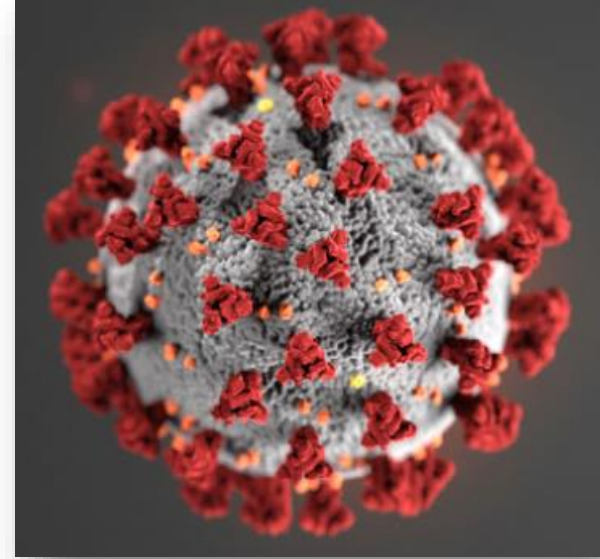


COVID-19: Overview and Update



Michelle A. Barron, MD
Professor of Medicine
Division of Infectious Diseases
University of Colorado Denver
Medical Director, Infection Prevention and Control
UCHealth University of Colorado Hospital



October 2020



University of Colorado **Anschutz Medical Campus**

uhealth

Modes of Transmission

- Definitions:
 - Respiratory droplets are $>5-10\ \mu\text{m}$ in diameter whereas droplets $\leq 5\ \mu\text{m}$ in diameter are referred to as droplet nuclei or aerosols.
 - Droplet transmission: Occurs when a person is in close contact (within 6 feet) with an infected person who has respiratory symptoms (e.g. coughing or sneezing) or who is talking or singing; in these circumstances, respiratory droplets that include virus can reach the mouth, nose or eyes of a susceptible person and can result in infection.
 - Airborne transmission: The spread of an infectious agent caused by the dissemination of droplet nuclei (aerosols) that remain infectious when suspended in air over long distances and time.
- Droplet is primary mode of spread of SARS-CoV-2 (virus that causes COVID-19)
- Aerosols: To date, transmission of SARS-CoV-2 by this type of aerosol route has not been demonstrated; much more research is needed

Exposure Investigations

- 2 COVID-19+ Hairdressers in MO (*MMWR* / July 17, 2020 / 69(28);930-932)
- 41 healthcare workers exposed to COVID-19+ patient during an aerosol generating procedure for at least 10 minutes at a distance of less than 2 meters from patient (*Ann Intern Med* 2020 Jun 2;172(11):766-767)
 - 85% wearing surgical mask/others wore N95.
 - PCR tested baseline and at day 14.
 - None developed symptoms and all tested pcr negative
- High attack rate following exposure after choir practice (*MMWR*/ May 15, 2020/ 69(19);606-610)
 - 2.5 hour choir practice attended by 61 persons, including symptomatic individual
 - 32 confirmed and 20 probable secondary COVID-19 cases
 - Transmission likely facilitated by close proximity (within 6 feet) during practice and augmented by act of singing

Universal Precautions in COVID-19 for Providers/Staff

- In all patient-facing areas, everyone at minimum must wear the following PPE:
 - Medical grade surgical or procedural mask
 - Eye protection (protective glasses or goggles, or face shields – prescription eye wear is not sufficient)
- If patient is known or suspected to have COVID-19, then there are two types of transmission based precautions we utilize based on whether or not an aerosol generating procedures
 - Enhanced Droplet Precautions
 - Enhanced Airborne Precautions
- In non-patient facing areas, masking with medical grade or cloth mask is required if cannot maintain a minimum of 6 feet between individuals

Enhanced Precautions AIRBORNE

(including aerosol generating procedures)

MANDATORY FOR EVERYONE

entering the enhanced precautions isolation room:

- Hand hygiene: Clean hands with soap and water or an alcohol-based hand sanitizer.
 - Prior to donning personal protective equipment at room entry.
 - Per doffing procedure at room exit.
- Gloves
- Gown
- Eye protection; personal eyeglasses not sufficient.
- Keep door closed.
- Dedicated equipment recommended.



