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Measures to Reduce Aerosolization of Covid-19  
when Low Risk Procedures Become High Risk for  
Transmission

*Executive Summary*

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## Measures to Reduce Aerosolization of Covid-19 When Low Risk Procedures Become High Risk for Transmission

### Situation

Clients have requested a review of the clinical evidence to support decision making for reducing aerosolization when performing procedures where the potential of transmission of Covid-19 to healthcare workers exists. *With the recent pandemic of Coronavirus disease (COVID-19), there is concern for minimizing the risk of aerosol generating procedures (AGP) of Covid-19 while performing necessary procedures when caring for patients.*

#### Procedures w/ Risk of Aerosolization

High Risk	Lower Risk
<ul style="list-style-type: none"> <li>• Airway management               <ul style="list-style-type: none"> <li>○ Intubation, bronchoscopy - therapeutic &amp; diagnostic, bronchial /lavage, tracheostomy</li> </ul> </li> <li>• High-flow O2</li> <li>• Bi-PAP/ CPAP</li> <li>• Stress Testing (treadmill)</li> <li>• Sengstaken-Blakemore tube insertion</li> <li>• Transesophageal echo</li> <li>• Upper Endoscopy</li> <li>• Head/ upper airway exam</li> <li>• Any procedure with prolonged exposure to the patient</li> </ul>	<ul style="list-style-type: none"> <li>• Central venous line insertion</li> <li>• Dialysis catheter insertion</li> <li>• Thoracentesis</li> </ul>

#### **Problem Statement:**

What clinical evidence is there suggesting methods for reducing aerosolization when performing procedures where the potential of transmission of Covid-19 to health care workers exists? ***What are the best practice considerations for minimizing exposure to AGP while performing necessary procedures on patients with Covid-19?***

#### **Technology under Evaluation:**

Personal Protective Equipment (PPE)

<ul style="list-style-type: none"> <li>• Full face shields, disposable goggles</li> <li>• N95 respirator</li> <li>• Isolation Face Masks, surgical scrub masks</li> <li>• Airborne Infection Isolation Rooms (AIIRs)</li> </ul>	<ul style="list-style-type: none"> <li>• Surgical scrub masks</li> <li>• Impervious, disposable isolation gowns</li> <li>• Surgical shoe covers</li> <li>• Gloves</li> </ul>
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## Background

According to the U.S. Centers for Disease Control and Prevention (CDC), Chinese authorities identified the new coronavirus, which has resulted in confirmed human infections in China and a growing number of other countries, including the United States. Infected patients have also spread the virus to healthcare workers.

According to the World Health Organization (WHO), COVID-19 is now a pandemic, meaning a global outbreak of disease. The virus is different from six other, previously identified human coronaviruses, including the Severe Acute Respiratory Syndrome (SARS) and Middle East Respiratory Syndrome (MERS) coronaviruses that have caused previous respiratory disease outbreaks.

There is much more to learn about the transmissibility, severity, and other features associated with COVID-19 as the outbreak investigation continues. Infected people can spread COVID-19 through their respiratory secretions, especially when they cough or sneeze. According to the CDC, spread from person-to-person is most likely among close contacts (about 6 feet). Person-to-person spread is thought to occur mainly via respiratory droplets produced when an infected person coughs or sneezes, similar to how influenza and other respiratory pathogens spread. These droplets can land in the mouths or noses of people who are nearby or possibly be inhaled into the lungs.

When someone touches a surface or object contaminated with the virus that causes COVID-19, and then touches their own eyes, nose, or mouth, they may expose themselves to the virus. According to OSHA recommendations on control and prevention of Covid-19, the transmissibility of COVID-19 from contaminated environmental surfaces and objects is not fully understood, employers should carefully evaluate whether or not work areas occupied by people suspected to have the virus may have been contaminated and whether or not those surfaces need to be decontaminated in response.

### Technology Description:

Airborne Infection Isolation Rooms (AIIRs) are single patient rooms that have been equipped with negative pressure ventilation capacity (Ather, 2020). Negative air pressure is achieved by ventilation systems that create an inward directional airflow from the corners of the patient room. The air is then transmitted from the hospital room to the outside of the building. It is vital that the door and windows to AIIRs are kept closed at all times to prevent a reversal of airflow.

