

New insights:

Understanding the impact of COVID-19 on the patient journey to wellness

Recent studies show that health complications post-COVID-19 illness may require additional ongoing monitoring and care for patients as they struggle to return to their baseline health pre-infection.¹ While the correlation between a patient’s overall health and/or age has previously been identified as impacting the severity and longevity of a COVID-19 illness,² prolonged illness is well described in adults with severe COVID-19 requiring hospitalization, especially among older adults.^{1,2} Recently, the number of SARS-CoV-2 infections in persons first evaluated as outpatients have increased, including cases among younger adults¹—requiring HCPs to proactively plan how to manage care for all patients.

As new insights and scientific research on COVID-19 infections continue to unfold, this evidence can help improve our understanding of the illness itself, and what may make patients more susceptible to a poorer outcome from COVID-19 infection. This information can inform clinical decision making. **Below is a curated summary focused on insights at 3 key points in the patient journey: baseline/routine care, suspected respiratory or COVID-19 illness, and post-COVID-19 illness care and monitoring.**

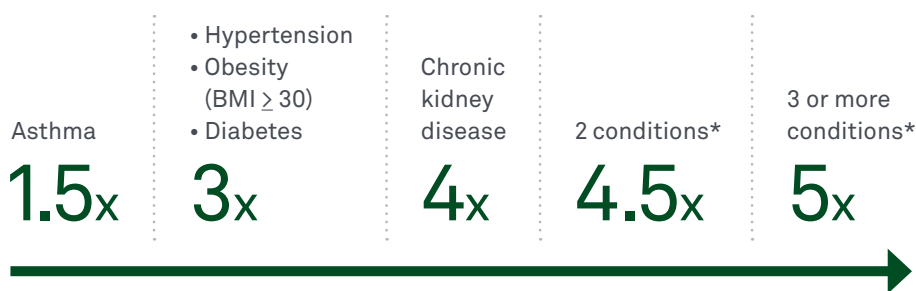
Baseline/routine care

According to the Centers for Disease Control and Prevention (CDC), a correlation exists between the severity of a COVID-19 illness and a person’s overall health. These risk factors could be exacerbated by deferred routine care and testing due to the pandemic:

- For 6% of COVID-19 related deaths, COVID-19 was the only cause mentioned²
- Patients who died due to COVID-19 had an average of 2.6 additional conditions or factors²

Understanding a person’s baseline overall health—from common vitamin deficiencies to underlying medical conditions—can help HCPs uncover factors that may place their patient at higher risk to a severe reaction to COVID-19.³ Researchers and physicians are focusing on how a person returns to baseline health for help to gain a better understanding of the full spectrum of COVID-19, and tailor public health messaging, interventions, and policy appropriately.¹

Risk for hospitalization if you have any of these conditions and get COVID-19 compared to people without the condition(s)³



Researchers have concluded that certain underlying medical conditions are associated with a higher risk of hospitalization with COVID-19.³ Data confirm that racial and ethnic minority groups with the referenced conditions are at even higher risk for severe COVID-19 illness.³

Emerging insights: vitamin D deficiency and COVID-19 comorbidity

One area that is coming into focus is vitamin D. 50% of the US population is vitamin D deficient,⁴ and patients with vitamin D deficiencies hospitalized with COVID-19 experienced worse outcomes than those with normal levels of the vitamin.⁵ Additional research is needed to determine if vitamin D supplementation could reduce COVID-19 incidence.^{4,5}

1.77x

greater risk of testing positive for SARS-CoV-2 RNA for patients with likely deficient vitamin D levels⁵

* Conditions include asthma, obesity, diabetes, chronic kidney disease, severe obesity, coronary artery disease, history of stroke, and COPD.

Suspected seasonal respiratory and SARS-CoV-2 infections

Influenza and COVID-19

The Centers for Disease Control and Prevention (CDC) believes both the seasonal influenza (flu) and COVID-19 will be circulating across the country this fall and winter—reinforcing the need for testing to confirm a differential diagnosis and treatment plan.⁶

The SARS-CoV-2 pandemic continues to spread exponentially across the country, with nearly 41K new cases per day as of September 28, with over 7 million confirmed cases in the US.⁷

Last flu season (2019-2020), the CDC estimated that the flu was associated with at least 39 million illnesses, 18 million medical visits, and 410,000 hospitalizations.⁸

Given the high prevalence of both respiratory illnesses, there is a heightened concern that the convergence of the COVID-19 pandemic with the annual flu season will inundate and overwhelm health systems and hospitals with patients suffering from respiratory viruses, returning to a period where there is a shortage of beds, ventilators, and staffing.⁹

Given both the flu and COVID-19 present with similar symptoms—fever, cough, shortness of breath, fatigue, sore throat, runny or stuffy nose, muscle pain and aches, headaches, and possible nausea and diarrhea¹⁰—laboratory testing for cases where COVID-19 and flu symptoms overlap is essential to identify the proper infection and more effectively guide treatment decisions for patient care.

