consider conducting mock intubation/extubation drills using PPE in a real environment (*in situ*). This is an opportunity to promote correct use of PPE among providers and to identify barriers to adherence. Consideration should be taken to avoid “rescue like” crash intubations where PPE cannot be fully adhered to, at the organizational level.

- **We suggest a lowered threshold for planning elective or semi-elective intubations in relevant cases.** Given the risk of transmission with non-invasive ventilation, we recommend proceeding early directly to endotracheal intubation in patients with acute respiratory failure.

- N95 masks fulfill the filtering efficiency criteria of the National Institute for Occupational Safety and Health (NIOSH) and are approved for protection against droplet and airborne transmission of 95% of particles greater than 0.3 microns in size.

- N95 masks, which must be fit tested, are believed to offer protection against the contact and droplet spread of the coronavirus.

- At a minimum, **N95 masks should be used for all known or suspected cases of 2019-nCoV, as well as for any asymptomatic “open airway” cases, e.g.: interventional pulmonology procedures.** A powered air-purifying respirator (PAPR) provides superior protection and may be warranted for airway procedures in patients with known or suspected 2019-nCov given prior cases of HCW infection with SARS-CoV using N95 masks. Routine intubation and extubation for any asymptomatic ADULT patient undergoing general endotracheal anesthesia is currently *not* classified as an “open airway case”.

- **Pediatric patients infected with COVID-19 may show no symptoms nor radiologic features of infection (afebrile, clear chest X ray).** Based on this evidence, N95 masks should be worn for all pediatric airway management and pediatric open airway procedures. (This is not specifically recommended by the APSF).

- Disposable OR caps and beard covers should be properly worn to reduce the risk of contaminating hands by touching hair which may have been exposed to droplets. Disposable fluid-resistant long-sleeved gowns, goggles and disposable full-face shields are recommended for frontline medical staff at risk of exposure.

- **Hand washing is essential before and after donning or doffing PPE.**
C. Operating Room Considerations

1. General Room Considerations Including PREoperative Room Readiness and Equipment Timeout:

   Adapted from Jefferson COVID-19 Standards

   - Most operating rooms and delivery rooms are POSITIVE PRESSURE. If a NEGATIVE PRESSURE operating room is available, it should be designated for any surgical patients who are positive or under suspicion for COVID-19.
   - PREoperatively, the circulator, scrub, anesthesiology provider(s), AND surgeon should perform a room readiness and equipment "Timeout". Consider documenting this “TIMEOUT” on the room log.
   - Limit all entry into the room only as needed. KEEP a log of all people who enter and leave the OR
   - Mark all OR entrances as “Enhanced Airborne Precautions…DO NOT ENTER UNLESS PART of the CARE TEAM”
   - During Intubation, only the absolute critical number of people that need be in the room, should be there. PAPR is preferred; if no PAPR possible, then N95 + Face Shield +isolation gown and gloves is appropriate.
   - Huddle before the case with surgeon and have all essential needed equipment in the room to minimize room traffic. And place Potential needed equipment/supplies outside
   - All staff in the OR need at a minimum to follow facility COVID Standards for PPE Usage. If the facility does not have a protocol, please follow the information posted on the Envsionhealth.com\coronavirus website OR
   - All equipment must be wiped down before it leaves the room with appropriate Hospital
   - Approved Disinfectant wipe (drug boxes, transport monitors, ambu bags, etc)
   - Room will need a terminal clean before anything else goes back into the room
   - THESE ARE NOT “TEACHING AIRWAYS.” THE MOST EXPERIENCED AIRWAY EXPERT SHOULD INTUBATE THESE PATIENTS.

2. ANESTHESIA MACHINE AND CIRCUIT SETUP: Adapted from Jefferson COVID-19 Standards

   1. Monitors
       a. Remove all unnecessary monitors, cables, and insure you are using the necessary monitors per Standard ASA Monitors
       b. If possible, make every effort to use the same monitor from the ICU, to minimize equipment usage/exposure, as appropriate.

   2. Anesthesia machine
       a. Remove all unnecessary items from the anesthesia machine drawers
b. Place round circuit HEPA HME circuit filter directly to the anesthesia machine, on the expiratory limb entry point (the one next to the APL valve) and then attach the breathing circuit.

  • CRITICAL: THE HEPA HME MUST STAY CONNECTED TO THE ANESTHESIA CIRCUIT AT ALL TIMES DURING PATIENT CARE or the machine must be taken out of service for terminal cleaning.

3. Anesthesia Circuit Connection to Pt ETT
   • Place a HEPA filter HME on the anesthesia circuit between the face mask elbow and the Y of the circuit
   • Attach the gas sampling line to the sampling port of the HEPA HME

4. Suction Connection to Pt ETT
   a. Consider using a contained suction system to minimize aerosolization.
   b. When working with adult patients, place a Halyard closed suction system (or similar) on the patient end of the HEPA HME. See Figures 4 and 5 courtesy of Jefferson.

Figures 4, 5, 6 BVM with Filter (4). Suggested circuit configuration (5) with HEPA filter (6) to minimize aerosolization of particles/droplets. NOTE: Sampling line must be filtered and suction tubing connected as a closed system.

Figure 4.

Figure 5.

Figure 6.