AIIRs should be entered into through an anteroom. This is a clean, not sterile, area used for transition healthcare personnel in and out of the airborne room. The anteroom should contain a full supply of all personal protective equipment (PPE) such as procedure or surgical masks, N95 respirators, eye protection, gloves and gowns all of which should be disposable. A dedicated hamper should be provided for the disposal of any PPE after exiting the room into the anteroom. A sink for handwashing and medical grade hand sanitizer should also be readily accessible in the anteroom.

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Face masks serve as a protective barrier against exposure to blood, fluids, healthcare associated infections (HAI's), surgical smoke/smoke plume, or high-risk aerosol transmittable diseases. Hospital staff may not be aware of regulations, established standards, or the various levels of protection available from face masks.

Masks are manufactured in various shapes with different features as flat-fold tie, cone, or duckbill, and can be worn with a face shield or protective eyewear (FDA, 2020). Types of face mask classifications utilized in hospitals today are: procedural masks are a disposable mask with ear loops generally used in a *clean environment* to prevent germs from coughing, sneezing, or talking to others; surgical masks are disposable devices primarily used by OR staff and are also used to prevent and protect the healthcare worker and patient from fluids, sprays, or contamination during a procedure in a *sterile environment*; N95 respirator masks are recommended for use by healthcare personnel (HCP) who need protection from both airborne and fluid hazards.

N95 masks are necessary to don in order to evacuate all surgical smoke/plume from energy-generating devices or other invasive procedures. **N95 masks should be worn during high-risk, aerosol-generating procedures or high potential exposure of patients with known or suspected aerosol transmittable diseases such as Covid-19** (OSHA, 2009).

## Clinical Evidence Assessment

### Guidelines as recommended by the CDC:

- Limit the numbers of staff providing their care, prioritize respirators and Airborne Infection Isolation Rooms (AIIR) for aerosol-generating procedures (AGP), [implement PPE optimization strategies](#) to extend supplies.
- Some procedures performed on patient with known or suspected COVID-19 could generate infectious aerosols. In particular, procedures that are likely to induce coughing (e.g., sputum induction, open suctioning of airways) should be performed cautiously and avoided if possible.
- **If performed, the following should occur:**
  - Healthcare Personnel (HCP) in the room should wear an N95 or higher-level respirator, eye protection, gloves, and a gown.
  - The number of HCP present during the procedure should be limited to only those essential for patient care and procedure support. Visitors should not be present for the procedure.
  - AGPs should ideally take place in an AIIR.
  - Clean and disinfect procedure room surfaces promptly as described in the section on environmental infection control below.
- **When collecting diagnostic respiratory specimens (e.g., nasopharyngeal swab) from a possible COVID-19 patient, the following should occur:**
  - HCP in the room should wear an N-95 or higher-level respirator (or facemask if a respirator is not available), eye protection, gloves, and a gown.

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- The number of HCP present during the procedure should be limited to only those essential for patient care and procedure support. Visitors should not be present for specimen collection.
- Specimen collection should be performed in a normal examination room with the door closed.
- Clean and disinfect procedure room surfaces promptly as described in the section on environmental infection control below. (CDC, 2020)

### **Occupational Safety and Health Administration (OSHA) Standards:**

Until further information is gathered regarding COVID-19, OSHA recommends a combination approach to reducing the transmission of and exposure to the virus, including [standard precautions](#), [contact precautions](#), and [airborne precautions](#), and eye protection such as goggles or face shields.

### **Relevant OSHA requirements may apply to preventing occupational exposure to COVID-19 are:**

- OSHA's Personal Protective Equipment (PPE) standards (in general industry, [29 CFR 1910 Subpart I](#)), which require using gloves, eye and face protection, and respiratory protection.
  - When respirators are necessary to protect workers, employers must implement a comprehensive respiratory protection program in accordance with the Respiratory Protection standard ([29 CFR 1910.134](#)).
    - OSHA has issued [temporary guidance](#) related to enforcement of respirator annual fit-testing requirements for healthcare.
- The General Duty Clause, [Section 5\(a\)\(1\)](#) of the [Occupational Safety and Health \(OSH\) Act of 1970](#), 29 USC 654(a)(1), which requires employers to furnish to each worker “employment and a place of employment, which are free from recognized hazards that are causing or are likely to cause death or serious physical harm.”

OSHA's Bloodborne Pathogens standard (29 CFR 1910.1030) applies to occupational exposure to human blood and other potentially infectious materials that typically do not include respiratory secretions that may transmit COVID-19. However, the provisions of the standard offer a framework that may help control some sources of the virus, including exposures to body fluids (e.g., respiratory secretions) not covered by the standard. (OSHA, 2020).