MASK REQUIREMENT - AIRBORNE

- Respirator required
N95 respirator or half facepiece reusable respirator or PAPR

ROOM SELECTION:

- Negative airflow pressure if available, room selection based on clinical factors.



ALCOHOL-BASED HAND SANITIZER



GLOVES



GOWN



EYE PROTECTION



N95 RESPIRATOR MASK

Enhanced Precautions DROPLET

MANDATORY FOR EVERYONE

entering the enhanced precautions isolation room:

- Hand hygiene: Clean hands with soap and water or an alcohol-based hand sanitizer.
 - Prior to donning personal protective equipment at room entry.
 - Per doffing procedure at room exit.
- Gloves
- Gown
- Eye protection; personal eyeglasses not sufficient.
- Keep door closed.
- Dedicated equipment recommended.



MASK REQUIREMENT - DROPLET

- Surgical mask required.

ROOM SELECTION:

- Negative airflow pressure if available, room selection based on clinical factors.



ALCOHOL-BASED HAND SANITIZER



GLOVES



GOWN



EYE PROTECTION



SURGICAL MASK

Examples of Aerosol Generating Procedures

- Airway suction
- Sputum induction
- Positive pressure ventilation (BiPAP, CPAP)
- High-frequency oscillatory ventilation
- Tracheostomy
- Endotracheal intubation
- GI/Endoscopy
- Pulmonary function test
- Bronchoscopy
- Lung Biopsy
- Nasopharyngeal swab

Enhanced Droplet Precautions For Suspected or Confirmed COVID-19+ Patient: Non-Aerosol Generating Procedures

- PPE:
 - Contact (gown and gloves)
 - Droplet (procedural or surgical mask)
 - Eye protection (goggles, face shield, or protective glasses – vision correction glasses not sufficient)
- Negative Pressure Room preferred but not required
 - Keep door closed
 - Duration of
- Patients must wear medical grade mask if outside the room and encouraged to wear a mask when staff or providers within 6 feet of the patient

Enhanced Airborne Precautions For Suspected or Confirmed COVID-19+ Patient: Aerosol Generating Procedures*

- PPE:
 - Contact (gown and gloves)
 - Airborne (N95 respirator mask, half-mask respirator#, or PAPR)
 - Eye protection (goggles, face shield, or protective glasses – vision correction glasses not sufficient)
- Negative Pressure Room preferred but not required
 - Keep door closed

*Airborne precautions applicable during the aerosol-generating procedure

#Half-mask respirators cannot be used during surgical or sterile procedures in the direct line of the operative or procedural field

PERSONAL PROTECTIVE EQUIPMENT (PPE) FOR STAFF AND PROVIDERS CARING FOR PATIENTS WITH SUSPECTED OR KNOWN COVID-19

All sites where suspected or known COVID-19 patients are receiving care.

COVID-19 is a DROPLET-generated virus, and ENHANCED-DROPLET precautions are necessary for patients who are not undergoing an aerosol-generating procedures or treatment.

Required transmission-based precautions:

- Droplet (surgical mask)
- Contact (gown and gloves)
- Eye protection (goggles or face shield—personal eyeglasses are NOT sufficient)
- Cohort and negative airflow room if available
- Keep door closed (if outside of their room, provide patient with medical grade mask)

*Aerosol-generating procedures and treatments:

- Nebulization
- Airway suction
- High-flow oxygen (>6L)
- Positive-pressure ventilation (BiPAP, CPAP)
- Mechanical ventilation
- High-frequency oscillatory ventilation

When performing a specified aerosol-generating procedure* utilize ENHANCED-AIRBORNE precautions

