Centers for Disease Control and Prevention

COVID-19

Clinical Questions about COVID-19: Questions and Answers

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COVID-19 Risk

Who is at risk for infection with SARS-CoV-2, the virus that causes COVID-19?

Currently, those at greatest risk of infection are persons who have had prolonged, unprotected close contact (i.e., within 6 feet for 15 minutes or longer) with a patient with confirmed SARS-CoV-2 infection, regardless of whether the patient has symptoms. Persons frequently in congregate settings (e.g., homeless shelters, assisted living facilities, college or university dormitories) are at increased risk of acquiring infection because of the increased likelihood of close contact. Those who live in or have recently been to areas with sustained transmission may also be at higher risk of infection. All persons can reduce the risk to themselves and others by wearing a mask, practicing physical distancing, washing their hands often, and taking other prevention measures. For more information, see Risk Assessment and Your Health.

What should healthcare providers (HCP) do outside of work to prevent transmission of SARS-CoV-2, the virus that causes COVID-19?

To prevent transmission of SARS-CoV-2 outside of work, HCP should follow CDC's Guidance on Public Health Recommendations for Community-Related Exposure and the general guidance at Your Health. Because of their potential for exposure to SARS-CoV-2 at work, some HCP may choose to implement extra measures when arriving home from providing healthcare, such as removing any clothing they wore while delivering healthcare, taking off their shoes, washing their clothing, and immediately showering. However, these practices are optional and based on a personal decision; there is insufficient evidence to determine whether these additional practices can lower infection risk.

Because person-to-person transmission through respiratory droplets within a radius of 6 feet is currently thought to be the main way the virus spreads, everyone — including HCP —can reduce the risk to themselves and others by wearing a mask, practicing physical distancing, washing their hands often, and taking other prevention measures.

CDC updates its guidance, including specific guidance in the links above, as additional information becomes available.

Who is at risk for severe COVID-19?

COVID-19 is a new disease and CDC is learning more about it every day. **Among adults, the risk for severe illness from COVID-19 increases with age, with older adults at highest risk.** Severe illness means that the person with COVID-19 may require hospitalization, intensive care, or a ventilator to help them breathe, or they may even die. People of any age with certain underlying medical conditions are also at increased risk for severe illness from SARS-CoV-2 infection.

See also Interim Clinical Guidance for Management of Patients with Confirmed Coronavirus Disease 2019 (COVID-19) and Information for Healthcare Professionals: COVID-19 and Underlying Conditions.

If my patient has an underlying medical condition associated with an increased risk of severe disease from COVID-19, what is my patient's risk of developing severe COVID-19, and what should I tell my patient to reduce their risk?

- Stay up to date on the latest evidence about the risk for patients with underlying medical conditions. CDC analyzes data to determine the level of risk for people with underlying medical conditions and will provide updates over time as new information is available.
- You know your patients' overall health and how well their conditions are managed. Use your clinical judgment to evaluate each patient's level of risk.
- Help patients manage their underlying conditions to the best of their ability, encouraging them to take medicines as prescribed and ensuring that patients have sufficient medication and supplies. For example, you may prescribe 3-month supplies of medications to ensure they have access to sufficient medications.
- Explain to all patients which symptoms of their chronic conditions require emergency care or in-person visits. Stress the importance of obtaining emergency care if needed.
- Reassure your patients who require emergency care that emergency departments (ED) have infection prevention plans to protect them from acquiring SARS-CoV-2 infection in the ED.
- Tell patients with underlying medical conditions that increase their risk of severe illness or poorer outcomes from COVID-19 to:
  - Take precautions to reduce the risk of getting COVID-19.
  - Closely follow your care plans for managing their chronic disease, including, for example, achieving better glycemic or blood pressure control.
  - Seek emergency care if any of their underlying medical conditions worsen and require immediate attention.
- Encourage all patients, regardless of risk, to:
  - Take steps to protect themselves.
  - Call their healthcare provider if you are sick with a fever, cough, or shortness of breath.
  - Follow CDC travel guidelines and the recommendations of your state and local health officials.
- Fear and anxiety about a new disease can feel overwhelming, especially for those with underlying risk factors, those in close contact with infected patients, and those with sources of stress outside the workplace. Follow guidance on ways to take care of yourself and encourage your patients to do the same.

Additional resources for healthcare providers

Are pregnant healthcare providers (HCP) at increased risk for adverse outcomes if they care for patients with COVID-19?

Pregnant HCP should follow risk assessment and infection control guidelines for HCP exposed to patients with suspected or confirmed COVID-19. Adherence to recommended infection prevention and control practices is an important part of protecting all HCP in healthcare settings. Based on what we know at this time, pregnant people are at an increased risk for severe illness from SARS-CoV-2 infection compared to non-pregnant people. Additionally, there might be an increased risk of adverse pregnancy outcomes, such as preterm birth, among pregnant people with COVID-19. Facilities may want to consider limiting exposure of pregnant HCP to patients with confirmed or suspected COVID-19, especially during higher risk procedures (e.g., aerosol-generating procedures) if feasible based on staffing availability.

Additional information about COVID-19 during pregnancy

What is multisystem inflammatory syndrome in children (MIS-C) and who is at risk?

CDC continues to investigate multisystem inflammatory syndrome in children (MIS-C) associated with COVID-19. Children and adolescents with MIS-C have presented with a persistent fever and a variety of signs and symptoms including involvement of multiple organs (e.g., cardiac, gastrointestinal, renal, hematologic, dermatologic, neurologic) and elevated inflammatory markers. CDC is collaborating with domestic and international partners to better understand this new syndrome, including how common it is and its risk factors. For more information, including a full case definition and how to report MIS-C to your health department, visit MIS-C Information for Healthcare Providers.

Infection Control

Are the alternatives to the 14-day quarantine described in the Options to Reduce Quarantine for Contacts of Persons with SARS-CoV-2 Infection Using Symptom Monitoring and Diagnostic Testing recommended for healthcare facilities?

Given the need for often extensive and close contact between patients and healthcare personnel, a 14-day quarantine period continues to be recommended for patients receiving healthcare and healthcare personnel with exposures to SARS-CoV-2 warranting quarantine[1] or work restrictions, respectively. This option maximally reduces post-quarantine transmission risk and is the strategy with the greatest collective experience at present.

Alternatives to the 14-day quarantine period are described in the Options to Reduce Quarantine for Contacts of Persons with SARS-CoV-2 Infection Using Symptom Monitoring and Diagnostic Testing. Healthcare facilities could consider these alternatives as a measure to mitigate staffing shortages, space limitations, or PPE supply shortages but, due to the special nature of healthcare settings (e.g., patients at risk for worse outcomes, critical nature of healthcare personnel, challenges with social distancing), not as a preferred option.

Healthcare facilities should understand that shortening the duration of work restriction or patient quarantine might pose additional transmission risk. They should also counsel patients and healthcare personnel about the need to monitor for and immediately self-isolate if symptoms occur during the 14 days after their exposure and the importance of adhering to all recommended non-pharmaceutical interventions.

[1]In healthcare settings, patients under quarantine are typically isolated in a single-person room and cared for by healthcare personnel using all PPE recommended for a patient with suspected or confirmed SARS-CoV-2 infection. However, these patients should not be cohorted with patients with SARS-CoV-2 infection unless they are also confirmed to have SARS-CoV-2 infection through testing.

Are there circumstances in healthcare settings when repeat testing for SARS-CoV-2 or quarantining might be considered for asymptomatic patients and residents who have recovered from SARS-CoV-2 infection but are re-exposed to SARS-CoV-2 within 3 months of their prior infection?

CDC currently recommends that asymptomatic patients and residents who have recovered and are within 3 months of a positive test for SARS-CoV-2 infection may not need to be quarantined or tested following re-exposure to SARS-CoV-2. However, there might be clinical scenarios in which the certainty about a prior infection or the durability of the immune response exist, for which providers could consider testing for SARS-CoV-2 and recommending quarantine following an exposure that occurs less than 3 months after their initial infection. Examples could include:

- Patients or residents with underlying immunocompromising conditions (e.g., patient after organ transplantation) or who become immune compromised (e.g., receive chemotherapy) in the 3 months following SARS-CoV-2 infection and who might have an increased risk for reinfection. However, data on which specific conditions may lead to higher risk and the magnitude of risk are not available.
- Patients or residents for whom there is concern that their initial diagnosis of SARS-CoV-2 infection might have been based on a false positive test result (e.g., resident was asymptomatic, antigen test positive, and a confirmatory nucleic acid amplification test (NAAT) was not performed).
- Patients or residents for whom there is evidence that they were exposed to a novel SARS-CoV-2 variant (e.g., exposed to a person known to be infected with a novel variant) for which the risk of reinfection might be higher

CDC continues to actively investigate the frequency of reinfection and the circumstances surrounding these episodes, including the role that new variants might play in reinfection, and will adjust guidance as necessary as more information becomes available.

Do CDC's interim infection prevention and control recommendations for COVID-19 apply to psychiatric hospitals or other behavioral health facilities?

Yes. To keep patients and healthcare personnel (HCP) healthy and safe, CDC's infection prevention and control guidance applies to all settings where healthcare is delivered. However, as with any guidance, facilities can tailor certain recommendations to their setting. For example, inpatient psychiatric care includes communal experiences and group activities that may need to continue. If so, these activities might need to be adapted to align with social distancing recommendations. Other recommended infection control measures (for example, ensuring access to alcohol-based hand sanitizer, cohorting patients with COVID-19 and assigning dedicated staff, or implementing universal source control measures) might not be safe or appropriate to implement in all locations or for all patients due to security and behavioral concerns.

Challenges and potential solutions specific to behavioral health settings might include:

- Cohorting
  - **Challenge:** To prevent transmission, it is generally recommended that patients with COVID-19 be transferred to a separate area of the facility where they can be cared for by dedicated HCP. Because of security concerns or specialized care needs, it might not be possible to cohort certain patients together or change HCP assigned to their care.
  - **Potential Solutions:** When cohorting is not possible, implement measures to maintain social distancing (at least 6 feet) between patients with COVID-19 and others on the unit. Ideally, this would include a separate bathroom for COVID-19 patients. Ensure HCP wear all recommended personal protective equipment (PPE) when caring for patients with suspected or confirmed COVID-19.
- Group Therapy Sessions
  - **Challenge**: Group counseling, therapy, and discussion sessions are a critical component of psychiatric treatment and care plans, but the traditional set-up for these activities is not compatible with social distancing recommendations.
  - **Potential Solutions**: When possible, use virtual methods, or decrease group size so social distancing can be maintained. In the event that COVID-19 is transmitted in the facility, sessions should stop or move to a video discussion forum until additional infection prevention measures are in place to stop the spread.
- Cloth Face Coverings
  - **Challenge:** For some patients, the use of cloth face coverings or facemasks might pose an additional danger or may cause distress. Some patients may be unable or unwilling to use them as intended. Elastic and cloth straps can be used for strangling oneself or others, and metal nasal bridges can be used for self-harm or as a weapon.
  - **Potential Solutions:** Consider allowing patients at low risk for misuse to wear cloth face coverings or facemasks, with a preference for those with short ear-loops rather than longer ties. Consider use of cloth face coverings or facemasks during supervised group activities. Ensure that HCP interacting with patients who cannot wear a cloth face covering or facemask are wearing eye protection and a facemask (or a respirator if the patient is suspected to have COVID-19 and respirators are available).
- Alcohol-based Hand Sanitizer
  - **Challenge**: While alcohol-based hand sanitizer (ABHS) containing 60-95% alcohol is an important tool to increase adherence to hand hygiene recommendations, ABHS must be used carefully in psychiatric facilities to ensure it is not ingested by patients.
  - **Potential Solutions:** Consider not placing ABHS in patients' rooms in psychiatric facilities, nor in locations where the patients have unsupervised access. Encourage frequent hand washing with soap and water for patients and HCP. Consider providing personal, pocket-sized ABHS dispensers for HCP.

If a long-term care facility has a resident or staff member with suspected or confirmed COVID-19, how and to whom should this be communicated?

