October 15: Testing Update, the Next Clinical Insights Panel, and the Impact of COVID-19 on the Brain

*Today's issue features information about the impact of COVID-19 on the brain from **Igor Koralnik, MD**, chief of neuro-infectious diseases and global neurology in the Ken & Ruth Davee Department of Neurology at Northwestern Medicine, who also oversees the new Neuro COVID-19 Clinic at Northwestern Memorial Hospital. It also includes an update on testing and details about the upcoming Clinical Insights Panel on Thursday, October 29.*

TESTING UPDATE FOR PATIENTS EXPERIENCING CLI AND ILI SYMPTOMS
On Monday, October 19, to align testing strategies for the influenza season, the COVID-19 order panel will be updated to include the option to simultaneously order SARS-CoV-2 and influenza tests. The collection for outpatient SARS-CoV-2 and influenza testing can occur at the alternate testing site locations. Due to the similarity of symptoms, SARS-CoV-2 and flu testing are recommended for all patients experiencing COVID-19-like illness (CLI) or influenza like illness (ILI) symptoms. Patients receiving a SARS-CoV-2 test prior to a procedure and those who are asymptomatic are not recommended to have an influenza test.

CLINICAL INSIGHTS PANEL
Available to all physicians across Northwestern Medicine, the next Clinical Insights Panel is scheduled from **7 to 8 am on Thursday, October 29**. You are encouraged to submit questions prior to the session by emailing **covid-19md@nm.org**. This session is approved for CME credit.

The discussion will include updates on flu and COVID-19 vaccine development, and feature Infectious Disease Specialist Michael Ison, MD, professor of Medicine in the Division of Infectious Diseases and Professor of Surgery in the Division of Transplant Surgery.

To participate, **join the Microsoft Teams Live Event** when it's time. To claim CME credit in Northwestern University Feinberg School of Medicine Cloud CME, text the activity code provided during the session to 312.957.8301.

IMPACT OF COVID-19 ON THE BRAIN
SARS-CoV-2 is unique in the coronavirus family in its ability to cause a multi-organ disease, with involvement of the central and peripheral nervous system in some individuals. A wide range of neurologic manifestations of SARS-CoV-2 infection has been recognized, and evidence of their severity and persistence is increasing. However, the frequency of those manifestations and associated risk factors remains unclear.

In a first-of-its-kind study in the U.S., the NM Neuro COVID-19 Clinic team retrospectively analyzed the first 509 patients who were hospitalized for COVID-19 infection across the health system and found that neurologic manifestations are very common in these patients. To date, only two other published papers describe the prevalence of neurological manifestations in hospitalized COVID-19 patients from China and Europe, which demonstrated neurologic manifestations in 36.4% of hospitalized COVID-19 patients in China and 57.4% in Europe.

We sought to characterize the incidence of neurologic manifestations in patients with confirmed COVID-19 and identify factors associated with the development of neurologic manifestations in hospitalized patients with both severe and non-severe respiratory disease. Furthermore, neurologic manifestations, especially encephalopathy, have been associated with worse clinical outcomes in other systemic illnesses including sepsis and may even lead to significant disability. Therefore, we sought to identify if encephalopathy was associated with greater morbidity in hospitalized patients with COVID-19.

The study outlined the frequency and severity of neurologic signs and symptoms in hospitalized patients. Our findings show neurological manifestations occurred in 82% of patients at some point during the course of the disease.

Of the 509 hospitalized patients with COVID-19:

- 42% had neurological manifestations at the time of initial symptom onset
- 63% at time of hospitalization
- 82% at any time during the course of the disease

The most frequent neurological symptoms were:

- Muscle pain (44.8%)
- Headaches (37.7%)
- Encephalopathy (31.8%)
- Dizziness (29.7%)
- Disorder of taste (15.9%)
- Disorder of smell (11.4%)

Encephalopathy, which is characterized by altered mental function ranging from mild confusion to coma, is the most severe neurologic manifestation of COVID-19. Upon discharge from the hospital, only 32.1% of patients with encephalopathy were able to care for their own affairs, compared to 89.3% of those who did not develop encephalopathy. There was also higher mortality in patients with encephalopathy (21.7%) compared to 3.2% of those without.

The cause of encephalopathy could not be determined with certainty given the lack of extensive diagnostic neurologic testing for most patients in this study due to ongoing pandemic restrictions. However, the most likely etiology of encephalopathy in patients with COVID-19 is multifactorial, including systemic disease and inflammation, coagulopathy, direct neuroinvasion by the virus, endotheliitis and possibly post-infectious autoimmune mechanisms.

Strokes, movement disorders, motor and sensory deficits, ataxia and seizures were uncommon (0.2 to 1.4% of patients each). Severe respiratory disease requiring mechanical ventilation occurred in 134 patients (26.3%). Of all patients, 362 (71.1%) had a favorable functional outcome at discharge. However, encephalopathy was independently associated with worse functional

outcome (OR 0.22; 95% CI 0.11–0.42; P < 0.001) and higher mortality within 30 days of hospitalization (35 [21.7%] vs. 11 [3.2%] patients; P < 0.001).

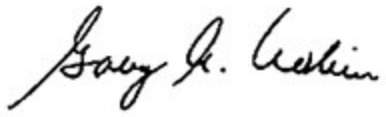
The Neuro COVID-19 team is looking to characterize the long-term neurologic effects of COVID-19 and the cognitive outcomes in patients with COVID-19-associated encephalopathy. We're studying this in patients who are discharged from the hospital, as well as in COVID-19 'long-haulers,' who have never been hospitalized but also suffer from a similar range of neurological problems, including brain fog.

Patients with prolonged neurologic symptoms from across the U.S. have scheduled consultations with the NM Neuro COVID-19 Clinic in hopes that the team's extensive knowledge of infectious diseases that affect the central nervous system can help determine what is causing these patients' symptoms. The use of telehealth technology is facilitating these interactions, making it easier and safer for patients who are recovering from COVID-19 to receive this advanced level of care.

The Neuro COVID-19 Clinic's unique approach, along with this new study, will help shape long-term care for people who experience neurological complications from COVID-19. Physicians and clinicians need to be aware of the high frequency of neurologic manifestations as a result of infection and the severity of altered mental function associated with this disease.

The Neuro COVID-19 Clinic at Northwestern Memorial Hospital was established to better understand and treat the impact of the disease on the brain. The study, titled **Frequent Neurologic Manifestations and Encephalopathy-Associated Morbidity in COVID-19 Patients**, was published on October 5 in *Annals of Clinical and Translational Neurology*.

Thank you to all NM physicians and clinicians for your ongoing commitment, collaboration and leadership in providing exceptional *Patients First* care.



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