AUDIT PROCESS:
Standard hospital infection control audit procedures.
Sources:

[All Cited on April 1, 2020 and available from:]

2. ASA: https://www.asahq.org/about-asa/governance-and-committees/asa-committees/committee-on-occupational-health/coronavirus
3. ACS: https://www.facs.org/about-acs/covid-19/information-for-surgeons/triage
5. SAMBA: https://sambahq.org/annualmeeting/#COVID
7. COVID Pt Specific Urgent-Emergent Surgical Patient Management Guidelines Jefferson Health Internal and available upon request.
10. Envision Healthcare: https://www.evhc.net/coronavirus
11. Correspondence: SARS-CoV-2 Infection in Children; March 18, 2020. DOI: 0.1056/NEJMc2005073
13. Joint ASA, APSF, AANA Statement

19. Envisionhealth.com/coronavirus


23. CDC Air Exchange and Airborne Pathogen Clearance Efficiency: [https://www.cdc.gov/infectioncontrol/guidelines/environmental/appendix/air.html#b1](https://www.cdc.gov/infectioncontrol/guidelines/environmental/appendix/air.html#b1)

**KEYWORDS AND/OR KEYWORD PHRASES:**

COVID-19
Viral Infection
2019-CoV
2019 Novel Coronavirus
Coronavirus infection
Surgical Patients
PPE
PAPR
Reuse
Donning
Respirator
Checklist
Pandemic
Anesthesiology
Non-Facility Issued PPE
The Joint Commission
Addendum 1
Respirator Reuse Recommendations
(4-13-2020)

There is no way of determining the maximum possible number of safe reuses for an N95 respirator. Safe N95 reuse is affected by a number of variables that impact respirator function and contamination over time.\(^{(18, 19)}\) However, manufacturers of N95 respirators may have specific guidance regarding reuse of their product. The recommendations below are designed to provide practical advice so that N95 respirators are discarded before they become a significant risk for contact transmission or their functionality is reduced.

If reuse of N95 respirators is permitted, respiratory protection program administrators should ensure adherence to administrative and engineering controls to limit potential N95 respirator surface contamination (e.g., use of barriers to prevent droplet spray contamination) and consider additional training and/or reminders (e.g., posters) for staff to reinforce the need to minimize unnecessary contact with the respirator surface, strict adherence to hand hygiene practices, and proper PPE donning and doffing technique, including physical inspection and performing a user seal check.\(^{(16)}\) Healthcare facilities should develop clearly written procedures to advise staff to take the following steps to reduce contact transmission:

- Discard N95 respirators contaminated with blood, respiratory or nasal secretions, or other bodily fluids from patients.
- Discard N95 respirators following close contact with any patient co-infected with an infectious disease requiring contact precautions.
- Use a cleanable face shield (preferred) or a surgical mask over an N95 respirator and/or other steps (e.g., masking patients, use of engineering controls), when feasible to reduce surface contamination of the respirator.
- Hang used respirators in a designated storage area or keep them in a clean, breathable container such as a paper bag between uses. To minimize potential cross-contamination, store respirators so that they do not touch each other and the person using the respirator is clearly identified. Storage containers should be disposed of or cleaned regularly.
- Clean hands with soap and water or an alcohol-based hand sanitizer before and after touching or adjusting the respirator (if necessary for comfort or to maintain fit).
- Avoid touching the inside of the respirator. If inadvertent contact is made with the inside of the respirator, perform hand hygiene as described above.
- Use a pair of clean (non-sterile) gloves when donning a used N95 respirator and performing a user seal check. Discard gloves after the N95 respirator is donned and any adjustments are made to ensure the respirator is sitting comfortably on your face with a good seal.

Management should consider additional training and/or reminders for users to reinforce the need for proper respirator donning techniques including inspection of the device for physical damage (e.g., Are the straps stretched out so much that they no longer provide enough tension for the respirator to seal to the face?, Is the nosepiece or other fit enhancements broken?, etc.). Healthcare facilities should provide staff clearly written procedures to:
Follow the manufacturer's user instructions, including conducting a user seal check.
Discard any respirator that is obviously damaged or becomes hard to breathe through.
Pack or store respirators between uses so that they do not become damaged or deformed.

Secondary exposures can occur from respirator reuse if respirators are shared among users and at least one of the users is infectious (symptomatic or asymptomatic). Thus, N95 respirators must only be used by a single wearer. To prevent inadvertent sharing of respirators, healthcare facilities should develop clearly written procedures to inform users to:

- Label containers used for storing respirators or label the respirator itself (e.g., on the straps (11)) between uses with the user's name to reduce accidental usage of another person's respirator.

References (Addendum 1)


Addendum 2
Out of OR (OOOR) Intubation and Extubation Readiness Checklist

Critical COVID + Patient Response
Preparing for Emergency Endotracheal Intubation Checklist

<table>
<thead>
<tr>
<th>Task</th>
<th>Detail</th>
<th>✓</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gather Supplies and Equipment; Team Assignments</strong></td>
<td></td>
<td>* Note names in comments</td>
<td></td>
</tr>
<tr>
<td>Assign staff</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>In room (Hot Zone)</td>
<td>Clinician</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Respiratory Tech</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Nurse inside the door for hand-offs, meds</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Nurse for patient care</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Outside room (Cold Zone)</td>
<td>Staff, in PPE, to hand off in room—no N-95 unless going into Hot Zone.</td>
<td></td>
<td>Assign to watch doffing post-proc</td>
</tr>
<tr>
<td></td>
<td>PLACARD ROOM ENTRIES: COVID + PATIENT</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Additional personnel for CPR, if becomes needed</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Staff to draw add’l meds, pull equipment/runner</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2nd clinician, skilled with ET intubation</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Hot Zone Equipment</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ventilator with Viral filter</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bag Valve Mask with Viral Filter w/ PEEP Valve</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lubricating jelly</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ETCO2 Color Change Detector</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ETT Tube(S), securing device &amp; in-line suction system</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>10 ml syringe</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Video Laryngoscope ETT stylet</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Video laryngoscope with ≥2 adult blade sizes Available (Miller 2, 3, Mac 3, 4)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Suction setups including canisters, tubing, Yankauer, regulators, oral Care Supplies</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2 oxygen regulators</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Disposable stethoscope</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Assortment oral and nasal airways</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Cold Zone Equipment</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Laryngoscope handle with batteries: ✓ BATTERIES</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Additional Video Laryngoscope Blades and Styles</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>LMA 3, 4, &amp; 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>MAC/Miller blades &amp; disposable bronchoscope</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Additional ET TUBES, preselected Bougie</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Cricothyrotomy Kit w/ skin prep, sterile towels