Facilities should follow the reporting requirements of their state or jurisdiction. Those regulated by the Centers for Medicare and Medicaid Services (CMS) (e.g., nursing homes) should also follow all CMS requirements, which are being updated to include new requirements for reporting to CDC and to residents and their representatives.

In addition, CDC recommends that health departments be promptly notified about:

- Residents or healthcare personnel (HCP) with suspected or confirmed COVID-19,
- Residents with severe respiratory infection resulting in hospitalization or death, and
- ≥ 3 residents or HCP with new-onset respiratory symptoms within 72 hours of each other.

These could signal an outbreak of COVID-19 or other respiratory disease in the facility. The health department can provide important guidance to assist with case finding and halting transmission.

The facility should also have a plan and mechanism to regularly communicate with residents, family members, and HCP, including if cases of COVID-19 are identified in the facility. Often, information in nursing homes is communicated through town hall meetings and staff meetings, along with letters or emails. However, during the COVID-19 pandemic, in-person gatherings should not occur. Instead, communication should occur through virtual meetings over phone or web platforms. These should be supplemented with written communications that provide contact information for a staff member who can respond to questions or concerns. Communications should include information describing the current situation, plans for limiting spread within the facility, and recommended actions they can take to protect themselves and others. Facilities should make this information available in a timely manner and offer periodic updates as the situation develops and more information becomes available.

Is a negative test for SARS-CoV-2, the virus that causes COVID-19, required before a hospitalized patient can be discharged to a nursing home?

No. For patients hospitalized with SARS-CoV-2 infection, decisions about discharge from the hospital should be based on their clinical status and the ability of an accepting facility to meet their care needs and adhere to recommended infection prevention and control practices. Decisions about hospital discharge are distinct from decisions about discontinuation of Transmission-Based Precautions.

For patients with suspected or confirmed SARS-CoV-2 infection, decisions about discontinuing Transmission-Based Precautions should be based on the strategies outlined here. The test-based strategy is recommended only for use in limited circumstances.

If a patient with suspected or confirmed SARS-CoV-2 infection **has not** met criteria for discontinuing Transmission-Based Precautions, they should be transferred to a facility with the ability to adhere to infection prevention and control recommendations for the care of residents with SARS-CoV-2 infection, including placement in a unit or area of the facility designated to care for residents with SARS-CoV-2 infection and provision of recommended personal protective equipment to healthcare personnel.

If the patient **has** met the criteria for discontinuing Transmission-Based Precautions, they do not require additional restrictions.

A patient hospitalized for non-COVID-related illnesses who is not known to have SARS-CoV-2 infection can be transferred to a nursing home without testing. To ensure a patient was not exposed and might subsequently develop SARS-CoV-2 infection, nursing homes should place the patient in Transmission-based Precautions in a separate observation area or in a single-person room for 14 days after admission.

As part of universal source control measures, all residents (including those described in the scenarios above) should wear a cloth face covering or facemask (if tolerated) whenever they leave their room.

During the COVID-19 pandemic, are there special considerations for surgical and other procedural care settings, including performance of aerosol-generating procedures (AGPs)?

As part of routine practices, healthcare personnel (HCP) should be applying Standard Precautions. HCP should always deliberately assess potential risks of exposure to infectious material before engaging in activities and procedures in healthcare delivery. Based on their risk assessment, safe work practices, including engineering controls that reduce the release of infectious material, administrative controls, and use of personal protective equipment (PPE) should be implemented at the point of care according to CDC guidelines and standards of practice for the activity performed.

To reduce SARS-CoV-2 exposure during the COVID-19 pandemic, CDC recommends that facilities:

- consider nonoperative approaches when feasible;
- minimize the use of procedures or techniques that might produce infectious aerosols when feasible;
- minimize the number of people in the operating or procedure room to reduce exposures;
- use the extent of community transmission and an assessment of the likelihood for patient harm if care is delayed to make decisions about cancelling or postponing elective surgeries and procedures; and
- implement universal source control measures, which includes having patients wear a cloth face covering (as tolerated) and having HCP wear a facemask at all times while they are in the healthcare facility.

If surgery or procedures cannot be postponed, HCP caring for patients with suspected or confirmed COVID-19 should adhere to all recommended infection prevention and control practices for COVID-19. This includes:

- Using all recommended PPE: an N95 or equivalent or higher-level respirator (or facemask if respirators are not available), eye protection, gloves, and a gown.
  - Respirators with exhalation valves should not be used during surgical procedures as unfiltered exhaled breath would compromise the sterile field.
  - If shortages exist, N95 or equivalent or higher-level respirators should be prioritized for procedures involving higher risk techniques (e.g., that generate potentially infectious aerosols) or that involve anatomic regions where viral loads might be higher (e.g., nose and throat, oropharynx, respiratory tract).
- As part of routine practice, HCP should also be using additional engineering controls for source control, when applicable (e.g., smoke evacuation devices).

Because SARS-CoV-2 can be transmitted by individuals who are infected but do not have symptoms, some infected individuals will not be identified by screening for clinical signs and symptoms. HCP providing surgical or procedural care to patients not suspected of having SARS-CoV-2 infection should use a tiered approach based on the level of community transmission to inform the need for universal eye protection and respirator use. HCP should continue to use eye protection or an N95 or equivalent or higher-level respirator whenever recommended for patient care as a part of Standard or Transmission-Based Precautions.

In addition to the use of universal PPE and source control in healthcare settings, targeted SARS-CoV-2 testing of patients without signs or symptoms of COVID-19 might be used to identify those with asymptomatic or pre-symptomatic SARS-CoV-2 infection and further reduce risk for exposures in some healthcare settings. Depending on guidance from local and state health departments, testing availability, and how rapidly results are available, facilities can consider implementing pre-admission or pre-procedure diagnostic testing with authorized nucleic acid or antigen detection assays for SARS-CoV-2.
Testing results might inform decisions about rescheduling elective procedures or about the need for additional Transmission-Based Precautions when caring for the patient. Limitations of using this testing strategy include

Why does CDC continue to recommend respiratory protection equivalent or higher to the level provided by an N95 disposable filtering facepiece respirator for care of patients with known or suspected COVID-19?

CDC's guidance to use NIOSH-approved N95 disposable filtering facepiece or higher level respirators when providing care for patients with suspected or known COVID-19 is based on the current understanding of SARS-CoV-2 and related respiratory viruses.

Current data suggest that close-range aerosol transmission by droplet and inhalation, and contact followed by self-delivery to the eyes, nose, or mouth are likely routes of transmission. Long-range aerosol transmission, such as is seen with measles, has not been a feature of SARS-CoV-2.

Potential routes of close-range transmission include splashes and sprays of infectious material onto mucous membranes and inhalation of infectious virions exhaled by an infected person. The relative contribution of each of these is not known for SARS-Co-V-2.

Facemasks commonly used during surgical procedures will provide barrier protection against droplet sprays contacting mucous membranes of the nose and mouth, but they are not designed to protect wearers from inhaling small particles. N95 and higher level respirators, such as other disposable filtering facepiece respirators, powered air-purifying respirators (PAPRs), and elastomeric respirators, provide both barrier and respiratory protection because of their tight fit and filtration characteristics.

Respirators should be used as part of a respiratory protection program that provides staff with medical evaluations, training, and fit testing.

Although facemasks are routinely used for the care of patients with common viral respiratory infections, N95 or higher level respirators are routinely recommended for emerging pathogens like SARS CoV-2, which have the potential for transmission via small particles, the ability to cause severe infections, and no specific treatments or vaccines.

CDC recommendations acknowledge the current challenges with limited supplies of N95s and other respirators. Facilities that do not have sufficient supplies of N95s and other respirators for all patient care should prioritize their use for activities and procedures that pose high risks of generating infectious aerosols and use facemasks for care that does not involve those activities or procedures. Detailed strategies for optimizing the supply of N95 respirators are available on the CDC website. Once availability of supplies is reestablished, the guidance states that the use of N95 and higher level respirators should resume.

What personal protective equipment (PPE) should be worn by individuals transporting patients with suspected or confirmed SARS-CoV-2 infection within a healthcare facility? For example, what PPE should be worn when transporting the patient to radiology for imaging that cannot be performed in the patient room?

In general, transport and movement of a patient with suspected or confirmed SARS-CoV-2 infection outside of their room should be limited to medically essential purposes. If being transported outside of the room, such as to radiology, healthcare personnel (HCP) in the receiving area should be notified in advance of transporting the patient. For transport, the patient should wear a facemask or cloth face covering (if tolerated) to contain secretions and be covered with a clean sheet.

If transport personnel must prepare the patient for transport (e.g., transfer them to the wheelchair or gurney), transport personnel should wear all recommended PPE (gloves, a gown, respiratory protection that is at least as protective as a fit tested NIOSH-certified disposable N95 filtering facepiece respirator or facemask—if a respirator is not available—and eye protection [i.e., goggles or disposable face shield that covers the front and sides of the face]). This recommendation is needed because these interactions typically involve close, often face-to-face, contact with the patient in an enclosed space (e.g., patient room). Once the patient has been transferred to the wheelchair or gurney (and prior to exiting the room), transporters should remove their gown and gloves and perform hand hygiene.

The transporter should continue to wear a respirator or facemask. The continued use of eye protection by the transporter is also recommended if there is potential that the patient might not be able to tolerate their facemask or cloth face covering for the duration of transport. Additional PPE should not be required unless there is an anticipated need to provide medical assistance during transport (e.g., helping the patient replace a dislodged facemask).

After arrival at their destination, receiving personnel (e.g., in radiology) and the transporter (if assisting with transfer) should perform hand hygiene and wear all recommended PPE. If still wearing their original respirator or facemask and eye protection, the transporter should take care to avoid self-contamination when donning the remainder of the recommended PPE. This cautious approach will be refined and updated as more information becomes available and as response needs change in the United States.

Interim guidance for EMS personnel transporting patients with confirmed or suspected SARS-CoV-2 infection is available here. EMS personnel should wear all recommended PPE because they are providing direct medical care and in close contact with the patient for longer periods of time.

What personal protective equipment (PPE) should be worn by environmental services (EVS) personnel who clean and disinfect rooms of hospitalized patients with SARS-CoV-2 infection?

In general, only essential personnel should enter the room of patients with SARS-CoV-2 infection. Healthcare facilities should consider assigning daily cleaning and disinfection of high-touch surfaces to nursing personnel who will already be in the room providing care to the patient. If this responsibility is assigned to EVS personnel, they should wear all recommended PPE when in the room. PPE should be removed upon leaving the room, immediately followed by performance of hand hygiene.

After discharge, terminal cleaning can be performed by EVS personnel. They should delay entry into the room until time has elapsed for enough air changes to remove potentially infectious particles. After this time has elapsed, EVS personnel can enter the room and should wear a facemask (for source control) along with a gown and gloves when performing terminal cleaning. 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 SARS-CoV-2 infection.

Which procedures are considered aerosol generating procedures in healthcare settings?

Some procedures performed on patients are more likely to generate higher concentrations of infectious respiratory aerosols than coughing, sneezing, talking, or breathing. These aerosol generating procedures (AGPs) potentially put healthcare personnel and others at an increased risk for pathogen exposure and infection.

Development of a comprehensive list of AGPs for healthcare settings has not been possible, due to limitations in available data on which procedures may generate potentially infectious aerosols and the challenges in determining if reported transmissions during AGPs are due to aerosols or other exposures.

There is neither expert consensus, nor sufficient supporting data, to create a definitive and comprehensive list of AGPs for healthcare settings.

Commonly performed medical procedures that are often considered AGPs, or that create uncontrolled respiratory secretions, include:

- open suctioning of airways
- sputum induction
- cardiopulmonary resuscitation
- endotracheal intubation and extubation
- non-invasive ventilation (e.g., BiPAP, CPAP)
- bronchoscopy
- manual ventilation

Based on limited available data, it is uncertain whether aerosols generated from some procedures may be infectious, such as:

- nebulizer administration*
- high flow O2 delivery

*Aerosols generated by nebulizers are derived from medication in the nebulizer. It is uncertain whether potential associations between performing this common procedure and increased risk of infection might be due to aerosols generated by the procedure or due to increased contact between those administering the nebulized medication and infected patients.