### **Evidence:**

According to Wu, et al. (2020) person-to-person transmission may occur through droplet or contact transmission and if there is a lack of stringent infection control or if no proper personal protective equipment available, it may jeopardize the first-line healthcare workers.

“Physicians and other healthcare workers who perform and participate in examinations and procedures within the head and neck region and airway are at particularly high risk of exposure

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and infection from aerosol and droplet contamination” (Babak, 2020). A number of routine procedures once considered low risk are now considered high risk amid the Covid-19 crisis. According to Babak, such procedures that can be aerosol generating include intubation, extubation, office-based nasal and laryngeal endoscopy, bronchoscopy, gastrointestinal endoscopy, management of facial trauma, foreign body management in the head and neck region, tracheostomy, tracheostomy care, powered instrumentation in mucosal head and neck surgery.

Taisheng (2020) recommends that all procedures be conducted with the HCP following comprehensive protection measures. Furthermore, should the patient require endotracheal intubation, a muscle relaxant should be used to avoid droplet transmission as this would minimize choking. Also of note, a closed, in line suctioning system should be used in ventilated patients to avoid airborne transmission caused by ventilator airflow.

And, if the “ventilator must be disconnected for operation, the standby function of the ventilator should be set to avoid airborne transmission caused by ventilator airflow. Once the standby function is not available, the Y-tube port of the ventilator should be blocked to avoid air spread” (Taisheng, 2020).

The American Society of Nuclear Cardiology (ASNC) and Society of Nuclear Medicine and Molecular Imaging (SNMMI) have made recommendations regarding whether the patient to be tested can be safely deferred, and if so, for how long. If there is not an urgent need for the patient to be tested, then it should be deferred in an effort to minimize exposure of the patient as well as the staff. If the testing is urgent in nature, ASNC and SNMMI recommend that they be performed with careful attention and proper precautions (Skali, 2019).

Furthermore, the American Society of Echocardiography (ASE) recommends that “transthoracic echocardiograms (TTE), stress echocardiograms and transesophageal echocardiograms (TEE) should only be performed if they are expected to provide clinical benefit” (Kirkpatrick, 2020).

It is important to note that CDC guidance may differ from OSHA infection prevention guidance with regard to healthcare worker infection prevention. CDC guidance reflects the impact of supply chain disruptions; OSHA guidance will help employers maintain compliance with respiratory protection standards. However, OSHA has released interim guidance to address shortages; this information should be incorporated into decision making and daily operations, with an awareness of temporary enforcement guidance, as well as requirements for monitoring, tracking, and reporting workplace exposures ([OSHA, 2020](#)).

## Financial Data

The market is currently facing price gouging from sellers of all forms of PPE amid coronavirus concerns. The current data indicates that the usual medical suppliers – Owens & Minor, Medline, and Cardinal Health-- are not increasing prices.

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Supplies from these vendors are limited, but overcharging has not been apparent. Most facilities have contracts in place preventing vendors from charging higher prices. Price gouging appears to be coming from non-traditional distributors and online resellers (MDBuyline, 2020).

## Operational Considerations

- CDC recommends placing patients in a regular examination room with the door closed. AllIRs should be reserved for patients undergoing aerosol generating procedures or for diagnoses such as active tuberculosis (CDC, 2020).
- The amount of time that the air inside an examination room remains potentially infectious is not known and may depend on a number of factors including the size of the room, the number of air changes per hour, how long the patient was in the room, if the patient was coughing or sneezing, and if an aerosol-generating procedure was performed. Facilities will need to consider these factors when deciding when the vacated room can be entered by someone who is not wearing PPE (CDC, 2020).
- Terminal cleaning of rooms after patient discharge should be performed by EVS workers, and they should wear a gown and gloves when performing terminal cleaning. A facemask and eye protection should be added if splashes or sprays during cleaning and disinfection activities are anticipated or otherwise required based on the selected cleaning products. Shoe covers are not recommended at this time for personnel caring for patients with COVID-19 (CDC, 2020).
- Provider/Clinician Education and Training: Develop and educate on existing regulations and/or standards for all types of PPE for all healthcare workers. Discuss proper utilization for specific departments, patients, and surgical procedures, and implications for current hospital operating mode (conventional, contingency, crisis) and the potential shortage, rationing, or re-use recommendations for appropriate PPE (CDC, 2020).
- Procedures that require prolonged exposure to patients with identified Covid-19 are considered high risk and should be cautiously considered. Those procedures that can be deferred, should be (Skali, 2019).

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