- [ ]

### Ultrasound with probe covers, US Gel

- [ ]

### Central Line with IV Caps / Arterial Line Kit

- [ ]

### I/O KIT

- [ ]

### Code cart

- [ ]

### Defibrillator/Pacer with appropriate pads

- [ ]

### Medications

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>IV FLUIDS</td>
<td>(LR or NS - 1 liter)</td>
</tr>
<tr>
<td>RESPIRATORY</td>
<td>Epinephrine 0.3mg IM, Terbutaline 0.25mg SQ, Albuterol MDI</td>
</tr>
<tr>
<td>Induction</td>
<td>Propofol, Etomidate, Ketamine</td>
</tr>
<tr>
<td>PARALYTIC</td>
<td>Succinylcholine, Rocuronium or Cisatracurium</td>
</tr>
<tr>
<td>Paralytic Reversal Agents (Ex: Sugammadex)</td>
<td></td>
</tr>
<tr>
<td>NARCOTIC</td>
<td>Fentanyl push dose</td>
</tr>
<tr>
<td>POST SEDATION</td>
<td>Pre-Prime Propofol tubing for infusion</td>
</tr>
<tr>
<td>Prefilled and LABELED vasopressor</td>
<td>Phenylephrine, ephedrine</td>
</tr>
<tr>
<td>Norepinephrine infusion</td>
<td></td>
</tr>
</tbody>
</table>

### Just prior to entering room

- Room readiness timeout
- Assess patient/environment for equipment needs
- Are all boxes checked above

- Perform pre procedure patient safety timeout
- Check PPE

### Post Procedure

<table>
<thead>
<tr>
<th>Action</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observer watches doffing</td>
<td>Wipe gloves &amp; arms of PPE per hospital protocol before doffing</td>
</tr>
<tr>
<td></td>
<td>Watches through door</td>
</tr>
<tr>
<td></td>
<td>DOFF ALL PPE EXCEPT N95 in room</td>
</tr>
<tr>
<td></td>
<td>Prior to opening door</td>
</tr>
<tr>
<td></td>
<td>Instruct on hand hygiene</td>
</tr>
<tr>
<td>Huddle</td>
<td>What went well/What didn’t go well</td>
</tr>
<tr>
<td></td>
<td>To identify for future PI</td>
</tr>
<tr>
<td></td>
<td>Were supplies/equipment appropriate</td>
</tr>
</tbody>
</table>
**Addendum 3**

**Checklist for the Donning of PAPR PE for the Proceduralization of Patients with COVID-19 or PUI**

**NOT AN EMERGENCY...TAKE YOUR TIME**

<table>
<thead>
<tr>
<th>Task</th>
<th>Detail</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Preparation for Donning PPE</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Identify a <strong>trained observer</strong></td>
<td>To read aloud each step in the donning procedural checklist and visually confirm and document that the step has been completed correctly</td>
<td>□</td>
</tr>
<tr>
<td>What to wear</td>
<td>Wear dedicated washable footwear, such as plastic or rubber materials</td>
<td>□ Footwear should be closed toe/heel with no holes</td>
</tr>
<tr>
<td></td>
<td>Remove all personal items (e.g., jewelry, watches, cell phones, pagers, pens)</td>
<td>□</td>
</tr>
<tr>
<td><strong>Inspect PPE</strong></td>
<td>Visually inspect the PPE ensemble to ensure that:</td>
<td>□</td>
</tr>
<tr>
<td></td>
<td>1. It’s in serviceable condition; check N95 (including straps) for signs of tear/damage</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2. All required PPE and supplies are available</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. Sizes selected are correct</td>
<td></td>
</tr>
<tr>
<td><strong>Donning</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Put on boot covers</td>
<td>Make sure that all areas of the foot are covered and the boot covers are snug over your ankle/calf</td>
<td>□</td>
</tr>
<tr>
<td></td>
<td>- Try not to touch the floor or other areas with your hands while putting the boot covers on. If you do, disinfect your hands before putting your inner gloves on</td>
<td></td>
</tr>
<tr>
<td>Put on inner gloves</td>
<td>Make sure cuffs go as far up arm as possible</td>
<td>□</td>
</tr>
<tr>
<td>Put on gown</td>
<td>Tie the gown securely at neck and waist, but in a manner that it can be easily untied when you begin the doffing process. Leave some length of the tie so that it can be pulled and untied without much effort</td>
<td>□ Gown should fully cover torso from neck to knees, arms to end of wrists, and wrap around back</td>
</tr>
<tr>
<td>Ensure cuffs of the inner gloves are tucked under the sleeve of the gown</td>
<td></td>
<td>□</td>
</tr>
<tr>
<td>Put on powered air-purifying respirator (PAPR)</td>
<td>Stays on outside of gown:</td>
<td>□ It may be necessary to ask your Trained Observer for assistance when putting on the outer gloves</td>
</tr>
<tr>
<td></td>
<td>- Attach hose to PAPR battery pack and filter</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Trained observer holds pack at small of back while you fasten the belt around your waist snugly and secure any loose straps</td>
<td></td>
</tr>
<tr>
<td>Put on outer gloves</td>
<td>Place 2nd set of gloves to provide an extra layer of safety; consider using a different color glove from inner layer to rapidly identify a breach in glove integrity</td>
<td>□</td>
</tr>
<tr>
<td></td>
<td>Outer gloves should cover wrist of gown</td>
<td></td>
</tr>
<tr>
<td>Put on a PAPR hood</td>
<td>Put on hood so it fully covers head, hair, and neck and extends over shoulders</td>
<td>□</td>
</tr>
<tr>
<td>Make sure opening is in front</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The Trained Observer turns on PAPR and attaches PAPR blower tube to the PAPR hood and make sure the tube is snapped and fits</td>
<td>□ If the unit stops during patient care must leave the patient are immediately</td>
<td></td>
</tr>
<tr>
<td>Put on outer apron</td>
<td>If the patient is vomiting or has diarrhea, put on a single-use, fluid resistant or impermeable apron that covers the torso to the level of the mid-calf</td>
<td>□</td>
</tr>
<tr>
<td><strong>Verify</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trained observer verifies the integrity of the ensemble</td>
<td>Should check that all areas are covered and no hair protrudes from the hood</td>
<td>□</td>
</tr>
</tbody>
</table>
Addendum 3 continued