Required transmission-based precautions:

- Airborne respirators (N95 respirator or PAPR or half-mask respirator. Note, half-mask respirator cannot be used during surgical or interventional procedures if in direct line of the operative or procedural field)
- Contact (gown and gloves)
- Eye protection (face shield or goggles—personal eyeglasses are NOT sufficient)
- Cohort and negative airflow room if available, prioritize if:
 - > 6L oxygen requirement
 - Wheezing requiring frequent nebulization
- Keep door closed (if outside of their room, provide patient with medical grade mask)

- Nasopharyngeal swab or nasal wash
- Intubation
- Extubation
- Tracheostomy
- Bronchoscopy
- ENT and OMFS procedures
- GI/endoscopy
- TEE
- Lung Biopsy
- G-tube placement
- Thoracentesis
- Sputum Induction
- Pulmonary Function Tests
- Positive Pressure Sleep Study
- Patient in Active Labor
- Any time in operating space

N95 and eye protection required for these regardless of COVID-19 status

Room Turnover for Patients Suspected or Confirmed COVID-19+

Table B.1. Air changes/hour (ACH) and time required for airborne-contaminant removal by efficiency *

ACH § ¶	Time (mins.) required for removal 99% efficiency	Time (mins.) required for removal 99.9% efficiency
2	138	207
4	69	104
6+	46	69
8	35	52
10+	28	41
12+	23	35
15+	18	28
20	14	21
50	6	8

* 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.

+ Denotes frequently cited ACH for patient-care areas.

Duration of Quarantine

- Quarantine is used for individuals that have had a significant exposure to someone with suspected or confirmed COVID-19
- If someone remains asymptomatic, they can test for COVID-19 at D5-7 after exposure and if the test is negative, they may end quarantine (must be in quarantine a minimum of 7 days)
- If someone remains asymptomatic but chooses not to get a test for COVID-19, then they must remain in quarantine for a minimum of 10 days
- If someone in quarantine becomes symptomatic, it is recommended that they get testing. If the testing is done before day 5-7 and is negative, the person must still remain in quarantine and either get retested or remain in quarantine

Duration of Isolation

- Isolation is used for patients with suspected or confirmed COVID-19
- For immunocompetent patients not requiring hospitalization:
 - Duration of isolation is 10 days after symptom onset or if asymptomatic, 10 days from the positive COVID-19 test
 - Isolation may end as long as symptoms improving (loss of smell and taste may last for months) and no fever or at least 24 hours without anti-pyretics
- For with severe disease requiring hospitalization or immunocompromised patients:
 - Duration of isolation is 20 days after symptom onset or if asymptomatic, 20 days from the positive COVID-19 test
 - Isolation may end as long as symptoms improving (loss of smell and taste may last for months) and no fever or at least 24 hours without anti-pyretics

