Study finds SARS-CoV-2-associated sepsis was more common, deadly than previously thought

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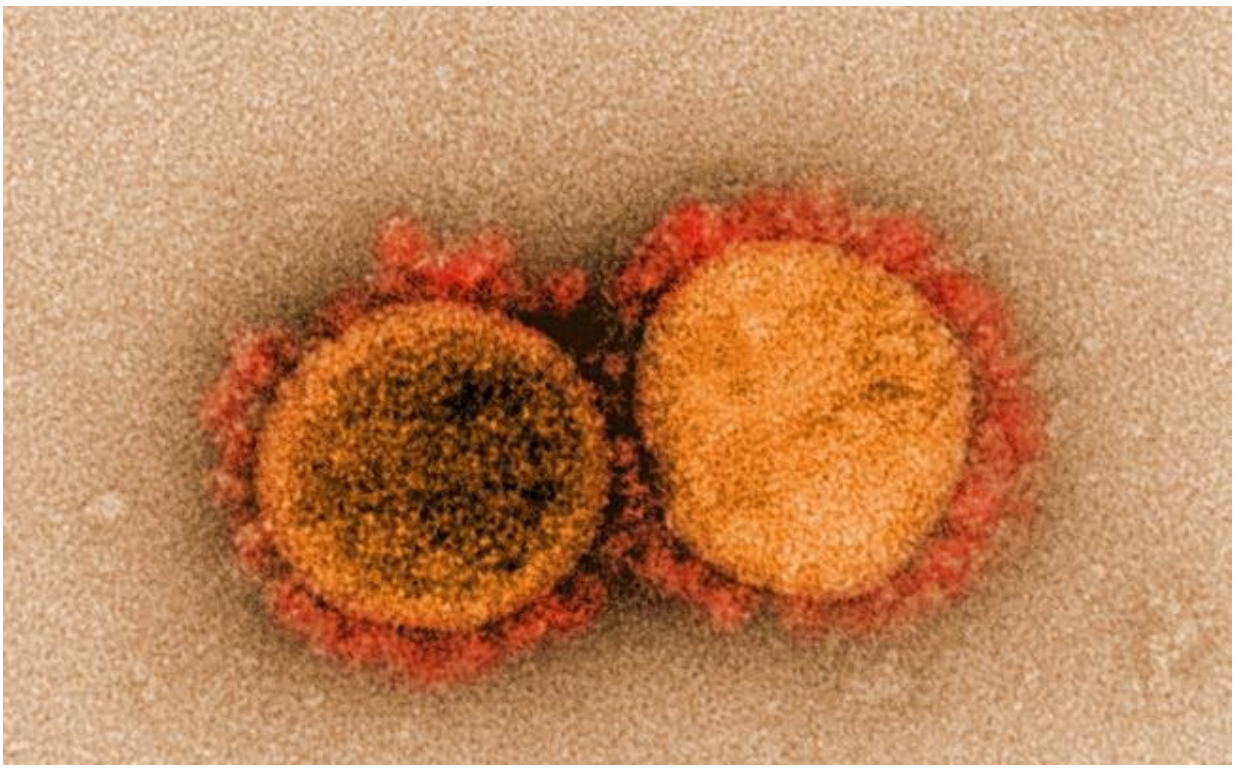

Transmission electron micrograph of SARS-CoV-2 virus particles, isolated from a patient. Image captured and color-enhanced at the NIAID Integrated Research Facility (IRF) in Fort Detrick, Maryland. Credit: NIAID

New research suggests that the virus responsible for COVID-19 was a

more common and deadly cause of sepsis during the initial period of the pandemic than previously assumed.

The study, led by investigators from Brigham and Women's Hospital, a founding member of the Mass General Brigham health care system, used electronic health record (EHR) data from five Mass General Brigham hospitals to track the rate of SARS-CoV-2-associated sepsis during the COVID-19 pandemic. The team found that SARS-CoV-2 accounted for approximately one in six cases of sepsis during the first two and a half years of the COVID-19 pandemic.

Their results, published in *JAMA Network Open*, suggest clinicians should rethink how they treat sepsis while also providing a framework for future surveillance for viral sepsis.

"Most people, including medical professionals, equate sepsis with bacterial infections," said lead author Claire Shappell, MD, MPH, of the Division of Pulmonary and Critical Care Medicine in the Department of Medicine at Brigham and Women's Hospital.

"This is reflected in treatment guidelines and quality measures that require immediate antibiotics for patients with suspected sepsis. However, viral infections, including the SARS-CoV-2 virus that causes COVID-19, can trigger the same dysregulated immune response that leads to organ dysfunction as in bacterial sepsis."

Previous research on viral sepsis has been limited. To capture a full and more accurate picture of sepsis cases, the team utilized electronic health records from Mass General Brigham hospitals during the study period.

"Previous efforts to quantify the burden of SARS-CoV-2-associated sepsis have been limited by inconsistent definitions and under-recognition of viral sepsis," said senior author Chanu Rhee, of the

Division of Infectious Diseases in the Department of Medicine at Brigham and Women's Hospital.

"Our prior research has shown that EHR-based surveillance can provide more accurate estimates of sepsis incidence and outcomes compared to administrative datasets, but this method had not previously been applied specifically for sepsis associated with SARS-CoV-2 or other viruses."

The team quantified the incidence and mortality for SARS-CoV-2-associated sepsis using clinical criteria adapted from the Center for Disease Control and Prevention's (CDC) sepsis surveillance definition that incorporated positive SARS-CoV-2 tests and clinical signs of organ dysfunction.

Using EHR data between March 2020 and November 2022, the team identified 431,017 hospitalizations from 261,595 individuals. During that time, 5.4% of hospitalizations were due to SARS-CoV-2 infections and 28.2% of those hospitalizations had SARS-CoV-2-associated sepsis.

The mortality rate for patients with SARS-CoV-2-associated sepsis was initially high—33% over the first three months of the pandemic. However, it declined over time and eventually became similar to the mortality rate for presumed bacterial sepsis, a rate of about 14.5% that remained stable throughout the study period. The researchers also confirmed their electronic surveillance definition accurately identified cases of viral sepsis caused by SARS-CoV-2 infections using the Mass General Brigham EHR dataset.

The study's design and utilization of EHR data provides a framework for future research into sepsis associated with other viruses, including influenza and respiratory syncytial virus (RSV). The team hopes to apply this method to larger and nationally representative datasets to report generalizable epidemiologic data on viral sepsis.

"Our study draws attention to the high burden and poor outcomes associated with viral sepsis, while demonstrating the utility of using EHR-based algorithms to conduct surveillance for both viral and bacterial sepsis," said Shappell. "We also hope our findings highlight that sepsis is not a 'one-size-fits-all' entity, but one that requires clinicians to tailor their diagnosis and treatment strategy to each patient's syndrome and probable pathogen."

More information: Use of Electronic Clinical Data to Track Incidence and Mortality for SARS-CoV-2-Associated Sepsis, *JAMA Network Open* (2023). DOI: 10.1001/jamanetworkopen.2023.35728

Provided by Brigham and Women's Hospital

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