Checklist for the Donning of N95 PPE for the Proceduralization of Patients with COVID-19 or PUI

**NOT AN EMERGENCY…TAKE YOUR TIME**

<table>
<thead>
<tr>
<th>Task</th>
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<th>Comments</th>
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<tr>
<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td>3. Sizes selected are correct</td>
<td></td>
</tr>
<tr>
<td><strong>Perform seal check</strong></td>
<td></td>
<td>Follow manufacturer instructions</td>
</tr>
<tr>
<td>Positive + pressure</td>
<td>Cover surface of respirator with hands so air is prevented from passing through face piece; gently exhale to see if face piece bulges</td>
<td>Use clean gloves to do the check</td>
</tr>
<tr>
<td>Negative - pressure</td>
<td>Take a quick deep breath to see if face piece collapses slightly</td>
<td></td>
</tr>
<tr>
<td>If leakage is identified</td>
<td>Readjust and test again, if fails do not use</td>
<td></td>
</tr>
<tr>
<td><strong>Perform hand hygiene</strong></td>
<td>In between fingers, back of hands and wrist</td>
<td></td>
</tr>
<tr>
<td><strong>Donning</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Put on boot covers</td>
<td>Make sure that all areas of the foot are covered and the boot covers are snug over your ankle/calf</td>
<td></td>
</tr>
<tr>
<td></td>
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<td></td>
</tr>
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<td></td>
</tr>
<tr>
<td>Put on the N95 or respirator</td>
<td>Hold the respirator in the palm of your hand with the straps facing the floor</td>
<td>Utilize level-3 surgical mask on top of N95 in case of contamination</td>
</tr>
<tr>
<td></td>
<td>Place the N95 respirator on your face covering your nose and mouth</td>
<td>Should be snug below chin level</td>
</tr>
<tr>
<td></td>
<td>Pull the bottom strap up and over top of your head, and put it behind your head below your ears</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Take the upper strap and put it behind your head towards the crown of your head</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mold the nose piece of the respirator over the bridge of your nose to obtain a tight seal</td>
<td></td>
</tr>
<tr>
<td>Put on goggles</td>
<td>Place over face and eyes and adjust fit</td>
<td></td>
</tr>
<tr>
<td>Put on outer apron</td>
<td>If the patient is vomiting or has diarrhea, put on a single-use, fluid resistant or impermeable apron that covers the torso to the level of the mid-calf</td>
<td>It may be necessary to ask your Trained Observer for assistance when putting on the outer apron</td>
</tr>
<tr>
<td>Put on outer gloves</td>
<td>Place 2nd set of gloves to provide an extra layer of safety; consider using a different color glove from inner layer to rapidly identify a breach in glove integrity</td>
<td>Outer gloves should cover wrist of gown</td>
</tr>
<tr>
<td>Put on face shield</td>
<td>Bending forward, hold on to the face shield with both hands, expand the elastic with your thumbs and place the elastic behind your head, so that the foam rests on your forehead</td>
<td>To provide additional protection to the front and sides of the face, including skin and eyes</td>
</tr>
<tr>
<td></td>
<td>Once the shield is situated, check to make sure it covers the front and sides of the face and no areas are left uncovered</td>
<td></td>
</tr>
<tr>
<td>Verifying trained observer verifies the integrity of the ensemble</td>
<td>Should be comfortable and able to extend the arms, bend at the waist, and go through a range of motions to ensure there is sufficient range of movement while all areas of the body remain covered</td>
<td></td>
</tr>
</tbody>
</table>

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Addendum 4
Checklist for the Doffing of PPE for the Proceduralization of Patients with COVID-19 or PUI
NOT AN EMERGENCY...TAKE YOUR TIME

<table>
<thead>
<tr>
<th>Task</th>
<th>Detail</th>
<th>ම</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preparation for Doffing PPE – Prior to moving from patient area into doffing area</td>
<td></td>
<td></td>
<td>Take your time when doffing; this trained observer will read steps</td>
</tr>
<tr>
<td>Identify a trained observer</td>
<td>Get attention of trained observer prior to entering doffing area</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Identify doffing area</td>
<td>2 chairs: dirty and clean</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Areas to dispose of used PPE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alcohol based hand sanitizer</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gloves</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inspect PPE</td>
<td>For obvious signs of contamination or materials, if so disinfect the surface of the PPE with an EPA-designated disinfectant wipe (hereinafter disinfect)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disinfect outer gloves</td>
<td>Disinfect</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Doffing: move to the doffing area</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disinfect outer gloves</td>
<td>Disinfect</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Remove outer apron (if used)</td>
<td>The assistant unties the strap - Remove apron by breaking the strap or lifting the strap over your head, rolling from the inside to outside and away from your body and discarding it - Once the apron is off, inspect your PPE for contamination, cuts, or tears. If you see your PPE has been compromised or if there are signs of contamination, disinfect</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disinfect outer gloves</td>
<td>Disinfect</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Remove boot covers</td>
<td>Sit in dirty chair in doffing area: - Don’t touch one leg with the other - Grasp the outside of the boot or shoe cover and pull down toward your ankle - Lift the boot or shoe cover over your heel, pull it off your foot, and dispose</td>
<td></td>
<td>Based on manufacturer instructions</td>
</tr>
<tr>
<td>Disinfect outer gloves</td>
<td>Disinfect</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Remove outer gloves</td>
<td>- Hold one of your wrists so that your thumb points to the ceiling - Pinch that glove and lift at the wrist, then roll it down until the glove is completely off your hand in a ball in the palm of the other hand - Slide a finger down and inside the outer glove on the other hand and pull it off until it’s balled around the first glove - Dispose</td>
<td></td>
<td>Keys to note: 1. Don’t contaminate or tear the inner glove 2. Don’t snap the gloves which could cause spray</td>
</tr>
<tr>
<td>Inspect inner gloves</td>
<td>If you do see a tear, hole, or signs of contamination of the inner gloves: - Disinfect - Remove the inner gloves, making sure not to contaminate your bare hands - Once the gloves are off, perform hand hygiene with alcohol based hand rub on your hands - Put on a new set of gloves up to the edge of the overall sleeve</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disinfect inner gloves</td>
<td>Disinfect</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Remove face shield</td>
<td>- Tilt your head forward slightly - Grab the strap at the temples and pull it forward and over your head, which will let the face shield fall from your face - Dispose</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disinfect inner gloves</td>
<td>Disinfect</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Remove surgical hood</td>
<td>- Tilt your head slightly - Grasp at the crown of the head, and use one hand to pull the hood forward, away from the body, and off the head - Dispose</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disinfect inner gloves</td>
<td>Disinfect</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Remove the gown
- Release the tie, then grasp the gown at the hip area, and pull the gown down and away from the sides of your body
- Once the gown is off your shoulders, pull one arm at a time from the sleeves of the gown so that the gown arms are bunched at your wrists
- Roll the exposed side of the gown inward until it’s a tight ball
- Dispose