References related to aerosol generating procedures:

Tran K, Cimon K, Severn M, Pessoa-Silva CL, Conly J (2012) Aerosol Generating Procedures and Risk of Transmission of Acute Respiratory Infections to Healthcare Workers: A Systematic Review. PLoS ONE 7(4); https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3338532/#!po=72.2222external iconexternal icon).

How long does an examination room need to remain vacant after being occupied by a patient with confirmed or suspected COVID-19?

Although spread of SARS-CoV-2 is believed to be primarily via respiratory droplets, the contribution of small respirable particles to close proximity transmission is currently uncertain. Airborne transmission from person-to-person over long distances is unlikely.

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.

For a patient who was not coughing or sneezing, did not undergo an aerosol-generating procedure, and occupied the room for a short period of time (e.g., a few minutes), any risk to HCP and subsequent patients likely dissipates over a matter of minutes. However, for a patient who was coughing and remained in the room for a longer period of time or underwent an aerosol-generating procedure, the risk period is likely longer.

For these higher risk scenarios, it is reasonable to apply a similar time period as that used for pathogens spread by the airborne route (e.g., measles, tuberculosis) and to restrict HCP and patients without PPE from entering the room until sufficient time has elapsed for enough air changes to remove potentially infectious particles.

General guidance on clearance rates under differing ventilation conditions is available.

In addition to ensuring sufficient time for enough air changes to remove potentially infectious particles, HCP should clean and disinfect environmental surfaces and shared equipment before the room is used for another patient.

My hospital is experiencing a shortage of isolation gowns. To preserve our supply, can we stop using gowns for the care of patients with methicillin-resistant Staphylococcus aureus (MRSA) and other endemic multidrug-resistant organisms (MDROs), and Clostridioides difficile?

CDC has released information about strategies to optimize the supply of isolation gowns. Healthcare facilities should refer to that guidance and implement the recommended strategies to optimize their current supply of gowns. This includes shifting toward the use of washable cloth gowns, if feasible.

The use of gowns as part of Contact Precautions in the context of MDROs has been implemented primarily to reduce the risk of transmission to other patients rather than to protect healthcare personnel (HCP). Facilities with shortages could consider suspending the use of gowns for the care of patients with endemic MDROs, such as MRSA, VRE, and ESBL-producing Gram-negative bacilli except as required for Standard Precautions. Facilities should assess their local epidemiology to determine which MDROs are considered endemic. Regardless of the use of gowns, HCP at facilities should continue to wear gloves for contact with these patients and their environment. Hand hygiene should continue to be emphasized. Facilities should also attempt to place patients colonized or infected with an MDRO in a private room, if available.

- **Caring for patients who have highly resistant Gram-negative organisms (e.g., carbapenem-resistant Enterobacteriacae) and other MDROs (e.g., *Candida auris*) that are not considered endemic:** Rather than gowns being donned for every room entry, they should be reserved for use as part of Standard Precautions and also prioritized for high-contact patient care activities that pose highest risk for transfer of pathogens from the patient to HCP. Examples of such high-contact care activities include dressing, bathing/showering, transferring, providing hygiene, changing linens, changing briefs or assisting with toileting, device care or use (central line, urinary catheter, feeding tube, tracheostomy/ventilator), and wound care. To further preserve gowns, HCP are recommended to bundle high-contact care activities as part of individual care encounters. Regardless of the use of gowns, HCP at facilities should continue to wear gloves for contact with these patients and their environment. Hand hygiene should continue to be emphasized. Facilities should also attempt to place patients colonized or infected with an MDRO in a private room, if available.
- **Caring for patients with *Clostridioides difficile* infections (CDI):** Facilities should continue using Contact Precautions (putting on a gown and gloves upon entry into the patient's room and placing the patient in a private room) for the care of symptomatic patients with CDI. As part of a supplemental strategy to prevent transmission of CDI, some facilities have implemented Contact Precautions for the care of patients at high risk for CDI who have asymptomatic carriage of *Clostridioides difficile*. There are limited data about the role of asymptomatic carriage in transmission of CDI. In this setting of a critical national shortage of gowns, facilities should consider suspending this approach until the shortage is addressed. Gowns should still be used as part of Standard Precautions.

A healthcare provider at our facility was recently diagnosed with COVID-19. What time period and criteria do we use to determine the patients, visitors, and other healthcare personnel (HCP) who might have been exposed to this individual while he/she was potentially infectious?

Anyone who had prolonged close contact (within 6 feet for a cumulative total of 15 minutes or more over a 24-hour period) with the infected healthcare provider might have been exposed.

- **If the provider had COVID-19 symptoms,** the provider is considered potentially infectious beginning 2 days before symptoms first appeared until the provider meets criteria to discontinue Transmission-Based Precautions or Home Isolation.
- **If the provider did not have symptoms**, collecting information about when the provider may have been exposed could help inform the period when they were infectious.
  - **If an exposure is identified.** The provider should be considered potentially infectious beginning 2 days after the exposure until criteria to discontinue Transmission-Based Precautions or Home Isolation are met.
  - **If the date of exposure cannot be determined.** For the purposes of contact tracing, it is reasonable to use a cutoff of 2 days before the specimen testing positive for SARS-CoV-2 was collected as the starting point, continuing until the criteria to discontinue Transmission-Based Precautions or Home Isolation are met. Although the infectious period is generally accepted to be 10 days after onset of infection, eliciting contacts during the entire 10 days before obtaining the specimen that tested positive for SARS-CoV-2 is likely inefficient. In most situations an exposed provider cannot recall all contacts over the preceding 10 days. Also, because recent data suggest that asymptomatic persons may have a lower viral burden at diagnosis than symptomatic persons, the additional resources required may divert case investigation and contact tracing resources away from activities most likely to interrupt ongoing transmission.

Contact tracing is generally recommended for anyone who had prolonged close contact with the person with SARS-CoV-2 infection during these time periods. While this question addresses exposure to a potentially infectious provider, the following actions are also recommended if the potentially infectious individual is a patient or visitor.

Recommended actions for HCP, patients, and visitors:

- Perform a risk assessment and apply work restrictions for other HCP who were exposed to the infected provider based on whether these HCP had prolonged, close contact **and** what PPE they were wearing. More detailed information is available in the Interim U.S. Guidance for Risk Assessment and Work Restrictions for Healthcare Personnel with Potential Exposure to COVID-19.
- Place exposed patients who are currently admitted to the healthcare facility in appropriate Transmission-Based Precautions and monitor them for onset of SARS-CoV-2 infection until 14 days after their last exposure.
- Contacts who are within 3 months of onset of prior SARS-CoV-2 infection might not require quarantine or testing if they remain asymptomatic.
- Perform contact tracing of exposed patients who are not currently admitted to the healthcare facility and for visitors as described in Health Departments: Interim Guidance on Developing a COVID-19 Case Investigation and Contact Tracing Plan .

Healthcare facilities should have a process for notifying the health department about known or suspected cases of SARS-CoV-2 infection, and should establish a plan, in consultation with local public health authorities, for how exposures in a healthcare facility will be investigated and how contact tracing will be performed. The plan should address the following:

A healthcare provider in our facility worked while infected with SARS-CoV-2. However, the provider wore a facemask at all times while interacting with patients. Are the patients at risk for SARS-CoV-2 and should they be notified?

Anyone who had prolonged close contact (within 6 feet for at least 15 minutes) should be considered potentially exposed. The use of a facemask for source control and adherence to other recommended infection prevention and control (IPC) measures (e.g., hand hygiene) by the provider help to reduce the risk of transmission or severe illness. In areas with moderate to substantial community transmission, patients are already at risk for exposure to SARS-CoV-2 due to exposures outside their home and should be alert to the development of signs or symptoms consistent with COVID-19.

The following should be considered when determining which patients are at higher risk for transmission and might be prioritized for evaluation and testing:

- Facemask use by the patient – Mirroring the risk assessment guidance for healthcare personnel, patients not wearing a facemask would likely be at higher risk for infection compared to those that were wearing a facemask.
- Type of interaction that occurred between the patient and infected provider – An interaction involving manipulation or prolonged close contact with the patient's eyes, nose, or mouth (e.g., dental cleaning) likely poses higher risk of transmission to the patient compared to other interactions (e.g., blood pressure check).
- PPE used by infected HCP – HCP wearing a facemask (or respirator) and face shield that extends down below the chin might have had better source control than wearing only a facemask. Note that respirators with exhalation valves might not provide source control.
- Current status of patient – Is the patient currently admitted to a hospital or long-term care facility? These individuals, if infected, can be at higher risk for severe illness and have the potential to expose large numbers of individuals at risk for severe disease.

Questions addressing the proper handling of healthcare personnel (HCP) who have recovered from SARS-CoV-2 Infection, but are still within 3 months of onset of their prior infection.

1. If HCP have recovered from SARS-CoV-2 infection but have a high-risk exposure within 3 months of their initial infection to a patient with SARS-CoV-2 infection, should they be restricted from work for 14 days after the exposure?

CDC has posted interim guidance for risk assessment and work restrictions for HCP with potential exposure to SARS-CoV-2. Because of their often extensive and close contact with people who are at high risk for severe illness, this guidance recommends a conservative approach to HCP monitoring and applying work restrictions to prevent transmission from potentially contagious HCP to patients, other HCP, and visitors. Review of currently available evidence suggests that most people do not become re-infected in the 3 months after SARS-CoV-2 infection. Testing of asymptomatic people during this 3-month period is complicated by the fact that some people have detectable virus from their prior infection during this period; a positive test during this period may more likely result from a prior infection rather than a new infection that poses risk for transmission.

In light of this, exposed HCP who are within 3 months of their initial infection, could continue to work, while monitoring for symptoms consistent with COVID-19 and following all recommended infection prevention and control practices (e.g., universal use of well-fitting source control). If symptoms develop, exposed HCP should be assessed and potentially tested for SARS-CoV-2, if an alternate etiology is not identified. Some facilities might still choose to institute work restrictions for asymptomatic HCP following a higher risk exposure, particularly if there is uncertainty about a prior infection or the durability of the person's immune response. Examples could include:

- HCP with underlying immunocompromising conditions (e.g., after organ transplantation) or who become immune compromised (e.g., receive chemotherapy) in the 3 months following SARS-Cov-2 infection who might be at increased risk for reinfection. However, data on which specific conditions may lead to higher risk and the magnitude of risk are not available.
- HCP for whom there is concern that their initial diagnosis of SARS-CoV-2 infection might have been based on a false positive test result (e.g., individual was asymptomatic, antigen test positive, and a confirmatory nucleic acid amplification test (NAAT) was not performed).
- HCP for whom there is evidence that they were exposed to a novel SARS-CoV-2 variant for which the risk of reinfection might be higher (e.g., exposed to a person known to be infected with a novel variant).

CDC continues to actively investigate the frequency of reinfection and the circumstances surrounding these episodes, including the role that new variants might play in reinfection, and will adjust guidance as necessary as more information becomes available.

2. If HCP within 3 months of their initial infection develop symptoms consistent with COVID-19, should they be excluded from work and retested?

HCP within 3 months of a confirmed SARS-CoV-2 infection who develop symptoms consistent with COVID-19 should be evaluated to identify potential alternative etiologies for their symptoms. If an alternate etiology for the symptoms cannot be identified, they may need to be retested for SARS-CoV-2 infection with the understanding that a positive viral test could represent residual viral particles from the previous infection, rather than new infection. Decisions about the need for and duration of work exclusion should be based upon their suspected diagnosis (e.g., influenza, SARS-CoV-2 infection).

3. Do HCP within 3 months of their initial infection need to wear all recommended personal protective equipment (PPE) when caring for patients with suspected or confirmed SARS-CoV-2 infection? For example, if there are limited respirators, should respirators be prioritized for HCP who have not been previously infected?

If healthcare personnel (HCP) are living with someone who has been diagnosed with SARS-CoV-2 infection, should they be excluded from work? If so, for how long?

