Testing for SARS-CoV-2
(Lab Diagnosis of COVID-19)

Updated February 11, 2021

What's New/Updated: Added recommendations regarding broader scope of testing of inpatients at time of admission, incorporated updated recommendations from FDA and CDC and added links to related System guides.

Diagnostic Testing for SARS-CoV-2 in Persons with Symptoms and Suspected of COVID-19

Authorized assays for viral testing include those that detect SARS-CoV-2 nucleic acid or antigen. Viral (nucleic acid or antigen) tests check samples from the respiratory system (such as nasal or oral swabs or saliva) to determine whether an infection with SARS-CoV-2, the virus that causes COVID-19, is present. Viral tests are recommended to diagnose acute infection of both symptomatic and asymptomatic individuals, to guide contact tracing, treatment options, and isolation requirements. Some tests are point-of-care tests, meaning results may be available at the testing site in less than an hour. Other tests must be sent to a laboratory, a process that may take at least 1-3 days.

- Molecular, RNA nucleic acid amplification test (NAAT) is the gold standard and should be used for identification and confirmation of infection in symptomatic persons suspected of COVID-19.

For initial diagnostic testing for SARS-CoV-2, the virus that causes COVID-19 the FDA has identified the following as appropriate types of specimens. Important: follow the instructions for use for the specific test method being used that has an approved FDA EUA.

- Nasopharyngeal (NP) specimen collected by a healthcare professional (HCP)
- Oropharyngeal (OP) specimen collected by an HCP using a swab;
- Mid-turbinate specimen collected by an HCP or by onsite self-collection using a specialized, flocked tapered swab; or
- Anterior nares specimen collected by an HCP or by onsite self-collection using a flocked swab, round foam swab, or spun fiber swab. For anterior nares specimen collection, a swab with a full-sized tip (OP-type swab) is generally preferred over a swab with a mini-tip (NP-type swab).

Other types of specimens, e.g. saliva, based on FDA EUA instructions

Figure 1. Illustration of locations for collecting specimens for testing
Personnel should adhere to standard procedures associated with other respiratory pathogens, such as seasonal influenza and other human coronaviruses, when they transport specimens within a facility. Refer to CDC recommendations for more details on biosafety practices for specimens.

Screening of Asymptomatic Populations at Higher Risk of Having or Transmitting SARS-CoV-2:
Recent experience with outbreaks in nursing homes and those in need of urgent scheduled or unscheduled care, e.g. pregnant women, emergent surgery, has identified some frequently do not report typical symptoms such as fever, cough and shortness of breath; some may not report any symptoms. Unrecognized asymptomatic and pre-symptomatic infections likely contribute to transmission in these and other healthcare settings. Therefore, screening of those not listed in the priorities listed above are increasingly important and providers are requesting testing be made available.

See Table 1 for which populations should be tested, timing, and specific method of detection should be used. The assumptions supporting recommendations in Table 1 are:

- Rapid test methods provide shorter turn around time but often are less sensitive
- Rapid antigen test method is an acceptable method to test for infection for symptomatic patients. In some settings, e.g. skilled nursing facilities, rapid, point-of-care tests are also used for serial surveillance testing of those without symptoms.
- Adequate lab supplies and test kit capacity are available to meet priorities for Tier 1 or 2.
- As part of resuming operations, test all patients scheduled for a procedure that requires an overnight stay to allow for molecular test resulted prior to surgery performed within 2 midnights (two calendar days) prior to the procedure.

NOTE: Asymptomatic community members that wish to be tested should be referred to their primary care provider’s office, or to an available community testing provider. They should not be sent to the emergency room for testing. In addition to patient populations outlined in Table 1 the following are specific updates related to inpatients;

Test patients undergoing elective procedures/ surgeries expected to require overnight stay within 3 calendar days prior to date of the surgical procedure.

- If test capacity permits, expand testing to include: all hospitalized patients at the time of admission.
  - Molecular testing is recommended, but antigen testing is allowed if molecular testing resources are constrained.

Table 1. Recommended Testing of Asymptomatic Patient Populations who are at higher risk of having and/or transmitting COVID-19 disease who present to the hospital for non-COVID-19 related services; Timing & Method.
Repeat Testing of Patients Who’ve Recovered from COVID-19

There is ongoing investigation of the correlation between detection of SARS-CoV-2 RNA and period of transmissibility (infectivity) for a person with COVID-19; evidence to date indicates transmissibility...
is significantly reduced after acute infection. Therefore, repeat molecular testing after either 10 days following onset of symptoms or from date of initial detection of viral RNA is **NOT** recommended due to the likelihood that such testing only detects remnant RNA and it is unlikely that the person can transmit infection to others. For patients meeting either of the criteria below, repeat testing is **NOT** recommended.

- **Symptom-based Criteria for Patient with initial symptoms of acute SARS-CoV-2**
  - At least 1 day (24 hours) has passed since recovery defined as resolution of fever without the use of fever-reducing medications and improvement in respiratory symptoms (e.g., cough, shortness of breath); **and**,
  - At least 10 days have passed since symptoms first appeared

- **Time-based strategy for Patient with no symptoms of acute SARS-CoV-2 but tested positive**
  - 10 days have passed since the date of their first positive COVID-19 diagnostic test, assuming they have not subsequently developed symptoms since their positive test. Note, because symptoms cannot be used to gauge where these individuals are in the course of their illness, it is possible that the duration of viral shedding could be longer or shorter than 10 days after their first positive test.