### Change inner gloves
- Disinfect gloves, remove and dispose
- Perform hand hygiene, using alcohol based hand rub only
- Put on a fresh pair of gloves

### Remove the N95
- Tilt your head forward
- Use two hands to grab the bottom strap, pull to the sides, then over your head.
- Next, use both hands to grab the upper strap, pull to the sides, then over your head. Keep tension on the upper strap as you remove it, which will let the mask fall forward
- Dispose

### Disinfect inner gloves
- Disinfect

### Disinfect your shoes
- Sit down in the clean chair
- Use the EPA-registered disinfectant wipes to thoroughly disinfect all the surfaces of your shoes, moving from top to bottom and including the soles.
- Be sure not to touch your ankles

### Disinfect inner gloves
- Disinfect

### Remove and discard inner gloves
- Hold one of your wrists so that your thumb points to the ceiling
- Pinch that glove and lift at the wrist, then roll it down until the glove is completely off your hand in a ball in the palm of the other hand
- Slide a finger down and inside the outer glove on the other hand and pull it off until it’s balled around the first glove
- Dispose

### Keys to note:
1. Don’t contaminate or tear the inner glove
2. Don’t snap the gloves which could cause spray

Once your gloves are off, it’s very important that you don’t touch your face, any exposed skin, or any surface in the room

### Perioperative Management of Adult and Pediatric, Inpatients and Outpatients, With COVID-19 or Persons Under Investigation for COVID-19.

May 6, 2020

Version Number 1.1

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Addendum 5
SCCM, SOCCA Recommendations for the Initial Management of the Hypoxic ADULT COVID-19 Patient (PUI)

Figure 5 below represents the current schema for the initial evaluation and management of the hypoxic adult with COVID-19. Summary recommendations for patients with COVID-19 and ARDS are depicted in figure 6 below.

Of note:

- Early intubation is not recommended unless criteria for intubation, as listed, are met. Consensus is to proceed with endotracheal intubation if the patient has a persistent oxygen requirement of ≥ 6lpm to maintain an oxygen saturation of > 92%.
- NIPPV or HFNC oxygen therapy should be considered in appropriate patients and if at all possible, applied in a negative pressure room. [The APSF COVID-19 recommendation dated March 12, 2020, states that “given the risk of transmission with non-invasive ventilation, we recommend proceeding early directly to endotracheal intubation in patients with acute respiratory failure” IS NO LONGER CONSIDERED APPROPRIATE THERAPY unless physiologic criteria for intubation are met.]
- Early proning should be considered in intubated and non-intubated patients to improve oxygenation.
- A/C ventilation (4-8ml/kg IBW) should be implemented with PEEP and FI02 to enhance oxygenation. Plateau pressures should be maintained below 30cmH2O.
- Early consultation with Critical Care should be obtained if oxygenation cannot be maintained.

Figure 5. Initial Management of the Hypoxic COVID-19 Patient
Figure 6. Recommendation Summary for the Management of COVID-19 Patients with ARDS.