Yes. HCP who have any kind of exposure for which home quarantine is recommended should be excluded from work:

- If HCP **are** able to quarantine away from the infected individual living with them, they should quarantine at home and not come into work for 14 days following their last exposure to the infected individual.
- If HCP are **not** able to quarantine away from the infected individual living with them and have ongoing unprotected exposure throughout the duration of the individual's illness, they should remain in home quarantine and be excluded from work until 14 days **after** the infected individual meets criteria for discontinuation of home isolation.
- If HCP develop SARS-CoV-2 infection while they are in quarantine, they should be excluded from work until they meet all return to work criteria for HCP with SARS-CoV-2 infection.

Home quarantine and work exclusion of asymptomatic exposed HCP who have recovered from SARS-CoV-2 infection in the prior 3 months might not be necessary. Additional information about this scenario is available here.

If a confirmatory test is performed on a person with a potential false-positive antigen test result or a potential false-negative result, what infection prevention and control (IPC) measures should be enacted while the result is pending?

When confirmatory testing is performed on a person with a potential false-positive antigen test result, IPC measures should be maintained pending the result. Additional testing of close contacts can be delayed until results of confirmatory testing are available unless symptomatic individuals are identified.

- For asymptomatic healthcare personnel (HCP), this includes continuing exclusion from work pending confirmatory testing.
- For asymptomatic patients or residents, this includes placement on Transmission-Based Precautions in a single room or, if single rooms are not available, remaining in their current room pending results of confirmatory testing. They should not be transferred to a COVID-19 unit or placed in another shared room with new roommates.

Given the generally lower sensitivity of antigen tests, people with COVID-19–like symptoms who have a negative antigen test result should have a confirmatory nucleic acid amplification test (NAAT), such as reverse transcriptase polymerase chain reaction (RT-PCR), in most situations. Pending the results of confirmatory testing, maintain the following IPC measures:

- Patients and residents with COVID-19–like symptoms should be placed on Transmission-Based Precautions in a single room (not on the COVID-19 unit)
- HCP with COVID-19–like symptoms should be excluded from work until the confirmatory test results are available.

Despite the potential need for confirmatory testing of negative results, the initial use of antigen tests for symptomatic people is still preferred if turnaround time for a NAAT is >2 days because a positive antigen test would initiate contact tracing and implementation of IPC measures.

Using two masks at the same time, including the use of a cloth mask over a medical facemask*, to improve the fit of facemasks in healthcare settings

CDC has recommended several ways to improve the fit and filtration of masks, including covering a medical facemask with a cloth mask. However, layering masks requires special care in healthcare settings.

- Although a cloth mask can be used over a medical facemask to improve fit, there may be better alternatives such as framed "fitters" or using a knot-and-tuck approach to achieve a good fit. If a good fit is achieved using a single medical facemask, additional approaches like adding layers to achieve a better fit might not be necessary.
- Cloth masks are not personal protective equipment (PPE). They should not be used in place of medical facemasks or NIOSH-approved respirators as part of Standard or Transmission-based Precautions.
- Wearing a medical facemask or cloth mask over an N95 respirator is not recommended for healthcare personnel in healthcare settings except as a contingency or crisis strategy during extended use of N95 respirators to protect the respirator from contamination during aerosol-generating procedures or procedures that might generate splashes and sprays.
- Wearing a medical facemask or cloth mask under an N95 respirator is never recommended as it will interfere with the seal.

In healthcare settings, medical facemasks are used by healthcare personnel for two general purposes.

- First, as PPE to protect a healthcare worker's nose and mouth from exposure to splashes, sprays, splatter, and respiratory secretions, such as when treating patients on Droplet Precautions. When used as PPE, medical facemasks should be removed and discarded after each patient encounter unless extended use is being practiced as part of a crisis or contingency capacity strategy.
  - If a cloth mask is used over the medical facemask, it should be removed and laundered after each patient encounter.
  - Cloth masks are not PPE and should not be used alone to protect against splashes and sprays, such as when used while treating patients on Droplet Precautions.
- Second, for source control to cover a healthcare worker's nose and mouth to prevent spread of respiratory secretions from the healthcare worker to other people. When used for source control, medical facemasks, including cloth masks that are used to cover medical facemasks to improve the fit, may be used for the duration of a shift unless they become soiled, damaged, or hard to breathe through; medical facemasks, including cloth masks, used for source control should be removed and discarded (or laundered if a cloth mask) at least after each workday.

Once put on, healthcare personnel should not touch their medical facemask or cloth mask. If they touch or adjust their medical facemask or cloth mask, they must perform hand hygiene before and after contact.

If laundering at the intervals described above cannot be performed, then cloth masks should not be used by healthcare personnel in healthcare settings.

*Medical facemasks are PPE and are often referred to as surgical masks or procedure masks. Use facemasks according to product labeling and local, state, and federal requirements. FDA-cleared surgical masks are designed to protect against splashes and sprays and are prioritized for use when such exposures are anticipated, including surgical procedures. Facemasks that are not regulated by FDA, such as some procedure masks, which are typically used for isolation purposes, may not provide protection against splashes and sprays.

Transmission

When is someone infectious?

The onset and duration of viral shedding and the period of infectiousness for COVID-19 are not yet known with certainty. Based on current evidence, scientists believe that persons with mild to moderate COVID-19 may shed replication-competent SARS-CoV-2 for up to 10 days following symptom onset, while a small fraction of persons with severe COVID-19, including immunocompromised persons, may shed replication-competent virus for up to 20 days. It is possible that SARS-CoV-2 RNA may be detectable in the upper or lower respiratory tract for weeks after illness onset, similar to infections with MERS-CoV and SARS-CoV. However, detection of viral RNA does not necessarily mean that infectious virus is present. Based on existing literature, the incubation period (the time from exposure to development of symptoms) of SARS-CoV-2 and other coronaviruses (e.g., MERS-CoV, SARS-CoV) ranges from 2–14 days.

Which body fluids can spread infection?

SARS-CoV-2 RNA has been detected in upper and lower respiratory tract specimens, and SARS-CoV-2 virus has been isolated from upper respiratory tract specimens and bronchoalveolar lavage fluid. SARS-CoV-2 RNA has been detected in blood and stool specimens, and SARS-CoV-2 virus has been isolated in cell culture from the stool of some patients, including a patient with pneumonia 15 days after symptom onset. The duration of SARS-CoV-2 RNA detection in upper and lower respiratory tract specimens and in extrapulmonary specimens is not yet known but may be several weeks or longer. Duration of several weeks or longer has been observed in cases of MERS-CoV or SARS-CoV infection. While viable, infectious SARS-CoV has been isolated from respiratory, blood, urine, and stool specimens, viable, infectious MERS-CoV has only been isolated from respiratory tract specimens. It is not yet known whether other non-respiratory body fluids from an infected person including blood, vomit, urine, breast milk, or semen can contain viable, infectious SARS-CoV-2.

Can people who recover from COVID-19 be re-infected with SARS-CoV-2?

CDC is aware of recent reports indicating that persons who were previously diagnosed with COVID-19 can be re-infected. These reports can understandably cause concern. The immune response, including duration of immunity, to SARS-CoV-2 infection is not yet understood. Based on what we know from other viruses, including common human coronaviruses, some reinfections are expected. Ongoing COVID-19 studies will help establish the frequency and severity of reinfection and who might be at higher risk for reinfection. At this time, whether you have had COVID-19 or not, the best ways to prevent infection are to wear a mask in public places, stay at least 6 feet away from other people, frequently wash your hands with soap and water for at least 20 seconds, and avoid crowds and confined spaces.

Testing, Diagnosis, and Notification

How do you test a patient for infection with SARS-CoV-2?

- Clinicians are able to access laboratory testing through state and local public health laboratories, as well as commercial and clinical laboratories across the country. The Association of Public Health Laboratories provides a list of states and territories with laboratories that are using COVID-19 viral tests. For more information, see Testing in U.S. Clinicians should direct testing questions to their state health departments. Commercial reference laboratories are also able to offer a larger volume of testing for SARS-CoV-2.
- CDC has guidance for who should be tested, but decisions about testing are at the discretion of state and local health departments and/or individual clinicians.
- Healthcare providers should report positive results to their local/state health department CDC does not directly collect these data directly.
- See recommendations for prioritization of testing, and instructions for specimen collection at Testing Overview for COVID-19.

Do existing commercially available multiple respiratory virus panels detect SARS-CoV-2?

Yes. There are commercially developed respiratory panels with multi-pathogen molecular assays that can detect respiratory pathogens, including SARS-CoV-2, influenza, and other human coronaviruses that can cause acute respiratory illness. The U.S. Food and Drug Administration (FDA) maintains a list of tests that includes viral tests with Emergency Use Authorization (EUA).

If a patient tests positive for another respiratory virus, should that exclude SARS-CoV-2 as a cause of illness?

Patients can be infected with more than one virus at the same time. Coinfections with other respiratory viruses in people with COVID-19 have been reported. Therefore, identifying infection with one respiratory virus does not exclude SARS-CoV-2 virus infection.

Should chest CT be used for diagnosis of COVID-19?

Clinicians considering use of chest CT scans for diagnosis or management of COVID-19 patients should consider whether such imaging will change clinical management. The American College of Radiology (ACR) recommends that CT should not be used to screen for COVID-19, or as a first-line test to diagnose COVID-19, and that CT should be used sparingly and reserved for hospitalized, symptomatic patients with specific clinical indications for CT. Appropriate infection control procedures should be followed before scanning subsequent patients. For more information see, ACR Recommendations for the use of Chest Radiography and Computed Tomography (CT) for Suspected COVID-19 Infection .

Whom should healthcare providers notify if they suspect a patient has COVID-19?

Healthcare providers should immediately notify infection control personnel at their facility if they suspect COVID-19 in a patient. If a patient tests positive, providers should report that positive result to their local/state health department.

How do you diagnose and report a potential case of multisystem inflammatory syndrome in children (MIS-C)?

Patients with MIS-C have presented with a persistent fever and a variety of signs and symptoms including multiorgan (e.g., cardiac, gastrointestinal, renal, hematologic, dermatologic, neurologic) involvement and elevated inflammatory markers. Not all children will have the same symptoms. For children who may have MIS-C, further evaluation for signs of this syndrome may include (but are not limited to) chest radiograph, echocardiography, and blood testing to evaluate for evidence of inflammation.

Healthcare providers who have cared or are caring for patients younger than 21 years of age meeting MIS-C criteria should report suspected cases to their local, state, or territorial health department. After hour phone numbers for health departments are available at the Council of State and Territorial Epidemiologists website. For additional reporting questions, please contact CDC's 24-hour Emergency Operations Center at 770-488-7100. For more information, including a full case definition, please visit MIS-C Information for Healthcare Providers.

Testing in Nursing Homes

How can public health jurisdictions prioritize testing across nursing homes when resources are limited?

Generally, nursing homes are recommended to test:

- Residents and healthcare personnel (HCP) with signs or symptoms of COVID-19
- Residents and HCP who are asymptomatic in response to an outbreak in the facility (i.e., a new SARS-CoV-2 infection in any HCP or any SARS-CoV-2 infection in a resident)
- All residents and HCP once and serially test HCP who are asymptomatic in facilities without an outbreak as required by CMS .

Health departments should have a plan on how to prioritize facilities when testing capacity is limited.

If testing capacity is limited for SARS-CoV-2, the virus that causes COVID-19, prioritize testing (1) of residents and healthcare personnel (HCP) with signs or symptoms of COVID-19 and (2) asymptomatic residents and HCP in response to an outbreak in the facility. When testing capacity is limited or test turnaround times are >2 days, testing HCP who are asymptomatic in facilities without an outbreak should be considered lower priority.

Is there an optimal frequency for testing residents and HCP who previously tested negative in nursing homes as part of an outbreak response?

As part of an outbreak response, CDC recommends that residents and HCP (who have not had a prior infection in the last 90 days) have viral testing (e.g., RT-PCR or antigen) immediately after the first new COVID-19 case is identified at the facility. Then the facility should perform serial testing of all residents and HCP who previously tested negative every 3–7 days until no new positive tests have been identified for 14 days. In nursing homes with outbreaks, most cases are identified within the first two weeks of diagnosing the first new case. These early cases likely occur among people who were previously exposed or were infected before more infection prevention and control (IPC) measures were implemented in response to the outbreak.