Patients meeting these criteria do **NOT** need another molecular test prior to any subsequent outpatient procedure or inpatient surgery requiring an overnight inpatient admission. The patient should be treated as having recovered from the COVID viral infection.

**Antigen Testing**

Antigen tests are designed to detect proteins from the virus that causes COVID-19 in respiratory specimens, for example nasal swabs. Antigen tests are very specific for the virus but are not as sensitive as molecular tests. This means that a positive result is accurate, but a negative result does not rule out infection.

- Sensitivity = 80%, when compared to an EUA molecular device. Specificity= 100%
- Specimen can be either a nasopharyngeal (NP) and nasal (NS) swab tested either directly or after the swabs have been added to either Copan UTM or the CDC’s formulation of viral transport media (VTM)
- Antigen is generally detectable in upper respiratory specimens during the acute phase of infection.

**Positive antigen result** - indicates that antigens from SARS-CoV-2 were detected, and the person tested is infected but clinical correlation with patient history and other diagnostic information is necessary to determine infection status. If therapeutic or subsequent management actions are to be taken based on the positive result, providers should consider confirming the test result with a molecular test.

**Negative antigen result**- does not rule out COVID-19 and should not be used as the sole basis for treatment or patient management decisions, including infection control decisions. Negative results should be considered in the context of a patient’s recent exposures, history and the presence of clinical signs and symptoms consistent with COVID-19.

**Examples of populations to screen using antigen tests:**
- Testing of residents, colleagues and clinicians in skilled nursing facilities under requirements from state-specific executive orders.
- Point of care / timely screening of persons scheduled for medically necessary outpatient procedures that require use of aerosol generating procedures (AGPs)
- Prior to initiation of immunosuppressive therapy
○ Rationale: Use of antigen test for screening conserves limited quantity of molecular test methods

● Community-focused testing

**Serological Antibody Test for SARS-CoV-2:**
Serological tests such as serum levels of IgM and IgG antibody against SARS-CoV-2 are important for understanding the epidemiology of emerging human coronaviruses (hCoVs), including the burden and role of asymptomatic infections to be clinically useful as the supplemental tests to the nucleic acid test.

The following is an important perspective and caution on interpretation and use of serologic testing from the IDSA.

As serological testing for SARS-CoV-2 advances, there are multiple issues that need to be addressed, from test quality to interpretation. Unlike molecular tests for COVID-19 (e.g., PCR), antibody tests may be better suited for public health surveillance and vaccine development than for diagnosis. **The current antibody testing landscape is varied and clinically unverified, and these tests should not be used as the sole test for diagnostic decisions.** Further, until more evidence about protective immunity is available,

- serology results should not be used to make staffing decisions or
- decisions regarding the need for personal protective equipment.

**Guiding Principles for Providers when Considering Serologic Testing for SARS-CoV-2:**

✓ Person being tested understands their willingness to be tested is voluntary
✓ Providers ordering test are to provide consistent education to persons being tested on interpreting results – patient (test subject) education is being developed and will be on COVID-19 web
✓ Order testing that uses a platform (analyzer) that has demonstrated high specificity, ideally > 99%
✓ Goal for testing should be to improve colleague/patient health and safety and/or have operational implications
✓ Begin with testing groups/populations with medium or high prevalence of previous infection to minimize false positives
✓ Testing should be done that supports ongoing research, and understanding of value of serologic testing
✓ Testing can support identifying those who might donate convalescent plasma with understanding that agencies that collect plasma will repeat testing of potential donors with their method(s)

**Key Populations to Consider for Serologic Testing:**
- Patients and healthcare personnel (HCP), e.g. colleagues and clinicians who have recovered from confirmed COVID-19 infection.
- HCP without any symptoms of COVID-19 but have or are caring for PUIs or those with COVID-19 in units or areas with high volume of patients, e.g. cohort unit, Fever and Upper Respiratory Infection (FURI) clinics, and/or Emergency Department.
- Residents and colleagues in congregate living settings, especially skilled nursing and assisted living facilities, that have experienced outbreaks of COVID-19.

The clinical application of serologic testing is still evolving, and the System’s Clinical Lab leadership network is actively working on getting more experience with serologic diagnostics at a select number of RHMs. Serologic assays are more retrospective and timing of development of antibody typically is after initial detection of viral RNA using NAAT. (See Figure 1) There remain uncertainties like cross-reactivity of IgG antibodies with other endemic hCoVs, relationship of antibody to RT-PCR detection of viral RNA, sensitivity and specificity of serology in populations that may have high or low prevalence of infection, etc.

Figure 2. Sequence of Detection of SARS-CoV-2 using Laboratory Diagnostics

References:

1. CDC. Overview of Testing for SARS-CoV-2 Available at: https://www.cdc.gov/coronavirus/2019-ncov/hcp/testingoverview.html#signs_symptoms


4. CDC. Interim Guidance for Antigen Testing for SARS-CoV-2 | CDC