**COVID-19 Resources**

<table>
<thead>
<tr>
<th>COVID-19 with mild ARDS</th>
<th>COVID-19 with mod to severe ARDS</th>
<th>Rescue/adjunctive therapy</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DO:</strong></td>
<td><strong>CONSIDER:</strong> Higher PEEP</td>
<td><strong>UNCERTAIN:</strong> Antivirals, chloroquine, anti-IL6</td>
</tr>
<tr>
<td>Vt 4-8 ml/kg and Pplat &lt;30 cm H₂O</td>
<td><strong>CONSIDER:</strong> NMBA boluses to facilitate ventilation targets</td>
<td></td>
</tr>
<tr>
<td><strong>DO:</strong></td>
<td><strong>CONSIDER:</strong> PEEP responsive</td>
<td><strong>CONSIDER:</strong> NMBA infusion for 24 h</td>
</tr>
<tr>
<td>Investigate for bacterial infection</td>
<td>Traditional recruitment maneuvers</td>
<td></td>
</tr>
<tr>
<td><strong>DO:</strong></td>
<td><strong>CONSIDER:</strong> Prone ventilation 12-16 h</td>
<td><strong>CONSIDER:</strong> Prone ventilation 12-16 h</td>
</tr>
<tr>
<td>Target SpO2 92% - 96%</td>
<td><strong>CONSIDER:</strong> if prone, high Pplat asynchrony</td>
<td><strong>CONSIDER:</strong> STOP if no quick response</td>
</tr>
<tr>
<td><strong>CONSIDER:</strong></td>
<td><strong>CONSIDER:</strong> NMBA infusion for 24 h</td>
<td>A trial of inhaled nitric oxide</td>
</tr>
<tr>
<td>Conservative fluid strategy</td>
<td><strong>DON'T DO:</strong> Staircase recruitment maneuvers</td>
<td></td>
</tr>
<tr>
<td><strong>CONSIDER:</strong></td>
<td><strong>CONSIDER:</strong> Short course of systemic corticosteroids</td>
<td><strong>CONSIDER:</strong> V-V ECMO or referral to ECMO center</td>
</tr>
<tr>
<td>Empiric antibiotics</td>
<td><strong>UNCERTAIN:</strong></td>
<td></td>
</tr>
<tr>
<td><strong>UNCERTAIN:</strong></td>
<td><strong>UNCERTAIN:</strong></td>
<td></td>
</tr>
<tr>
<td>Systemic corticosteroids</td>
<td><strong>DO:</strong></td>
<td>Mod = moderate ARDS = adult respiratory distress syndrome Pplat = plateau pressure SpO2 = peripheral capillary oxygen saturation PEEP = positive end-expiratory pressure NMBA = neuromuscular blocking agents ECMO = extracorporeal membrane oxygenation</td>
</tr>
</tbody>
</table>

**Sources**

1. SCCM Guidelines on the Management of Critically Ill Adults with Coronavirus Disease 2019 (COVID-19) [https://journals.lww.com/ccmjournal/Abstract/onlinefirst/Surviving_Sepsis_Campaign__Guidelines_on_the.95707.aspx](https://journals.lww.com/ccmjournal/Abstract/onlinefirst/Surviving_Sepsis_Campaign__Guidelines_on_the.95707.aspx).
Addendum 6.
Pediatric Critical Care Medicine Recommendations for the Management of Critically Ill Children with COVID-19 (PUI)

- Though critical illness from COVID-19 remains rare in children, infants less than 1 year of age may be at highest risk for severe illness. (Figure 7 below)
- NIPPV should be considered for respiratory disease, especially if the patient is in a negative pressure room.
- Ong and Colleagues have reviewed the presentation and management of critically ill children with COVID-19, which may be found in source 2 below.

Figure 7. PCCM Infographic for the care of critically ill children with COVID-19

**COVID-19 in Critically Ill Children – A Narrative Review of the Literature**

Management considerations in your pediatric intensive care unit:
1. Consider using non-invasive ventilation in mild disease, if negative pressure rooms are available; be wary of aerosolisation
2. Intubate patients with minimal personnel in room, run simulations, practice donning/doffing
3. 90% of caregivers/parents may be COVID+
4. Treat cases that fit clinical picture as COVID+ until tests come back negative
5. Prepare for surge capacity in your unit
6. Use global resources (#pedsICU, #COVId19)
7. Cater to mental wellbeing of staff

CONCLUSIONS
Critically ill COVID-19 pediatric patients remain rare, as the majority of pediatric cases have mild symptoms. The substantial rise in international numbers necessitates early planning in consideration of a rise in cases.


Source
1. SCCM, Pediatric Critical Care Medicine:
   https://journals.lww.com/pccmjournal/Abstract/onlinefirst/Coronavirus_Disease_2019_in_Critically_Ill.98057.aspx

2. Ong, Jacqueline S. M. MB BChir, MMed (Paeds), MRCPCH; Tosoni, Alvise MD; Kim, YaeJean MD, PhD; Kissoon, Niranjan MB BS, FRCP(C), FAAP, MCM, FACPE; Murthy, Srinivas MD CM, MHSc. Coronavirus Disease 2019 in Critically Ill Children A Narrative Review of the Literature. Pediatric Crit Care Med 2020; XX:00–00 [Cited on April 11, 2020] Available from:
   https://journals.lww.com/pccmjournal/Abstract/onlinefirst/Coronavirus_Disease_2019_in_Critically_Ill.98057.aspx
Addendum 6 Continued

Caring for Children with COVID-19

1. Children (0–18 years) with COVID-19 are more likely to remain asymptomatic or have mildly symptomatic disease. Severe symptoms requiring admission for supplemental oxygen have been described in up to 10% of symptomatic children, particularly those under the age of 5, with the highest risk in those under 12 months of age. The mortality rate appears to be extremely low: one study out of China reported only one death in 2,143 pediatrics patients. (1)

2. The intersection with chronic pediatric respiratory conditions such as asthma, cystic fibrosis, and chronic lung disease, and with the attendant increased risk of severe disease, is unknown.

3. Respiratory virus co-infections and secondary bacterial infections are possible.

4. During periods of community transmission and in the absence of targeted therapy for mild and moderate disease, the decision to test children for SARS-CoV-2 is driven by resource availability, infection prevention and control principles, and epidemiologic contact tracing or hot-spot case finding.

5. Pediatric symptoms, if present, are similar to common viral respiratory infections with a majority of symptoms affecting the upper airway. This differs from adults, who tend to have lower respiratory symptoms most prominent. (2,1)

   - Fever 80-95% – majority <24hr duration
   - (Dry) cough 45-80%
   - Myalgias or fatigue 10-45%
   - Pharyngitis 10-40%
   - Rhinorrhea and/or congestion 10-30%
   - Diarrhea 10-20%
   - Dyspnea or hypoxemia 5-10%

6. Most labs are normal to include inflammatory markers (ESR, CRP, procalcitonin), chemistries, kidney and hepatic function. White blood cell count is typically normal but may be low.

7. If abnormal imaging, CXR will have non-specific increased lung markings or patchy infiltrates. Chest CT shows ground glass opacities.