39-56 million

flu illnesses estimated between October 1, 2019–April 4, 2020⁸

140,000-370,000

new COVID-19 cases predicted during the week ending October 17, 2020¹¹

Emerging insights: tuberculosis and COVID-19 comorbidity

According to the World Health Organization (WHO), health services need to be actively engaged for an effective and rapid response to COVID-19 while ensuring that tuberculosis (TB) and other essential health services are maintained.¹²

Tuberculosis testing may be able to provide critical insight into the elevated risks associated with COVID-19

- People ill with COVID-19 and TB show similar symptoms such as cough, fever, and difficulty breathing¹²
- While experience with COVID-19 infection in patients with TB remains limited, it is anticipated that people ill with both TB and COVID-19 may have poorer treatment outcomes, especially if TB treatment is interrupted¹²

Post-COVID-19 illness

Studies and observational findings are demonstrating that COVID-19 survivors face several potentially significant health challenges post-infection—reporting dyspnea, unusual fatigue, heart palpitations, shortness of breath, joint pain, “brain fog,” and mood swings.^{13,14}

Observed evidence suggests that COVID-19 may lead to new, secondary health conditions throughout the body, including issues such as respiratory distress, cardiovascular events, coagulopathy, and neurological disorders.^{13,14}

Respiratory distress

People who are ill with tuberculosis and other respiratory infectious diseases, such as SARS-CoV-2, influenza A/B, and RSV, often present with overlapping symptoms. These conditions can slow recovery and lead to further complications. Patients who present with respiratory distress during the recovery period may require additional monitoring and follow-up care.

35% of patients had not returned to their baseline state of health 2-3 weeks post-COVID-19 infection¹

1 in 5 

young adults with no chronic medical conditions had not returned to their baseline state of health 2-3 weeks after their infection¹

Coagulopathy

There is a growing body of evidence to support a theory that COVID-19 can infect blood vessels, which could explain the high prevalence of blood clots, strokes, heart attacks, and organ failures.¹⁵ In fact, the condition commonly called “COVID toes” or “COVID fingers” is regularly considered a potential sign of an active COVID-19 infection.

Patients with severe infection may meet the requirements for overt disseminated intravascular coagulation (DIC) criteria of the International Society on Thrombosis and Haemostasis. The coagulation parameters in COVID-19 DIC are reflected in the table below.¹⁶

| Parameter | COVID-19 DIC |
|-----------------------------|---------------------|
| Platelet count | Normal or reduced |
| PT | Normal or prolonged |
| aPTT | Normal or prolonged |
| Thrombin time | Normal or prolonged |
| Fibrinogen | Elevated |
| Factor VIII | Elevated |
| Fibrin degradation products | Elevated |
| D-dimer | Elevated |

Conclusion

Our knowledge continues to evolve on the impact of COVID-19 on patient health. **Baseline/routine, suspected respiratory or COVID-19 infection, and post-COVID-19 infection testing** can help uncover important insights into a patient’s health before, during, and after a COVID-19 infection, and can help lead to better outcomes.

HCPs may consider a variety of testing approaches based on the needs of individual patients. Below are some of the tests HCPs may find helpful in developing a better understanding of their patients' current health status.

