

Metabolic syndrome increases risk of respiratory distress, death for hospitalized COVID-19 patients

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Lead author of the study Dr. Joshua Denson, pulmonary and critical care medicine physician and assistant professor of medicine at Tulane University School of Medicine. Photo by Paula Burch Celentano.

Patients hospitalized with COVID-19 who had a combination of high blood pressure, obesity, diabetes or other conditions associated with metabolic syndrome were at much higher risk of acute respiratory distress syndrome (ARDS) and death, according to an international study published in the medical journal [JAMA Network Open](#).

The risk for developing ARDS, a life-threatening lung condition that causes low blood oxygen, grew progressively higher with each additional metabolic syndrome criteria present. The study, one of the largest to examine the link between metabolic syndrome and outcomes for COVID-19, examined records of more than 46,000 patients admitted in 181 hospitals across 26 countries.

“Our study found that if you have high cholesterol, high blood pressure, mild obesity and pre-diabetes or diabetes and are hospitalized with COVID-19, you have a one in four chance of developing ARDS, which is significant,” said lead author of the study [Dr. Joshua Denson](#), pulmonary and critical care medicine physician and assistant professor of medicine at Tulane University School of Medicine. “We also found that at every level of respiratory support, patients with metabolic syndrome experienced worse outcomes. Metabolic syndrome patients experienced increased invasive mechanical ventilation, increased noninvasive ventilation, or high-flow oxygen support, and increased supplemental oxygen use compared to patients without metabolic syndrome.”

"These important findings are another example of possibilities from pooled data of hundreds of hospitals, in detecting meaningful associations during the pandemic," said [Dr. Rahul Kashyap](#), senior author of the study and principal investigator of the [Discovery VIRUS: COVID-19 Registry](#). "These findings will assist with efforts for creating national infrastructures, for identifying critical illness risk factors and testing novel/re-purposed medications to help improve patient outcomes."

Researchers from Tulane University, the Society of Critical Care Medicine and Mayo Clinic followed outcomes for patients hospitalized between mid-February 2020 to mid-February 2021 in the Discovery VIRUS: COVID-19 Registry. Researchers compared 5,069 patients (17.5%) with metabolic syndrome with 23,971 control patients (82.5%) without metabolic syndrome. They defined metabolic syndrome as having more than three of the following criteria: obesity, pre-diabetes or diabetes, hypertension and high cholesterol.

Patients with metabolic syndrome were 36% more likely to develop ARDS, almost 20% more likely to die in the hospital, more than 30% more likely to be admitted to an ICU and 45% more likely to require mechanical ventilation. Researchers calculated these risks after adjusting for race, age, sex, ethnicity, other comorbid conditions and hospital case volume.

Overall, slightly more than 20% of the patients with metabolic syndrome died in the hospital, 20% developed ARDS and almost half were admitted to the ICU. Approximately 16% of those without metabolic syndrome died, 12% developed ARDS and nearly 36% were admitted to the ICU.

Metabolic syndrome was significantly more common among patients with COVID-19 admitted to U.S. hospitals (18.8%) than those admitted to non-U.S. hospitals (8%). According to the Centers for Disease Control, more than a third of adults in the U.S. meet the criteria for metabolic syndrome, with some regions having a metabolic syndrome prevalence greater than 40%.

Severe cases of COVID-19 are characterized by a hyperinflammatory immune response to the infection throughout the body. Authors suspect that chronic low-grade inflammation from metabolic diseases, mainly when clustered together, could make these patients more vulnerable to COVID-19.

The researchers note that given the high rates of metabolic syndrome, obesity and diabetes in the U.S., one hypothesis for why the U.S. leads the world in COVID-19 cases and deaths could be the high prevalence of metabolic syndrome in this population.

This study was made possible by the Viral Infection and Respiratory Illness Universal Study (VIRUS) that reveals practice variations and provides a rich database for research into effective treatments and care. The Society of Critical Care Medicine's Discovery, the Critical Care Research Network and Mayo Clinic launched this first global COVID-19 registry that tracks ICU and hospital care patterns in near real-time in March 2020. For more information, visit the [Discovery VIRUS COVID-19 Registry](#).