8. Treatment of severe disease remains supportive, to include critical care interventions as required. Enrollment in clinical trials, or compassionate use of experimental therapies, should be considered for children with severe disease just as they would be for severely affected adults. There is no evidence to suggest that prophylaxis is necessary or effective for the majority of children. [See Addendum 6, Table 1, page 35]

9. Children appear to efficiently shed the virus, even if asymptomatic. Viral load is detectable in respiratory secretions for up to 2 weeks and in stool for up to 4 weeks. (3, 4)

10. Given the prolonged duration of shedding of respiratory viruses in children, during periods of community transmission of SARS-CoV-2, it may be prudent to assume symptomatic children are infected, unless proven otherwise from an infection control standpoint - an issue particularly relevant to caregivers from vulnerable risk populations.

Sources

Table 1. Considerations for the Pharmacologic Treatment of Pediatric Patients with Confirmed COVID-19
(Stanford University)

<table>
<thead>
<tr>
<th>Drug</th>
<th>Pediatric Dosing</th>
<th>Adult Dosing</th>
<th>Usual Duration</th>
<th>Pearls</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remdesivir*</td>
<td>&lt; 40 kg: 5 mg/kg IV on day 1, then 2.5 mg/kg IV daily</td>
<td>≥ 40 kg: 200 mg IV on day 1, then 100 mg IV daily</td>
<td>5-10 days</td>
<td>Monitor for transaminase elevation</td>
</tr>
<tr>
<td>Hydroxychloroquine</td>
<td>6.5 mg/kg PO BID on day 1, then 3.25 mg/kg PO BID</td>
<td>400 mg PO BID on day 1, then 200 mg PO BID</td>
<td>5 days</td>
<td>QT prolongation (baseline EKG), hypoglycemia</td>
</tr>
</tbody>
</table>

*There is insufficient data to support specific recommendations for immunocompromised patients.

*Doses and appropriateness of therapy must be confirmed with institutional pediatric critical care, infectious disease, and pharmacy prior to ordering.
Addendum 7

Interim Guidance for Basic and Advanced Life Support in Adults, Children, and Neonates With Suspected or Confirmed COVID-19


The goal of these interim guidelines are to ensure that patients with or without COVID-19 who experience cardiac arrest have the best possible chance of survival without compromising the safety of rescuers. Figure 8 lists the adjustments made to existing CPR algorithms. The entire new guideline is cited below and can be obtained from: https://www.ahajournals.org/doi/pdf/10.1161/CIRCULATIONAHA.120.047463

Figure 8. Summary of adjustments to CPR algorithms in suspected or confirmed COVID-19 patients.

<table>
<thead>
<tr>
<th>Reduce provider exposure</th>
</tr>
</thead>
<tbody>
<tr>
<td>● Don PPE before entering the room/scene</td>
</tr>
<tr>
<td>● Limit personnel</td>
</tr>
<tr>
<td>● Consider using mechanical CPR devices for adults and adolescents who meet height and weight criteria</td>
</tr>
<tr>
<td>● Communicate COVID-19 status to any new providers</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Prioritize oxygenation and ventilation strategies with lower aerosolization risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>● Use a HEPA filter, if available, for all ventilation</td>
</tr>
<tr>
<td>● Intubate early with a cuffed tube, if possible, and connect to mechanical ventilator, when able</td>
</tr>
<tr>
<td>● Engage the intubator with highest chance of first-pass success</td>
</tr>
<tr>
<td>● Pause chest compressions to intubate</td>
</tr>
<tr>
<td>● Consider use of video laryngoscopy, if available</td>
</tr>
<tr>
<td>● Before intubation, use a bag-mask device (or T-piece in neonates) with a HEPA filter and a tight seal</td>
</tr>
<tr>
<td>● For adults, consider passive oxygenation with nonrebreathing face mask as alternative to bag-mask device for short duration</td>
</tr>
<tr>
<td>● If intubation delayed, consider supraglottic airway</td>
</tr>
<tr>
<td>● Minimize closed circuit disconnections</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Consider resuscitation appropriateness</th>
</tr>
</thead>
<tbody>
<tr>
<td>● Address goals of care</td>
</tr>
<tr>
<td>● Adopt policies to guide determination, taking into account patient risk factors for survival</td>
</tr>
</tbody>
</table>

Source: American Heart Association: https://www.ahajournals.org/doi/pdf/10.1161/CIRCULATIONAHA.120.047463
Addendum 7 continued

BLS Healthcare Provider Adult Cardiac Arrest Algorithm for Suspected or Confirmed COVID-19 Patients

Updated April 2020

Verify scene safety
- Don PPE
- Limit personnel

Victim is unresponsive. Shout for nearby help. Activate emergency response system via mobile device (if appropriate). Get AED and emergency equipment (or send someone to do so).

No normal breathing, has pulse

Normal breathing, has pulse

Look for no breathing or only gasping and check pulse (simultaneously). Is pulse definitely felt within 10 seconds?

No breathing or only gasping, no pulse

CPR
Begin cycles of 30 compressions and 2 breaths using bag-mask device with filter and tight seal

OR
Continuous compressions with passive oxygenation using face mask. Use AED as soon as it is available.

AED arrives.

Check rhythm. Shockable rhythm?

Yes, shockable
Give 1 shock. Resume CPR immediately for about 2 minutes (until prompted by AED to allow rhythm check). Continue until ALS providers take over or victim starts to move.

No, nonshockable
Resume CPR immediately for about 2 minutes (until prompted by AED to allow rhythm check). Continue until ALS providers take over or victim starts to move.

By this time in all scenarios, emergency response system or backup is activated, and AED and emergency equipment are retrieved or someone is retrieving them.
Addendum 7 continued

ACLS Cardiac Arrest Algorithm for Suspected or Confirmed COVID-19 Patients

Updated April 2020

**CPR Quality**
- Push hard (at least 2 inches [5 cm]) and fast (100-120/min) and allow complete chest recoil.
- Minimize interruptions in compressions.
- Avoid excessive ventilation, change compressor every 2 minutes, or sooner if fatigued.
- If no advanced airway, 30:2 compression-ventilation ratio.
- Quantitative waveform capnography
  - If PETCO₂ < 10 mm Hg, attempt to improve CPR quality.
- Intra-arterial pressure
  - If relaxation phase (diastolic) pressure < 20 mm Hg, attempt to improve CPR quality.