For this reason, if testing capacity allows and does not divert staff and resources away from performing other critical IPC measures (e.g., ensuring effective implementation of Transmission-Based Precautions for infected and potentially exposed residents), the facility should consider testing more frequently (e.g., every 3 days) for the first two weeks of the outbreak, then test less frequently (e.g., every 7 days) thereafter until no new cases are identified for 14 days. As an example, testing would occur on day 0 (day the first case is identified), days 3, 6, 9, and 12, and then on days 19, 26, etc.

This increased frequency of testing might not be possible in many facilities (e.g., lack of testing supplies or diversion of resources from other patient care activities). A minimum frequency of testing every 7 days is recommended until no new positive tests have been identified for 14 days. The effectiveness of increased frequency of testing is substantially diminished if IPC measures are not maintained. Facilities should ensure adherence to appropriate IPC measures in outbreak settings, including use of Transmission-Based Precautions for the care of all residents (even those who have negative tests) on affected units (or facility-wide, if cases are widespread). Facilities should also ensure rapid turnaround time of less than 2 days from specimen collection to test result.

Should residents in nursing homes who are asymptomatic be tested in non-outbreak settings?

Unrecognized SARS-CoV-2 is most often introduced into a nursing home by asymptomatic healthcare personnel (HCP) or visitors with COVID-19 who work at or visit the nursing home, rather than residents. Recommendations for testing of residents who are asymptomatic in nursing homes is generally reserved for situations such as response to an outbreak in the facility (i.e., a new SARS-CoV-2 infection in any HCP or any SARS-CoV-2 infection in a resident) or evaluation of a resident who has had close contact with someone with confirmed SARS-CoV-2 infection.

Regular testing of asymptomatic residents can result in false-positive results and potentially result in additional unnecessary testing. If testing capacity allows, consideration could be given to regular serial testing of residents who are asymptomatic and who frequently leave the facility for medical treatment and then return (e.g. residents who receive regular hemodialysis, including those who are dialyzed at an onsite facility that treats nursing home and community patients), especially in communities where there is moderate to substantial community transmission. Such residents might be at higher risk for SARS-CoV-2 infections because of their frequent exposures outside the nursing home. These exposures can be from community patients, staff members during ambulatory care or during transportation; however, the benefit of serial testing of residents is not known.

When should an antigen test result be considered a false positive?

Research studies report that the specificity of antigen tests and nucleic acid amplification tests (NAAT), such as reverse-transcriptase polymerase chain reaction (RT-PCR), are generally similar and high. However, false-positive results may occur with any test, even those that have very high sensitivity and specificity.

A point-of-care antigen test result should be considered a possible false-positive when a positive test result appears inconsistent with the clinical situation (e.g., a positive antigen test in an asymptomatic person who does not have risk factors and resides in a community with lower COVID-19 prevalence). When a false-positive test is suspected, nursing homes and health departments should also review and gather the following information:

- Review the FDA EUA and instructions for use of the point-of-care antigen test to ensure correct use. For instance, the use of viral transport medium has been shown to produce false-positive results in some tests and should not be used for some antigen platforms (including BD Veritor and Quidel Sofia platforms). For further information on appropriate use of point of care tests, see Specimen Collection and Handling of Point of Care Tests.
- Review recent control results to ensure accuracy of the antigen test platform. If able, perform procedural quality control tests to ensure correct operation of the platform.
- Compare the percent positivity of the samples that were run that day (or week) to their previous percent positivity (e.g., their rolling 7-day average percent positive). Identifying many positives in one day might indicate an issue with the antigen results (either due to operator error or faulty test supplies).
- Consider the pre-test probability of disease. If testing a population with a COVID-19 prevalence of <1% (e.g., screening asymptomatic HCP in non-outbreak settings) with a single test with 99% specificity, the positive predictive value (probability that a positive test is a true-positive) could be <40%. In other words, in such situations, fewer than 4 of every 10 positive tests represent a true positive. If the prevalence of COVID-19 in the population is >10% (e.g., testing asymptomatic residents and HCP as part of an outbreak response) with that same test with 99% specificity, the positive predictive value may be >90%. In such situations, more than 9 of every 10 positive tests represent a true positive. Therefore, testing in low-prevalence populations with antigen or RT-PCR tests might produce false positives, but that is less likely in outbreak settings.

If a nursing home is concerned about a false-positive antigen test result, what confirmatory test should be performed?

In most instances, CDC guidance currently recommends performing confirmatory testing when asymptomatic individuals are antigen positive.

If confirmatory testing is performed, facilities can optimize the performance of the confirmatory test by doing the following:

- Use nucleic acid amplification tests (NAAT), such as reverse-transcriptase polymerase chain reaction (RT-PCR), as the confirmatory test. The utility of performing a confirmatory test with a second antigen test (either with the same platform or a different platform) is not known; repeating the test using antigen platforms might not be helpful if there are concerns about operator error contributing to false-positive results.
- Optimize sensitivity of the confirmatory test by collecting a high-quality specimen to ensure the confirmatory test does not produce a false negative result.
  - Nasopharyngeal (NP) swabs used correctly have a higher sensitivity than other specimen sources. Therefore, confirmatory tests should be performed using NP swabs.
  - The quality of the specimen can impact sensitivity, which can be lower in residents who are not able to follow instructions or those who are intolerant of being tested. If the person is unable to tolerate a NP swab, then a swab of the anterior nares or mid-turbinate could be considered as collection of these specimen types are more tolerable, and have similar or slightly lower sensitivity.
- Select a confirmatory test with high sensitivity. The sensitivity of different RT-PCRNAAT platforms varies and the facility can check the FDA EUA of the platform.
- Perform the confirmatory test within 2 days of the initial test. Tests performed >2 days apart should be considered separate tests, and discordant results may be due to changes in viral dynamics.

Should residents or HCP who have a positive antibody test for SARS-CoV-2 be tested as part of facility-wide testing?

Yes. To determine if residents and HCP have a current infection, they should have a viral test (e.g., reverse-transcriptase polymerase chain reaction [RT-PCR]) regardless of their antibody test result. A positive antibody test result shows that an individual has antibodies from an infection with the virus that causes COVID-19, or possibly from infection with a related virus from the same family of viruses (called coronavirus), such as one that causes the common cold. We do not know yet if having antibodies to the virus that causes COVID-19 can protect someone from getting infected again or, if they do, how long this protection might last. Therefore, antibody tests should not be used to diagnose COVID-19 and should not be used to inform infection prevention actions.

How should facilities approach residents who decline testing?

Residents, or their medical powers of attorney, have the right to decline testing. Clinical discussions about testing may include alternative specimen collection sources that may be more acceptable to residents than nasopharyngeal swabs (e.g., anterior nares). Providing information about the method of testing and reason for pursuing testing may facilitate discussions with residents and their medical powers of attorney.

If a resident has symptoms consistent with COVID-19, but declines testing, they should remain on Transmission-Based Precautions until they meet the symptom-based criteria for discontinuation.

If a resident is asymptomatic and declines testing at the time of facility-wide testing, decisions on placing the resident on Transmission-Based Precautions for COVID-19 or providing usual care should be based on whether the facility has evidence suggesting SARS-CoV-2 transmission (i.e., confirmed infection in HCP or nursing-home onset infection in a resident).

Only residents who have a confirmed positive viral test should be moved to COVID-19-designated units or facilities.

How should facilities approach HCP who decline testing?

If HCP with symptoms consistent with COVID-19 decline testing, they should be presumed to have COVID-19 and excluded from work. Return to work decisions should be based on COVID-19 return to work guidance at the discretion of the facility's occupational health program.

If asymptomatic HCP decline testing, work restriction, if any, should be determined by the facility's occupational health and local jurisdiction policies. All staff should be trained in proper use of personal protective equipment, including universal facemask policies, hand hygiene, and other measures needed to stop transmission of SARS-CoV-2.

If HCP work at multiple facilities, do they need to receive a viral test at each facility?

No, HCP do not need to be tested at each facility. If documentation of the test result is provided to each facility, the results from one setting are adequate to meet the testing recommendations at any facility. Each facility should maintain appropriate documentation of test results and have a plan to evaluate and manage HCP. HCP should be encouraged to tell facilities if they have had exposures at other facilities with recognized COVID-19 cases.

Should asymptomatic HCP who are tested as part of facility-wide testing be excluded from work while waiting for test results?

If HCP remain asymptomatic, they may continue working while awaiting test results, unless work restrictions have been implemented by the occupational health program because of an exposure warranting exclusion from work.

Treatment and Management

Should post-exposure prophylaxis be used for people who may have been exposed to a person with COVID-19?

There is currently no FDA-approved post-exposure prophylaxis for people who may have been exposed to COVID-19. For information about registered clinical trials of investigational therapeutics for pre- or post-exposure prophylaxis of SARS-CoV-2 infection, visit ClinicalTrials.gov .

For more information on movement restrictions, monitoring for symptoms, and evaluation after possible exposure to COVID-19, see Interim US Guidance for Risk Assessment and Public Health Management of Persons with Potential Coronavirus Disease 2019 (COVID-19) Exposure in Travel-associated or Community Settings and Interim U.S Guidance for Risk Assessment and Public Health Management of Healthcare Personnel with Potential Exposure in a Healthcare Setting to Patients with Coronavirus Disease 2019 (COVID-19).

The National Institutes of Health recently published guidelines on prophylaxis use for COVID-19 and testing and management of COVID-19 patients. For more information, please visit: National Institutes of Health: Coronavirus Disease 2019 (COVID-19) Treatment Guidelines .

How are COVID-19 patients treated?

Not all patients with COVID-19 will require medical supportive care. Clinical management for hospitalized patients with COVID-19 is focused on supportive care for complications, including supplemental oxygen and advanced organ support for respiratory failure, septic shock, and multi-organ failure. Empiric testing and treatment for other viral or bacterial etiologies may be warranted.

The National Institutes of Health has published interim guidelines for the medical management of COVID-19 prepared by the COVID-19 Treatment Guidelines Panel.

For information on investigational therapies, see Therapeutic Options for Patients with COVID-19.

Do patients with confirmed or suspected COVID-19 need to be admitted to the hospital?

Not all patients with COVID-19 require hospital admission. Patients whose clinical presentation warrants in-patient clinical management for supportive medical care should be admitted to the hospital under appropriate Transmission-Based Precautions.

Some patients with initial mild clinical presentation may worsen in the second week of illness. The decision to monitor these patients in the inpatient or outpatient setting should be made on a case-by-case basis. This decision will depend not only on the clinical presentation, but also on the patient's ability to engage in self-monitoring, the feasibility of safe isolation at home, and the risk of transmission in the patient's home environment. For more information, see Interim Infection Prevention and Control Recommendations for Patients with Suspected or Confirmed Coronavirus Disease 2019 (COVID-19) in a Healthcare Setting and Interim Guidance for Implementing Home Care of People Not Requiring Hospitalization for Coronavirus Disease 2019 (COVID-19).

References related to hospitalization and outcomes among patients with COVID-19:

Huang C, Wang Y, Li X, et al. Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. *Lancet* 2020;395:497-506.

Wang D, Hu B, Hu C, et al. Clinical Characteristics of 138 Hospitalized Patients With 2019 Novel Coronavirus-Infected Pneumonia in Wuhan, China. *JAMA* 2020.

Dong Y, Mo X, Hu Y, et al. Epidemiology of COVID-19 Among Children in China. *Pediatrics* 2020.

Wu Z, McGoogan JM. Characteristics of and Important Lessons From the Coronavirus Disease 2019 (COVID-19) Outbreak in China: Summary of a Report of 72 314 Cases From the Chinese Center for Disease Control and Prevention. *JAMA* 2020.

When can patients with confirmed COVID-19 be discharged from the hospital?

Patients can be discharged from the healthcare facility whenever clinically indicated. Meeting criteria for discontinuation of Transmission-Based Precautions is not a prerequisite for discharge from a healthcare facility. Isolation should be maintained at home if the patient returns home before the time period recommended for discontinuation of hospital Transmission-Based Precautions.