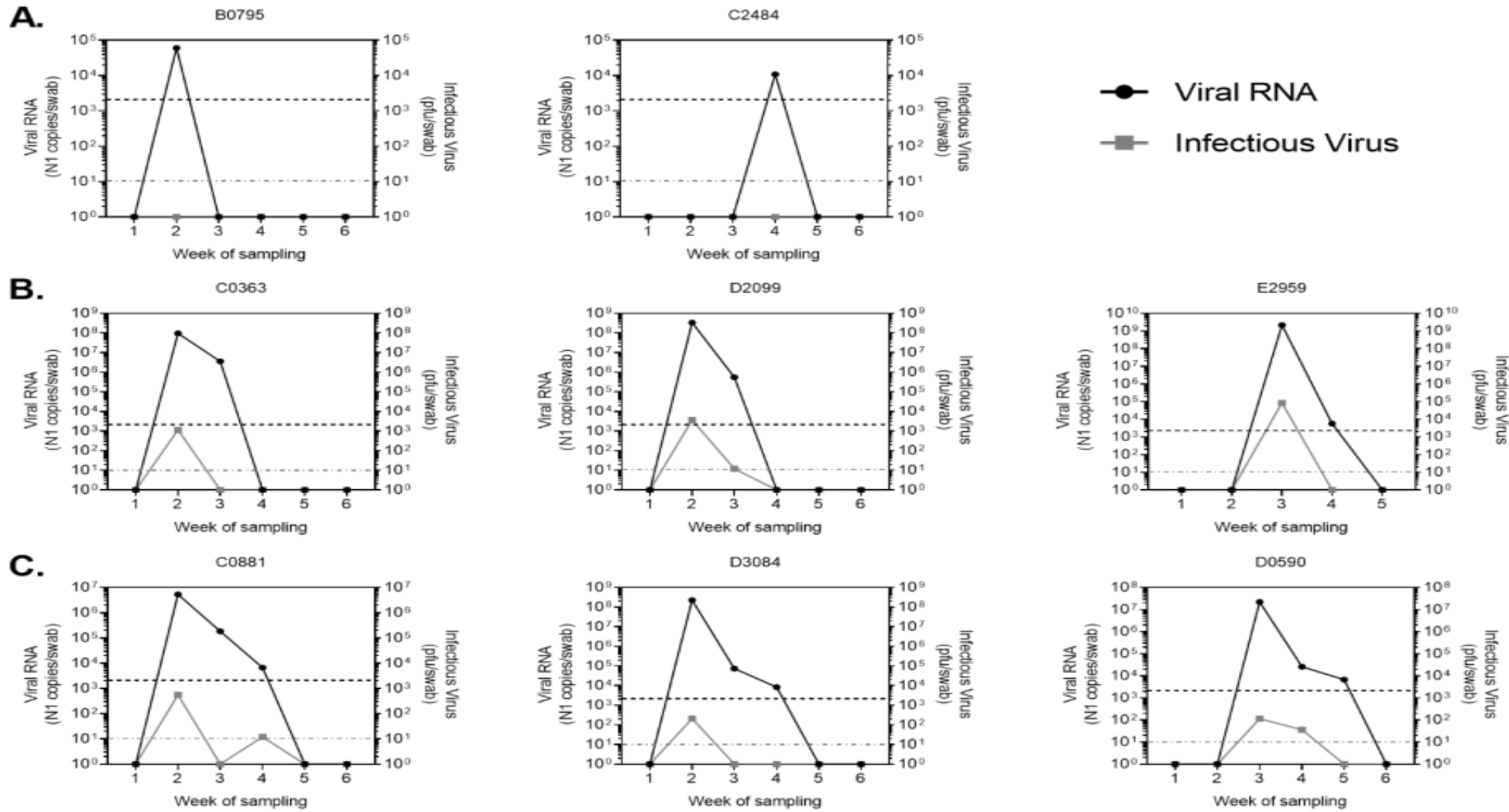
When to Remove Transmission Based Precautions in Patients with Suspected or Confirmed COVID-19

<https://www.cdc.gov/coronavirus/2019-ncov/hcp/disposition-hospitalized-patients.html>

Time Based Approach versus Test Based approach

- For immunocompetent patients not requiring hospitalization:
 - Transmission based precautions may be removed >10 days after symptom onset or if asymptomatic, >10 days from the positive COVID-19 test as long as symptoms improving (loss of smell and taste may last for months) and no fever or at least 24 hours without anti-pyretics
- For with severe disease requiring hospitalization or immunocompromised patients excluding hematologic malignancies and transplant patients:
 - Transmission based precautions may be removed >20 days after symptom onset or if asymptomatic, >20 days from the positive COVID-19 test as long as symptoms improving (loss of smell and taste may last for months) and no fever or at least 24 hours without anti-pyretics
- Test based approach, 2 negative COVID-19 pcr tests at least 24 hours apart, should be considered for hematologic malignancies and transplant recipients

Viral Shedding and Infectivity



<https://www.medrxiv.org/content/10.1101/2020.06.08.20125989v1>

Questions?