**Shock Energy for Defibrillation**
- Biphasic: Manufacturer recommendation (eg, initial dose of 120-200 J; if unknown, use maximum available, Second and subsequent doses should be equivalent, and higher doses may be considered.
- Monophasic: 360 J

**Advanced Airway**
- Minimize closed-circuit disconnection.
- Use intubator with highest likelihood of first pass success.
- Consider video laryngoscopy.
- Endotracheal intubation or supraglottic advanced airway.
- Waveform capnography or capnometry to confirm and monitor ET tube placement.
- Once advanced airway is in place, give 1 breath every 6 seconds (10 breaths/min) with continuous chest compressions.

**Drug Therapy**
- Epinephrine IV/IIO dose: 1 mg every 3-5 minutes.
- Amiodarone IV/IIO dose: First dose: 300 mg bolus. Second dose: 150 mg.
- Lidocaine IV/IIO dose: First dose: 1-1.5 mg/kg. Second dose: 0.5-0.75 mg/kg.

**Return of Spontaneous Circulation (ROSC)**
- Pulse and blood pressure
- Abrupt sustained increase in PETCO₂ (typically 240 mm Hg)
- Spontaneous arterial pressure waves with intra-arterial monitoring

**Reversible Causes**
- Hypovolemia
- Hypoxia
- Hydrogen ion (acidosis)
- Hypo-Hypokalemia
- Hypothermia
- Tension pneumothorax
- Tamponade, cardiac
- Toxins
- Thrombosis, pulmonary
- Thrombosis, coronary

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Addendum 7 continued

BLS Healthcare Provider
Pediatric Cardiac Arrest Algorithm for 2 or More Rescuers for Suspected or Confirmed COVID-19 Patients

Updated April 2020
Addendum 7 continued

Pediatric Cardiac Arrest Algorithm for Suspected or Confirmed COVID-19 Patients

Updated April 2020

Don PPE
- Limit personnel

Start CPR
- Ventilate with oxygen using bag-mask device with filter and tight seal, if unavailable use nonbreathing face mask
- Attach monitor/defibrillator
- Prepare to intubate

Prioritize Intubation / Resume CPR
- Pause chest compressions for intubation
- If intubation delayed, consider supraglottic airway or bag-mask device with filter and tight seal
- Connect to ventilator with filter when possible

CPR Quality
- Push hard (>50% of anteroposterior diameter of chest) and fast (100-120/min) and allow complete chest recoil.
- Minimize interruptions in compressions.
- Avoid excessive ventilation.
- Change compressor every 2 minutes, or sooner if fatigued.
- If no advanced airway, 15:2 compression-ventilation ratio.

Shock Energy for Defibrillation
- First shock 2 J/kg, second shock 4 J/kg, subsequent shocks 24 J/kg, maximum 10 J/kg or adult dose.

Advanced Airway
- Minimize closed-circuit disconnection
- Use intubator with highest likelihood of first pass success
- Consider video laryngoscopy
- Prefer cuffed endotracheal tube if available
- Endotracheal intubation or supraglottic advanced airway
- Waveform capnography or capnometry to confirm and monitor ET tube placement
- Once advanced airway in place, give 1 breath every 6 seconds (10 breaths/min) with continuous chest compressions

Drug Therapy
- Epinephrine IO/IV dose: 0.01 mg/kg (0.1 mL/kg of the 0.1 mg/mL concentration), repeat every 3-5 minutes.
- Amiodarone IO/IV dose: 5 mg/kg bolus during cardiac arrest, may repeat up to 2 times for refractory VF/pulseless VT, or Lidocaine IO/IV dose: Initial: 1 mg/kg (loading dose), Maintenance: 20-50 mcg/kg per minute (infusion), may repeat bolus dose if infusion initiated >15 minutes after initial bolus therapy.

Return of Spontaneous Circulation (ROSC)
- Pulse and blood pressure
- Spontaneous arterial pressure waves with intra-arterial monitoring

Reversible Causes
- Hypovolemia
- Hypoxia
- Hyperkalemia
- Hypoglycemia
- Hypo-hyperkalemia
- Hypothermia
- Tension pneumothorax
- Tachycardia, cardiac
- Toxins
- Thrombosis, pulmonary
- Thrombosis, coronary

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How many minutes must I wait following an aerosolizing procedure, such as endotracheal intubation or extubation, before the air is cleared?

Though most operating rooms have a 15-20x per hour air exchange rate, knowing exactly what your operating room’s exchange rate is will allow you to specifically tailor your wait times for maximum airborne pathogen removal. The following steps describe the best way to individualize your most efficient wait times.

1. Determine how many air exchanges per hour occur in your particular OR or OR suite. You will find this answer in your Annual Air Balance Report, which your OR Manager or Facility Director will have.
2. Once you have this number, refer to the CDC below to determine how many minutes is required for airborne pathogen removal.

Example- Following review of your Annual Air Balance Report, you learn that your operating room air exchange rate is 15 times per hour. If you want 99% removal efficiency, you would have to wait 18 minutes following intubation and/or extubation. If you want 99.9%, you would have to wait 28 minutes following intubation and/or extubation.

<table>
<thead>
<tr>
<th>ACH &amp; %</th>
<th>Time (mins) required for removal 99% efficiency</th>
<th>Time (mins) required for removal 99.9% efficiency</th>
</tr>
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</table>

* This table is revised from Table S3-1 in reference 4 and has been adapted from the formula for the rate of purging airborne contaminants presented in reference 1435.

https://www.cdc.gov/infectioncontrol/guidelines/environmental/appendix/air.html#b1
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