Decisions to discontinue Transmission-Based Precautions or in-home isolation should be made according to the following guidance:

- For hospitalized persons, see Discontinuation of Transmission-Based Precautions and Disposition of Patients with SARS-CoV-2 Infection in Healthcare Settings.
- For non-hospitalized persons, see Interim Guidance for Implementing Home Care of People Not Requiring Hospitalization for COVID-19 and Discontinuation of Isolation for Persons with COVID-19 Not in Healthcare Settings.

Testing, Isolation, and Quarantine for Persons Who Have Recovered from Previous SARS-CoV-2 Infection

What do we know about detection of SARS-CoV-2 RNA after clinical recovery from COVID-19?

Many recovered persons do not have detectable SARS-CoV-2 RNA in upper respiratory tract specimens. However, viral RNA can be persistently detected by reverse transcription polymerase chain reaction (RT-PCR) in respiratory tract samples in some persons after apparent clinical recovery. In some persons, after testing negative by RT-PCR in two consecutive samples, later samples can test positive again. These persistent detections of viral RNA usually are associated with higher cycle threshold (Ct) values (i.e., fewer RNA copies) than Ct values found in RT-PCR results from samples collected shortly before or during clinical illness. Studies that have examined how long SARS-CoV-2 RNA can be detected in adults have demonstrated that, in some persons, it can be detected for weeks.

Are clinically recovered persons infectious to others if they test persistently or recurrently positive for SARS-CoV-2 RNA?

Whether the presence of detectable but low concentrations of viral RNA after clinical recovery represents the presence of potentially infectious virus is unknown. Based on experience with other viruses, it is unlikely that such persons pose an important infectious risk to others. However, whether this is true for SARS-CoV-2 infection has not been definitively established.

After the onset of illness, the detectable viral burden usually declines. After a week or more, anti-SARS-CoV-2 immunoglobulin becomes detectable and then antibody levels increase. Some of these antibodies may prevent the virus from infecting cells in cell culture. A decline in viral RNA is associated with a decreased ability to isolate live virus. For most patients with COVID-19, efforts to isolate live virus from upper respiratory tract specimens have been unsuccessful when specimens are collected more than 10 days after illness onset. Recovery of live virus between 10 and 20 days after symptom onset has been documented in some persons with severe COVID-19; in some cases, these persons were in an immunocompromised state.

Persons who have tested persistently or recurrently positive for SARS-CoV-2 RNA have, in some cases, had their signs and symptoms of COVID-19 improve. When viral isolation in tissue culture has been attempted in such persons in South Korea and the United States, live virus has not been isolated. There is no evidence to date that clinically recovered persons with persistent or recurrent detection of viral RNA have transmitted SARS-CoV-2 to others.

Despite these observations, it's not possible to conclude that all persons with persistent or recurrent detection of SARS-CoV-2 RNA are no longer infectious. There is no firm evidence that the antibodies that develop in response to SARS-CoV-2 infection are protective. If these antibodies are protective, it's not known what antibody levels are needed to protect against reinfection.

These data and experience with other viral respiratory infections indicate that most persons recovered from COVID-19 who test persistently or recurrently positive by RT-PCR are likely no longer infectious. Isolation and precautions may be discontinued for persons with COVID-19 10 days after symptom onset (the date on which symptoms first began, including non-respiratory symptoms), provided their fever has resolved for at least 24 hours, without the use of fever-reducing medications, and their other symptoms have improved. For some persons with severe or critical illness, or who are severely immunocompromised, isolation and precautions may be maintained for up to 20 days after symptom onset.

Can cycle threshold (Ct) values be used to assess when a person is no longer infectious?

No. Although attempts to culture virus from upper respiratory specimens have been largely unsuccessful when Ct values are in high but detectable ranges, Ct values are not a quantitative measure of viral burden. In addition, Ct values are not standardized by RT-PCR platform nor have they been approved by FDA for use in clinical management. CDC does not endorse or recommend use of Ct values to assess when a person is no longer infectious. However, serial Ct values may be useful in the context of the entire body of information available when assessing recovery and resolution of infection.

What further evidence is needed to be reassured that persistent or recurrent shedding of SARS-CoV-2 RNA after recovery does not represent the presence of infectious virus?

Prospectively collecting serial respiratory samples and attempting to isolate live virus in tissue culture from multiple persons testing positive by RT-PCR following illness recovery is needed. If repeated attempts to recover replication-competent virus in culture from such serial samples are unsuccessful, that data would be sufficient evidence that infectious virus is absent. Then we would be sure that persons continuing to test positive do not pose an infectious risk to others.

Can viral culture be used to demonstrate that a person who had persistently or recurrently detectable viral RNA is not infectious to others?

Yes. However, viral culture is not widely performed for SARS-CoV-2. It must be conducted in Biosafety Level 3 (BSL-3) laboratories using BSL-3 practices by experienced virologists and culture results can take a week or more. Therefore, while persons whose specimens do not yield live virus are considered no longer infectious, the complexity of such testing and the time required to complete it mean that culture cannot be used routinely to guide management of infected persons.

A person who previously tested positive by RT-PCR for SARS-CoV-2 and clinically recovered from COVID-19 is later tested again, for example, as part of a contract tracing investigation. If that person again tests positive by RT-PCR, should they be managed as potentially infectious to others, and isolated again for COVID-19?

For persons who remain asymptomatic following recovery from COVID-19, retesting (e.g., as part of a contact tracing investigation) is not necessary during the first 3 months after the date of symptom onset. When a positive test occurs less than 3 months after the person's symptom onset of their most recent illness, it is possible that the positive test represents a new infection or a persistently positive test associated with the previous infection. If a positive test occurs more than 3 months after a person's symptom onset, clinicians and public health authorities should consider the possibility of reinfection. Until we have more information, the determination of whether a patient with a positive test in these situations is contagious to others should be made on a case-by-case basis. Consider consultation with infectious diseases specialists and public health authorities to review all available information (e.g., medical history, time from initial positive test, RT-PCR Ct values, and presence of COVID-19 signs or symptoms). Persons who are determined to be potentially infectious should undergo evaluation and remain isolated until they again meet criteria for discontinuation of isolation or discontinuation of transmission-based precautions, depending on their circumstances.

If a previously infected person has clinically recovered but later experiences symptoms consistent with COVID-19, should the person be isolated again and tested for SARS-CoV-2?

If a previously infected person experiences new symptoms consistent with COVID-19 3 months or more after the date of the previous illness onset (or date of last positive viral diagnostic test [RT-PCR or antigen test] if the person never experienced symptoms), the person should undergo repeat viral diagnostic testing. However, serologic testing should not be used to establish the presence or absence of SARS-COV-2 infection or reinfection. These people who have a positive test result should be considered infectious and remain isolated until they again meet criteria for discontinuation of isolation or of transmission-based precautions. Contact tracing during the person's second episode of symptoms is warranted.

For persons who have recovered from laboratory-confirmed SARS-CoV-2 infection and who experience new symptoms consistent with COVID-19 within 3 months since the date of symptom onset of the previous illness episode (or date of last positive viral diagnostic test if the person never experienced symptoms), repeating viral diagnostic testing may be warranted if alternative etiologies for the illness cannot be identified. If reinfection is suspected and retesting is undertaken, the person should follow isolation recommendations for cases of COVID-19 pending clinical evaluation and testing results. Results of repeat testing should also be interpreted in consultation with an infectious disease specialist with consideration of cycle threshold values (if available) and clinical presentations. The determination of whether a patient with a subsequently positive test is contagious to others should be made on a case-by-case basis, in consultation with infectious diseases specialists and/or public health authorities, after review of available information (e.g., medical history, time from initial positive test, RT-PCR Ct values, and presence of COVID-19 signs or symptoms).

Note: Serologic testing should not be used to establish the presence or absence of SARS-CoV-2 infection or reinfection.

If an infected person has clinically recovered and then later is identified as a contact of another person with COVID-19, do they need to be quarantined?

If a person has clinically recovered from SARS-CoV-2 infection and is then identified as a contact of a new case 3 months or more after the date of symptom onset of their previous illness episode (or date of positive viral diagnostic test [RT-PCR or antigen test] if the person never experienced symptoms), then they should follow general quarantine recommendations for contacts and undergo repeat viral diagnostic testing.

The following applies to a person who has clinically recovered from SARS-CoV-2 infection that was confirmed with a viral diagnostic test and then, within 3 months since the date of symptom onset of the previous illness episode (or date of positive viral diagnostic test if the person never experienced symptoms), is identified as a contact of a new case. If the person remains asymptomatic since the new exposure, then they do not need to be retested for SARS-CoV-2 and do not need to be quarantined. However, if the person experiences new symptoms consistent with COVID-19 and an evaluation fails to identify a diagnosis other than SARS-CoV-2 infection (e.g., influenza), then repeat viral diagnostic testing may be warranted, in consultation with an infectious disease specialist and public health authorities for isolation guidance.

If an infected person has clinically recovered using the symptom-based strategy, do they need a test to show they are not infectious?

No. The symptom-based strategy is intended to replace the need for repeated testing.

If an infected person has clinically recovered, should the person continue to wear a cloth face covering in public?

Yes. It is recommended that all persons, with a few exceptions, wear cloth face coverings in public.[1] The primary purpose of cloth face coverings is to limit transmission of SARS-CoV-2 from infected persons who may be infectious but do not have clinical symptoms of illness or may have early or mild symptoms that they do not recognize. Cloth face coverings may provide reassurance to others in public settings and be a reminder of the need to maintain social distancing. However, cloth face coverings are not personal protective equipment (PPE) and should not be used instead of a respirator or a facemask to protect a healthcare worker.

[1] Cloth face coverings should not be placed on young children under age 2, anyone who has trouble breathing, or anyone who is unconscious, incapacitated, or otherwise unable to remove the mask without assistance.

What should I do if I suspect a potential case of reinfection?

Although current understanding of reinfection remains limited, CDC is working with its partners to characterize the clinical features, transmissibility, and immunological profile around reinfection with SARS-CoV-2. Therefore, the guidance remains the same to reinfections as to primary infection with SARS-CoV-2. To further our shared understanding of reinfection, CDC has released the *Investigative Criteria for Suspected Cases of SARS-CoV-2 Reinfection* as well as the *Common Investigation Protocol for Investigating Suspected SARS-CoV-2 Reinfection*. This protocol is to support public health investigations conducted by interested institutions and jurisdictions. Clinicians with available specimens for suspected cases of reinfection meeting the above investigative criteria are also invited to contact CDC at eocevent461@cdc.gov after consulting with their local health department to pursue investigations with CDC support.

Obstetrical Care

Does CDC recommend use of facemasks or respirators for healthcare personnel (HCP) caring for pregnant patients with known or suspected COVID-19 infection?

When available, respirators (or facemasks if a respirator is not available), eye protection, gloves, and gowns should be used for the care of patients with known or suspected COVID-19 infection, including women who are pregnant. For more information, please see Interim Infection Prevention and Control Recommendations for Patients with Suspected or Confirmed Coronavirus Disease 2019 (COVID-19) in Healthcare Settings.

How should the use of N95 respirators be prioritized within obstetric healthcare settings during shortages?

During respirator shortages, care should be taken to ensure that N95 respirators are reserved for situations where respiratory protection is most important, such as performance of aerosol-generating procedures on patients with suspected or confirmed COVID-19 infection. In such shortage situations, facemasks might be used for other types of patient care.

Alternatives to N95 respirators might be considered where feasible. These include other classes of NIOSH-approved filtering facepiece respirators, half facepiece or full facepiece elastomeric respirators, and powered air-purifying respirators (PAPRs) where feasible. All of these alternatives will provide equivalent or higher protection than N95 respirators when properly worn. However, PAPRs and elastomeric respirators should **not** be used in surgical settings due to concerns that exhaled air may contaminate the sterile field. For more information please see: Strategies for Optimizing the Supply of N95 Respirators: Conventional Capacity Strategies.

