COVID-19 Testing
Guidance for Healthcare Providers Ordering Testing

The medical/technical team of the Unified Health Command (UHC), which is made up of Billings Clinic, St. Vincent Healthcare, RiverStone Health and Yellowstone County Disaster and Emergency Services, offers this guidance on COVID-19 testing.

When to Consider Testing:

At this time, the Unified Health Command is not recommending broad population testing with either PCR or serology. Consider the information below when making a decision about ordering a test, keeping in mind clinical symptoms and history, exposure history, and the prevalence of disease in the population.

**PCR testing (nasal swab):**

- For symptomatic patients with acute illness suggestive of COVID-19, a PCR is the test of choice.
- Asymptomatic patients where the presence of SARS-CoV-2 would change treatment (i.e., pre-operative patients).

**Serology testing (venipuncture):**

Patients who had characteristic or concerning signs and symptoms of COVID-19 less than a 2-week timeframe, were unable to get tested and were told to “assume” they had disease.

- Follow up for patients/high risk individuals who clinically appeared to have had COVID-19 but were swab negative. Negative serologies help confirm/reassure that the swab was not a false negative.
- Individuals with close/household contact with known COVID-19 patients.
- Patients wishing to participate in the convalescent serum donor trial.

**Risks and Benefits of Serology Testing**

1. Benefits include the ability to identify someone who may have already been infected and recovered from a COVID-19 infection.
2. Risks include lack of accuracy as well as unknown clinical utility:
   a) Data about sensitivity and specificity is limited. Therefore, accurate interpretation of tests is challenging, particularly when the population prevalence may be low *(see chart below).*
   b) Concerns about clinical utility. It is unknown what the presence of antibodies means. If a patient has positive IgM, it is unknown if they remain infectious. If a patient has positive IgG, it is unknown to what degree, if any, they are immune.

May 14, 2020
Sample message to patients:

Because COVID-19 is a new disease, we do not have an accurate picture of immunity to this particular virus. After some viral infections, individuals typically have lifelong immunity, for instance measles is such a disease. After other infections, individuals may have much shorter immunity periods. **Regardless of accuracy, the result of the antibody test does not change what you need to do to remain safe and healthy.** Even if a positive antibody result is accurate, it does not mean that you can or should resume normal activity. **Having antibodies to COVID-19 does not guarantee immunity.**

### Sensitivity and Specificity

<table>
<thead>
<tr>
<th>Sensitivity and specificity of 90%</th>
<th>NPV</th>
<th>Probability that disease is present when the test is negative</th>
<th>0.6%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PPV</td>
<td>Probability that disease is not present when the test is positive</td>
<td>67.9%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sensitivity and specificity of 95%</th>
<th>NPV</th>
<th>Probability that disease is present when the test is negative</th>
<th>0.3%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PPV</td>
<td>Probability that disease is not present when the test is positive</td>
<td>50.0%</td>
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<table>
<thead>
<tr>
<th>Sensitivity and specificity of 99%</th>
<th>NPV</th>
<th>Probability that disease is present when the test is negative</th>
<th>0.1%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PPV</td>
<td>Probability that disease is not present when the test is positive</td>
<td>16.1%</td>
</tr>
</tbody>
</table>

*NPV & PPV – negative & positive predictive values. Source: Evaluate Vantage calculations.*

### Antibody Testing:
Given the availability of serologic testing for SAR-CoV-2 antibodies, there is increasing interest from medical staff, and the general public, in the use of this test for the identification and management of patients with COVID-19.

**Background:** COVID-19 is typically diagnosed by detecting the presence of SARS-CoV-2 RNA on clinical specimens. Like the immunological response to other viral infections, including SARS-CoV, antibodies to SARS-CoV-2 have been found in patients with COVID-19. Additionally, like most viral infections, there is usually a significant amount of time between the onset of symptoms and the detection of antibodies. Multiple laboratories, including Mayo Clinic, and commercial testing...
industries have developed antibody-based tests for COVID-19 under the Food and Drug Administration Emergency Use Authorization for diagnostic tests.

**Assessment:** Many of the commercially available SARS-CoV-2 antibody tests have reported reliability issues because they are poorly validated. Because of the nature of the immune response to viral infections and variability in the development of antibody test of SARS-CoV-2, there are multiple unresolved issues surrounding general clinical use serological testing including:

- There are no universal standards for reporting and detection limits are variable.
- The antibody response of COVID-19 patients is still largely unknown. A recently published study characterized the profile of IgM and IgG response of a small group of Chinese patients with COVID-19. The researchers noted that IgG antibodies are identified before IgM antibodies in patients with COVID-19. Additionally, the median time of seroconversion is 11 days for IgG and 14 days for IgM from the disease onset. Therefore, there is likelihood of false-negative results, especially if blood samples are collected early in the disease process.
- Cross-reactivity with seasonal coronaviruses have been reported in some of the tests, thus increase the likelihood of false-positive results.
- The Infectious Diseases Society of America recently issued a statement about the use of SARS-CoV-2 serology tests, stating that they “should not be used as the sole test for diagnostic decisions” and the results “should not be used to make staffing decisions or decisions regarding the need for personal protective equipment”.

Expert consensus is that the best use of serologic testing of SARS-CoV-2 antibody include:

- Epidemiologic study of COVID-19 seroprevalence within a population.
- Identification of possible convalescent plasma donors.
- Determine the immunologic response in patients after vaccination against SARS-CoV-2.

It is NOT recommended to use current SARS-CoV-2 IgG antibody tests to identify patients with acute COVID-19. Additionally, false-positive results may occur in a small percentage of individuals.

**Recommendations:** Serologic testing for SARS-CoV-2 antibody should not be used

- To identify symptomatic patients with COVID-19
- As part of a pre-procedural screening process
- As a “test of cure” for COVID-19
- To test patients for past COVID-19 or immunity to SARS-CoV-2

Because the use and clinical significance of the serological tests have not been established and the potential confusion that the interpretation of the test results may generate, the use of serologic tests for SARS-CoV-2 antibodies is recommended in consultation with an infectious disease specialist.