| Test | Baseline/ routine care | Suspected seasonal respiratory or SARS-CoV-2 infection | Post-COVID-19 infection |
|--|---------------------------|---|----------------------------|
| CBC | ✓ | | ✓ |
| Comprehensive Metabolic Panel | ✓ | | ✓ |
| Hemoglobin A1c | ✓ | | ✓ |
| Lipid Panel | ✓ | | ✓ |
| Vitamin D | ✓ | | ✓ |
| SARS-CoV-2 Serology (COVID-19) Antibody (IgG), Immunoassay | ✓ | | ✓ |
| SARS-CoV-2 RNA (COVID-19) and Influenza A and B, Qualitative NAAT | | ✓ | |
| SARS-CoV-2 RNA (COVID-19) and Respiratory Pathogen Panel, Qualitative NAAT | | ✓ | |
| SARS-CoV-2 RNA (COVID-19) and Respiratory Viral Panel, Qualitative NAAT | | ✓ | |
| SARS-CoV-2 RNA (COVID-19), Qualitative NAAT | | ✓ | |
| Influenza A and B and RSV RNA, Qualitative, Real-Time RT-PCR | | ✓ | |
| Influenza A and B RNA, Qualitative Real-Time PCR | | ✓ | |
| Respiratory Viral Panel, PCR | | ✓ | |
| Respiratory Pathogen Panel | | ✓ | |
| D-Dimer | | | ✓ |

HCPs should consider referring patients to specialists for in-depth cardiology, neurology, oncology, drug monitoring, and infectious disease testing based upon a patient’s presentation post-infection.

Cardio-inflammation

Recent studies have highlighted the cardiovascular impact of COVID-19—underscoring the need for monitoring of patients who present with symptoms or have pre-existing conditions that may exacerbate their body’s response to COVID-19.

78% of patients diagnosed with COVID-19 showed evidence of heart damage weeks after recovery¹⁷

Research has demonstrated that patients are more likely to have a myocardial infarction (MI) within 7 days of a viral infection compared to before the infection (<65yo: 2.4x increased risk; >65yo: 7.3x increased risk).¹⁸

Furthermore, COVID-19 may “induce new cardiac pathologies,” including vascular inflammation, myocarditis, and arrhythmia.¹⁹

Neurologic complications

Studies indicate that between 36.4% and 84.5% of COVID-19 patients show neurological symptoms during and after the active infection period.^{20,21}

Patients with neurologic complications from COVID-19 can lack typical autoantibody signatures in serum and CSF (except for NFL), but do show increased levels of CSF proteins, lactate, or white blood cells indicative of autoimmune encephalitis. Additionally, antineuronal autoantibodies in the CSF (IgG) have been identified that often are not included in standard assays, which may be indicative of further neurological complications.²²

Influenza A and B and SARS-CoV-2 panel test information

- This test has not been FDA cleared or approved;
- This test has been authorized by FDA under an EUA for use by authorized laboratories;
- This test has been authorized only for the simultaneous qualitative detection and differentiation of nucleic acid from SARS-CoV-2, influenza A virus, and influenza B virus, and not for any other viruses or pathogens; and
- This test is only authorized for the duration of the declaration that circumstances exist justifying the authorization of emergency use of in vitro diagnostics for detection and/or diagnosis of COVID-19 under Section 564(b)(1) of the Federal Food, Drug, and Cosmetic Act, 21 U.S.C. § 360bbb-3(b)(1), unless the authorization is terminated or revoked sooner.

The antibody tests (sometimes known as the serology tests or IgG tests) are intended for use as an aid in identifying individuals with an adaptive immune response to SARS-CoV-2, indicating recent or prior infection. Results are for the detection of SARS-CoV-2 antibodies. IgG antibodies to SARS-CoV-2 are generally detectable in blood several days after initial infection, although the duration of time antibodies are present post-infection is not well characterized. At this time, it is unknown for how long antibodies persist following infection and if the presence of antibodies confers protective immunity. Individuals may have detectable virus present for several weeks following seroconversion. Negative results do not preclude acute SARS-CoV-2 infection. If acute infection is suspected, molecular testing for SARS-CoV-2 is necessary. The antibody test should not be used to diagnose acute SARS-CoV-2 infection. False positive results for the antibody test may occur due to cross-reactivity from pre-existing antibodies or other possible causes.

- The antibody tests and the molecular tests (together “All tests”) have not been FDA cleared or approved;
- All tests have been authorized by FDA under EUAs for use by authorized laboratories;
- The antibody tests have been authorized only for the detection of IgG antibodies against SARS-CoV-2, not for any other viruses or pathogens;
- The molecular tests have been authorized only for the detection of nucleic acid from SARS-CoV-2, not for any other viruses or pathogens; and,
- All tests are only authorized for the duration of the declaration that circumstances exist justifying the authorization of emergency use of in vitro diagnostics for detection and/or diagnosis of COVID-19 under Section 564(b)(1) of the Act, 21 U.S.C. § 360bbb-3(b)(1), unless the authorization is terminated or revoked sooner

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