When respirator supplies are restored, the facility can switch back to use of N95 respirators for all care of patients with known or suspected COVID-19 infection. For more information, please see Interim Infection Prevention and Control Recommendations for Patients with Suspected or Confirmed Coronavirus Disease 2019 (COVID-19) in Healthcare Settings.

Is forceful exhalation during the second stage of labor considered an aerosol-generating procedure for respirator prioritization during shortages?

Based on limited data, forceful exhalation during the second stage of labor would not be expected to generate aerosols to the same extent as procedures more commonly considered to be aerosol generating (such as bronchoscopy, intubation, and open suctioning. Forceful exhalation during the second stage of labor is not considered an aerosol-generating procedure for respirator prioritization during shortages over procedures more likely to generate higher concentrations of infectious respiratory aerosols.

When respirator supplies are restored, as with all clinical care activities for patients with known or suspected COVID-19, HCP should use respirators (or facemasks if a respirator is not available), eye protection, gloves, and gowns during the second stage of labor, in addition to other personal protective equipment that may be typically indicated for labor and delivery. For more information please see: Healthcare Infection Prevention and Control FAQs

Is use of high-flow oxygen considered an aerosol-generating procedure for respirator prioritization during shortages?

Based on limited data, high-flow oxygen use is not considered an aerosol-generating procedure for respirator prioritization during shortages over procedures more likely to generate higher concentrations of infectious respiratory aerosols (such as bronchoscopy, intubation, and open suctioning). Patients with known or suspected COVID-19 should receive any interventions they would normally receive as standard of care. When respirator supplies are restored, as with all clinical care activities for patients with known or suspected COVID-19, respirators (or facemasks if a respirator is not available), eye protection, gloves, and gowns should be used by HCP for the care of pregnant patients with known or suspected COVID-19. For more information please see: Healthcare Infection Prevention and Control FAQs

Should intrapartum fever be considered as a possible sign of COVID-19 infection?

Clinicians should use their judgment to determine if a patient has signs and symptoms compatible with COVID-19 and whether the patient should be tested. Fever is the most commonly reported sign; most patients with confirmed COVID-19 have developed fever and/or symptoms of acute respiratory illness (cough, difficulty breathing).

Data regarding COVID-19 in pregnancy are limited; according to current information, presenting signs and symptoms are expected to be similar to those for non-pregnant patients, including the presence of fever.

Other considerations that may guide testing are epidemiologic factors such as the occurrence of local community transmission of COVID-19 infections. As part of evaluation, clinicians are strongly encouraged to test for other causes of respiratory illness and peripartum fever. For more information please see: Testing Overview for Coronavirus Disease 2019 (COVID-19)

What guidance is available for labor and delivery HCP with potential exposure in a healthcare setting to patients with COVID-19 infection?

HCP in labor and delivery healthcare settings should follow the same infection prevention and control recommendations and personal protective equipment recommendations as all other HCP. If HCP are exposed to patients with COVID-19 infection, guidance is available for HCP and healthcare facilities on steps to take. For more information, please see: Interim U.S. Guidance for Risk Assessment and Public Health Management of Healthcare Personnel with Potential Exposure in a Healthcare Setting to Patients with Coronavirus Disease (COVID-19)

Drugs and Investigational Therapies

Are empiric antibiotics recommended for patients suspected of having COVID-19?

Several patients with COVID-19 have been reported to present with concurrent community-acquired bacterial pneumonia. Decisions to administer antibiotics to COVID-19 patients should be based on the likelihood of bacterial infection (community-acquired or hospital-acquired), illness severity, and antimicrobial stewardship issues. For more information, see Diagnosis and Treatment of Adults with Community-acquired Pneumonia: An Official Clinical Practice Guideline of the American Thoracic Society and Infectious Diseases Society of America .

What antiviral drugs are available to treat COVID-19?

The National Institutes of Health (NIH) has published guidelines on testing and management of patients with COVID-19. For more information, please visit the NIH Coronavirus Disease 2019 (COVID-19) Treatment Guidelines. The recommendations are based on scientific evidence and expert opinion and are regularly updated as more data become available.

Current clinical management of COVID-19 includes infection prevention and control measures and supportive care, including supplemental oxygen and mechanical ventilatory support when indicated. The U.S. Food and Drug Administration (FDA) has approved one drug, remdesivir (Veklury), for the treatment of COVID-19 in certain situations.

Persons seeking information about registered clinical trials for COVID-19 in the United States can search for such information here: ClinicalTrials.gov.

For more information on investigational therapies, see Therapeutic Options for Patients with COVID-19.

Do nonsteroidal anti-inflammatory drugs (NSAIDs) worsen the course of disease for people with COVID-19?

CDC is currently not aware of scientific evidence establishing a link between NSAIDs (e.g., ibuprofen, naproxen) and worsening of COVID-19. FDA, the European Medicines Agency, the World Health Organization, and CDC are continuing to monitor the situation and will review new information on the effects of NSAIDs and COVID-19 disease as it becomes available. For those who wish to use treatment options other than NSAIDs, there are other over-the-counter and prescription medications approved for pain relief and fever reduction. Patients who rely on NSAIDs to treat chronic conditions and have additional questions should speak to their healthcare provider for individualized management. Patients should use NSAIDs, and all medications, according to the product labels and advice of their healthcare professional.

Patients with Asthma

If I have patients with asthma, do I need to make any changes to their daily asthma preventive management regimens to reduce their risk of getting sick with COVID-19?

People with moderate to severe **asthma**, particularly if not well controlled, might be at higher risk of getting very sick from COVID-19.

Based on what we currently know about COVID-19, the selection of therapeutic options through guideline-recommended treatment of asthma has not been affected. National asthma guidelines are available. Continuation of inhaled corticosteroids is particularly important for patients already using these medications because there is no evidence of increased risk of COVID-19 morbidity with use of inhaled corticosteroids and an abundance of data showing reduced risk of asthma exacerbation with maintenance of asthma controller therapy.

Patients with asthma but without symptoms or a diagnosis of COVID-19 should continue any required nebulizer treatments.

If my patient experiences an asthma exacerbation, should the exacerbation be treated any differently to reduce risk of COVID-19?

Selection of therapeutic options through guideline-recommended treatment of asthma exacerbations has not been affected by what we currently know about COVID-19.

Systemic corticosteroids should be used to treat an asthma exacerbation per national asthma guidelines and current standards of care, even if it is caused by COVID-19. Short-term use of systemic corticosteroids to treat asthma exacerbations should be continued. There is currently no evidence to suggest that short-term use of systemic corticosteroids to treat asthma exacerbations increases the risk of developing severe COVID-19, whereas there is an abundance of data to support use of systemic steroids for moderate or severe asthma exacerbations.

Patients with asthma but without symptoms or a diagnosis of COVID-19 should continue any required nebulizer for treatments, as recommended by national professional organizations, including the American Academy of Allergy, Asthma & Immunology (AAAAI) and the American College of Allergy, Asthma & Immunology (ACAAI). If healthcare providers need to be present during nebulizer use among patients who have either symptoms or a diagnosis of COVID-19, use CDC's recommended precautions when performing aerosol-generating procedures (AGPs).

Clinicians may be concerned that an asthma exacerbation is related to an underlying infection with COVID-19. Clinicians can access laboratory testing for COVID-19 through a network of state and local public health laboratories across the country. Lists of states and territories with laboratories that are using COVID-19 viral tests are available. For more information, see Testing in U.S. Clinicians should direct testing questions to their state and local health departments.

Are any changes recommended to the asthma treatment plan if my patient with asthma has COVID-19?

Patients can be referred to CDC's recommendations for caring for themselves or someone else at home sick with COVID-19.

If nebulizer use at home is necessary for patients with asthma who have symptoms or a diagnosis of COVID-19, use of the nebulizer in a location that minimizes and preferably avoids exposure to any other members of the household, and preferably a location where air is not recirculated into the home (like a porch, patio, or garage) is recommended by national professional organizations, including the American College of Allergy, Asthma & Immunology (ACAAI) by the ACAAI and the Allergy & Asthma Network (AAN). Limiting the number of people in the room or location where the nebulizer is used is also recommended by the Asthma & Allergy Foundation of America (AAFA). Nebulizers should be used and cleaned according to the manufacturer's instructions.

If nebulizer use in a healthcare setting is necessary for patients who have either symptoms or a diagnosis of COVID-19, use CDC's recommended precautions when performing aerosol-generating procedures (AGPs).

Patients with Liver Disease

Should people with COVID-19 and increased alanine aminotransferase (ALT) or aspartate aminotransferase (AST) be tested for viral hepatitis?

Yes, for your patients with COVID-19 who have risk factors for viral hepatitis and elevated hepatic enzymes, consider testing them for hepatitis A, B, and C, virus infections. However, ALT or AST may also be associated with COVID-19 alone and indicate greater severity of illness. For more information, review CDC's Interim Clinical Guidance for Management of Patients with Confirmed Coronavirus Disease (COVID-19)

During the COVID-19 pandemic, should high-risk populations continue to be vaccinated for hepatitis A in response to the ongoing hepatitis A outbreaks?

Yes. People who are unvaccinated and at higher risk for hepatitis A virus (HAV) infection during the widespread outbreaks of hepatitis A across the United States should receive the hepatitis A vaccine when possible. This includes:

- people who use drugs (injection or non-injection)
- people experiencing unstable housing or homelessness
- men who have sex with men (MSM)
- people who are or were recently incarcerated
- people with chronic liver disease (including cirrhosis, hepatitis B or C) and living or working in areas where the hepatitis A outbreaks are ongoing

Vaccination in group settings such as jails, other correctional facilities, and homeless shelters should continue if already planned and organized in a way that would follow infection control practices and where relevant social distancing standards can be maintained. When vaccinating people in non-group settings, ensure that general practices for the safe delivery of vaccination services are followed. Whenever possible, vaccination efforts in non-group settings should continue for people at highest risk of acquiring HAV infection or developing serious complications from HAV infection, if staying at least 6 feet away from others can be maintained.

Note: For people receiving COVID-19 vaccination, a minimum interval of 14 days is recommended before or after receiving COVID-19 vaccination and any other vaccination. However, mRNA COVID-19 and other vaccines may be administered within a shorter period in situations where the benefits of vaccination are deemed to outweigh the potential unknown risks of vaccine coadministration, such as hepatitis A vaccination during an outbreak.

Should routinely recommended hepatitis A and B vaccines continue to be administered to children?

Routine hepatitis A and B vaccination of children should continue to the extent possible, according to the CDC immunization schedules. For more information on vaccination during the COVID-19 pandemic, see the Immunizations and Well-child Care section on the Information for Pediatric Healthcare Providers page.

Should hepatitis B vaccination of HBV-exposed infants continue during the COVID-19 pandemic?

Yes. Hepatitis B vaccination of all infants, especially those exposed to hepatitis B virus, should occur according to the Advisory Committee on Immunization Practices (ACIP) recommendations.

Interim guidance to prevent mother-to-child transmission of hepatitis B virus:

Labor and Delivery Care

- Identify the hepatitis B surface antigen (HBsAg) status of all women presenting for delivery.
- If a woman's HBsAg status is positive, hepatitis B immune globulin (HBIG) and single antigen hepatitis B vaccine should be administered to her infant within 12 hours of birth.
- If a woman's HBsAg status is unknown, single antigen hepatitis B vaccine should be administered to her infant within 12 hours of birth. Administration of HBIG should be determined per ACIP recommendations. Infants weighing <2,000 grams should receive HBIG if the mother's HBsAg status cannot be determined within 12 hours of birth.

Provide the birth dose of hepatitis B vaccine to all other newborns within 24 hours of birth to prevent hepatitis B virus transmission from household or other close contacts.

Should management of infants born to HBV-infected women continue during the COVID-19 pandemic?

Yes. Management should continue to prevent mother-to-child transmission of hepatitis B.

