COVID-19 frequently causes neurological injuries

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Without directly invading the brain or nerves, the virus responsible for COVID-19 causes potentially damaging neurological injuries in about one in seven infected, a new study shows. These injuries range from

temporary confusion due to low body-oxygen levels, to stroke and seizures in the most serious cases, say the study authors.

Led by researchers at NYU Grossman School of Medicine, the study showed no cases of brain or nerve inflammation (meningitis or encephalitis), indicating no immediate invasion of these organs by the pandemic virus, SARS-CoV-2.

While this should reassure patients, the neurological complications of COVID-19 should be taken seriously because they dramatically raise a patient's risk of dying while still in hospital (by 38 percent), researchers say. Such adverse effects also raise a coronavirus patient's likelihood (by 28 percent) of needing long-term or rehabilitation therapy immediately after their stay in hospital.

"The results of our study showed no signs that the coronavirus directly attacks the nervous system," says study lead investigator Jennifer Frontera, MD. "The neurological complications seen in COVID-19 are predominately the secondary effects of being severely ill and suffering from low oxygen levels in the body for prolonged periods of time," says Frontera, a professor in the Department of Neurology at NYU Langone Health.

Published in the journal *Neurology* online Oct. 5, the study closely monitored the progress of 606 COVID-19 adult patients diagnosed with brain or other nerve-related medical conditions at any of four NYU Langone hospitals in New York City and Long Island between March 10 and May 20, when coronavirus infections were at their peak in the region.

Frontera says that ahead of the pandemic, dozens of NYU Langone neurologists and trainees had deployed across its medical centers to assist with the expectant surge of COVID-19 patients.

Early reports from Asia and Europe, where infections had spiked before rising in the United States, she says, had also "raised the alarm" about possible brain damage from coronavirus infection. Because of this, the research team was ready to look for any signs of neurological dysfunction among the thousands of patients being admitted to hospital in the spring. Among all the hospitals, 4,491 patients tested positive for COVID-19 during that time.

Among the study's other key results was that common neurological problems, such as confusion caused by chemical electrolyte imbalances, severe infection or kidney failure, usually arose within 48 hours of developing general COVID-19 symptoms, including fever, difficulty breathing, and cough.

Half of those neurologically affected were over the age of 71, which researchers say is significantly older than the other 3,885 patients with COVID-19 (at a media age of 63) who did not experience brain dysfunction. Most were men (66 percent) and white (63 percent). Frontera notes that the study results do suggest that Blacks are not at greater risk of neurological complications than other COVID-19 patients, which is "welcome news," given that Blacks are widely known to be at greater risk of death from coronavirus infection. However, she says this potentially important observation requires further investigation.

While the coronavirus is known to attack other organs, including blood vessels and the heart, researchers say its main target is the lungs, where it makes breathing difficult, starving the body of oxygen it needs to stay alive. Low levels of oxygen in the body and brain was another common neurological problem, study results showed, that could lead to confusion, coma, or permanent brain damage.

"Our study results suggest that physicians need to be more aggressive in stabilizing body oxygen levels in patients with COVID-19 as a

potentially key therapy for stopping, preventing and/or possibly reversing neurological problems," says study senior investigator Steven Galetta, MD.

More information: Jennifer A. Frontera et al, A Prospective Study of Neurologic Disorders in Hospitalized COVID-19 Patients in New York City, *Neurology* (2020). DOI: 10.1212/WNL.0000000000010979

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