Interim guidance to prevent mother-to-child transmission of hepatitis B virus:

Pediatric Care of HBV-exposed Infants

- Make every effort to ensure HBV-exposed infants complete the hepatitis B vaccine series following the ACIP recommendations. Providers using single-component vaccine who are experiencing immunization service disruption should administer hepatitis B vaccine as close to the recommended intervals as possible, including series completion at 6 months, and follow ACIP recommendations for post-vaccination serologic testing.
- If post-vaccination serologic testing is delayed beyond 6 months after the hepatitis B series is completed, consider administering a "booster" dose of single antigen hepatitis B vaccine and then ordering post-vaccination serologic testing (HBsAg & antibody to HBsAg [anti-HBs]) 1-2 months after the "booster" dose.

Should hepatitis A and B vaccines continue to be administered to adults at risk for hepatitis A or B?

Yes. Continue to administer these vaccines if an in-person visit must be scheduled or occurs for some other purpose and the clinical preventive service can be delivered during that visit with no additional risk; or an individual patient and their clinician believe that there is a compelling need to receive the service based on an assessment that the potential benefit outweighs the risk of exposure to SARS-CoV-2, the virus that causes COVID-19. The vaccination status of all patients should be assessed at every clinical encounter to reduce missed opportunities for vaccination. See the Interim Guidance for Routine and Influenza Immunization Services During the COVID-19 Pandemic for more information.

Patients with Hypertension

Are patients with hypertension at increased risk for severe illness from COVID-19?

Many patients with severe illness from COVID-19 have underlying hypertension.[1] Hypertension is common in the United States. Hypertension is more frequent with advancing age and among non-Hispanic blacks and people with other underlying medical conditions such as obesity and diabetes. At this time, people whose only underlying medical condition is hypertension might be at increased risk for severe illness from COVID-19.[2]

1. Garg S, Kim L, Whitaker M, et al. Hospitalization Rates and Characteristics of Patients Hospitalized with Laboratory-Confirmed Coronavirus Disease 2019 — COVID-NET, 14 States, March 1–30, 2020. MMWR Morb Mortal Wkly Rep 2020;69:458–464. DOI: http://dx.doi.org/10.15585/mmwr.mm6915e3 .
2. Killerby ME, Link-Gelles R, Haight SC, et al. Characteristics Associated with Hospitalization Among Patients with COVID-19 — Metropolitan Atlanta, Georgia, March–April 2020. MMWR Morb Mortal Wkly Rep 2020;69:790–794. DOI: http://dx.doi.org/10.15585/mmwr.mm6925e1 .

Should angiotensin-converting enzyme inhibitors (ACE-Is) or angiotensin receptor blockers (ARBs) be stopped in patients with COVID-19?

No. The American Heart Association, the Heart Failure Society of America, and the American College of Cardiology recommend continuing ACE-I or ARB medications for all patients already prescribed those medications for indications such as heart failure, hypertension, or ischemic heart disease. At this time, available evidence demonstrates no indication of COVID-specific harm from these agents. Several randomized controlled trials are under way to better answer this important clinical question. Cardiovascular disease patients diagnosed with COVID-19 should be fully evaluated by a healthcare professional before adding or removing any treatments, and any changes to their treatment should be based on the latest scientific evidence. Patients who rely on ACE-Is or ARBs to treat chronic conditions and have additional questions should speak to their healthcare provider for individualized management

Waste Management

What do waste management companies need to know about wastewater and sewage coming from a healthcare facility or community setting with either a known COVID-19 patient or person under investigation (PUI)?

Waste generated in the care of PUIs or patients with confirmed COVID-19 does not present additional considerations for wastewater disinfection in the United States. Coronaviruses are susceptible to the same disinfection conditions in community and healthcare settings as other viruses, so current disinfection conditions in wastewater treatment facilities are expected to be sufficient. This includes conditions for practices such as oxidation with hypochlorite (i.e., chlorine bleach) and peracetic acid, as well as inactivation using UV irradiation.

Do wastewater and sewage workers need any additional protection when handling untreated waste from healthcare or community setting with either a known COVID-19 patient or PUI?

Wastewater workers should use standard practices including basic hygiene precautions and wear the recommended PPE as prescribed for their current work tasks when handling untreated waste. There is no evidence to suggest that employees of wastewater plants need any additional protections in relation to COVID-19.

Should medical waste or general waste from healthcare facilities treating PUIs and patients with confirmed COVID-19 be handled any differently or need any additional disinfection?

Medical waste (trash) coming from healthcare facilities treating COVID-2019 patients is no different than waste coming from facilities without COVID-19 patients. CDC's guidance states that management of laundry, food service utensils, and medical waste should be performed in accordance with routine procedures. There is no evidence to suggest that facility waste needs any additional disinfection.

More guidance about environmental infection control is available in section 7 of CDC's Interim Infection Prevention and Control Recommendations for Patients with Confirmed COVID-19 or Persons Under Investigation for COVID-19 in Healthcare Settings.

Cleaning and Disinfection of Environmental Surfaces

How are environmental surfaces involved in the transmission of infections?

Surfaces can become contaminated with microorganisms and potential pathogens. However, many of these surfaces are generally not directly associated with transmission of infections to either healthcare workers or patients. The transfer of pathogens from environmental surfaces is largely due to hand contact with the surface (e.g., frequently touched surfaces). Touch contamination may lead to cross contamination of patient care items, other environmental surfaces, self-contamination, and possible infection after touching one's face or mouth.

How does one interrupt transmission of pathogens from environmental surfaces?

Both hand hygiene and the cleaning and disinfection of environmental surfaces are fundamental practices to reduce the incidence of healthcare-associated infections.

Where can I find detailed information on cleaning and disinfection?

For more information see our guidelines for healthcare facilities that cover cleaning, disinfection, sterilization, and hand hygiene:

- Guideline for Environmental Infection Control, 2003
- Guideline for Disinfection and Sterilization, 2008
- Guideline for Hand Hygiene in Healthcare Settings

Why is cleaning of surfaces important?

Cleaning is an important first step for any process that involves disinfection or sterilization because the presence of organic and inorganic soils may cause disinfection or sterilization to fail. Cleaning is the process of removing both organic and inorganic matter from surfaces with the use of detergents (e.g., anionic, cationic, non-ionic, and zwitter ionic) or enzymatic cleaners. Cleaning may involve manual, automated, or a combination of manual and automated methods.

- Depending on the cleaning method and the surface being cleaned, a 10^2-10^6 log reduction of microorganisms may be possible.
- Proper cleaning may be enough to make an environmental surface safe to handle and to prevent transmission of pathogens.
- Currently, no cleaning guidelines apply to all devices or surfaces, nor is there a single accepted standard method to measure the effectiveness of cleaning (examples include adenosine triphosphate (ATP), fluorescent markers, blood, protein, carbohydrate, RODAC™ plates, or touch plates).
- See the CDC Environmental Toolkit for additional information on developing a cleaning evaluation program.

What detergents are used for routine environmental cleaning in healthcare settings?

Many cleaners used in healthcare settings for routine cleaning of the general environment are cationic detergents, with many of these being quaternary ammonium compounds which are also low- to intermediate-level disinfectants. For EPA registered detergent disinfectants, refer to the label to determine if the product is a one-step or multiple-step product, and follow the product label instructions for use.

- One-step disinfection product and process combine cleaning and disinfection of a noncritical environmental surface or item into a single step. Depending on the instructions for product use, some do not have to be rinsed off.
- Multi-step products and processes require the user to clean the surface before it is disinfected. In some cases, the disinfectant must be rinsed from the surface following the wet contact time listed on the product label.

Are there ways to audit the cleaning process?

- Cleaning guidelines vary based on devices and surfaces being cleaned. Multiple methods are used to measure the residual bioburden or effectiveness of cleaning (e.g., ATP, fluorescent markers, blood, protein, carbohydrate, and RODAC™ plates, or touch plates)
- See the CDC Environmental Toolkit for additional information on developing a cleaning evaluation program.

What are no-touch devices or NTDs?

- No-touch devices (NTDs) are sometimes used in healthcare settings as an adjunct to terminal room cleaning (i.e., after patient discharge or transfer). They are not currently able to replace existing cleaning and disinfection processes. These devices use a variety of different disinfection technologies such as ultraviolet germicidal irradiation (UVGI) and chemical agents. They are called no-touch devices because they use a pre-determined program that allows the device to run unmanned in an unoccupied, pre-cleaned room (e.g., patient room) for a defined period.
- Chemical disinfectants used for NTDs vary according to the specific device. Examples include vapor phase hydrogen peroxide, dry mist hydrogen peroxide, combined hydrogen peroxide + antimicrobial silver, dry fog hydrogen peroxide + peroxyacetic acid, ionized hydrogen peroxide, and chlorine dioxide gas.
- The effectiveness of NTDs is still under investigation; most data are laboratory demonstrations of pathogen inactivation. Thus far, only one study of NTD use has shown a decrease in patient infection rates, the Duke BETR Disinfection Study (Andersen DJ, et al. Lancet Infect Dis 2018; 18(8): 845–853).

What information is available about the use of electrostatic sprayers or foggers for the disinfection of rooms and surfaces in healthcare environments?

These devices are typically used as an adjunct technology to terminal room cleaning. This means that the patient has been transferred or discharged and is no longer occupying the space. So that EVS may begin cleaning and disinfecting the room in preparation for a new patient (e.g., terminal cleaning).

For information about the application of EPA List N disinfectants with electrostatic sprayers and foggers, refer to the EPA's Frequent Questions about Disinfectants and Coronavirus (COVID-19). If a product does not have an electrostatic spraying or fogging use on a label, the EPA has not evaluated the safety and efficacy of using that product with an electrostatic sprayer or a fogger.

- Foggers can be hand-held or no-touch devices (NTDs).
- When using an electrostatic sprayer or a fogger to apply disinfectants, always follow manufacturer directions for operation and maintenance of the sprayer or fogger and the disinfectant label's use directions (e.g., application rate, distance to surface while applying, and contact time).
- Follow the disinfectant's label recommendations for appropriate personal protective equipment (PPE) for the operator, and adhere to any recommended re-entry times for bystanders, other staff members, or patients.

Is ultraviolet germicidal irradiation (UVGI) recommended for disinfection of air and surfaces in the healthcare setting?

- UVGI can be used as a supplemental treatment for disinfection of air in HVAC systems or above people in occupied spaces (upper-room or upper-air systems) and for supplemental disinfection of surfaces following routine cleaning and disinfection. UVGI, also known as Germicidal Ultraviolet (GUV), uses ultraviolet energy in the UV-C band (wavelengths of 220-280 nanometers), which is effective against SARS-CoV-2 under laboratory conditions. Efficacy of the applied dose (a function of irradiance and time) is highly dependent on many factors, such as the concentration of the virus, inoculum size (in experimental studies), the virus medium, contours and type of material being treated, as well as what the virus is suspended in (e.g., culture media, respiratory droplets, other proteinaceous material). These complex variables may explain the range of results presented in the published literature.
- For more information on these technologies see the CDC Business FAQs under the heading "Cleaning and Disinfection in the Workplace"
- UV-C can be applied on healthcare environmental surfaces using robots as NTDs following terminal cleaning and is still considered investigational; one study mentioned above the Duke BETR Disinfection Study (Andersen DJ, et al. Lancet Infect Dis 2018; 18(8): 845–853) has shown a decrease in Healthcare-associated infections.

Additional Resources

- Clinical Care Guidance
- Therapeutic Options for Patient with COVID-19
- Guidance for Pediatric Healthcare Providers
- Disposition of Hospitalized Patients with COVID-19
- Inpatient Obstetric Healthcare Guidance
- Information for Healthcare Providers: COVID-19 and Pregnant People
- Ending Isolation for Immunocompromised Patients
- Risk Assessment and Public Health Management of Healthcare Personnel with Potential Exposure in a Healthcare Setting to Patients with Coronavirus Disease (COVID-19)
- Infection Prevention and Control Recommendations for Patients with Suspected or Confirmed Coronavirus Disease 2019 (COVID-19) in Healthcare Settings
- Strategies for Optimizing the Supply of N95 Respirators: Conventional Capacity Strategies
- Testing Overview for Coronavirus Disease 2019 (COVID-19)
- Healthcare Infection Prevention and Control FAQs
- National Institutes of Health: Coronavirus Disease 2019 (COVID-19) Treatment Guidelines

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