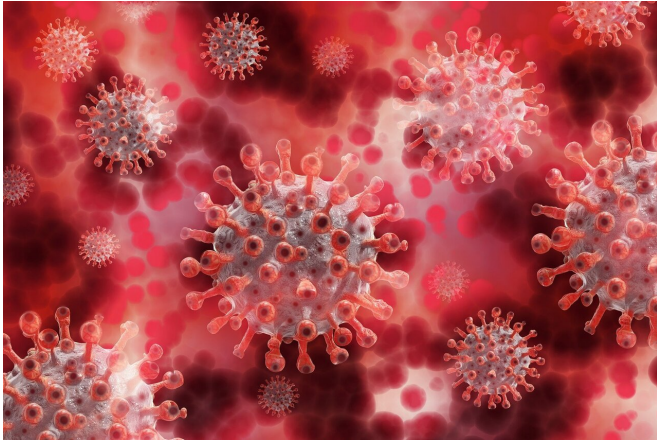# A new predictive model helps identify those at risk for severe COVID-19

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Credit: Pixabay/CC0 Public Domain

Researchers at the Buck Institute analyzed data from the COVID-19 Symptom Tracker app used by 3 million people in the United Kingdom, adding the use of immunosuppressant medication, use of a mobility aid, shortness of breath, fever, and fatigue to the list of symptoms and comorbidities that increase the risk for severe COVID-19. Results are published in the *Journal of Medical Internet Research*.

"Even though there are established risk factors for severe COVID-19 there are no good predictors that enable healthcare providers, or even those who have tested positive, to assess who should seek advanced medical care," says Buck Institute Associate Professor David Furman, Ph.D., the senior scientist who led the study. "We are glad to add to the efforts underway around the world to determine how to best care for those infected by the coronavirus."

Furman said that out of the three million people who used the app about 11,000 people tested positive for the virus and about 500 ended up in the hospital. The symptom-tracking app collects data from multiple angles, asking people to describe how they feel, symptoms they are experiencing, and medications they are using along with demographics and lifestyle factors such as nutrition and diet.

Results did not identify chronological age as a risk factor for severe COVID-19; Furman acknowledged that the fact that elderly people are less likely to use a smartphone app was a limitation of the study. "But our study," Furman says, "does emphasize that any population that expresses the features identified in our model could be susceptible to a more severe form of COVID-19."

Adding that many of the factors identified in the study are related to aging, Furman says, "understanding vulnerable younger populations that are biologically older than their chronological age and exhibit features that are generally associated with the older population could help clinicians identify susceptible young populations."

Furman says findings that identify the use of immunosuppressant medications as a major predictor of more serious disease warrant more investigation. "Are these patients doing worse because of an underlying auto-immune/auto-inflammatory disease or because the medications are suppressing their inflammatory response—we don't know," he says. "Labs around the world are studying the overactive immune response that leads to the cytokine storm which is associated with severe COVID-19. Our findings highlight the need to understand the biology of what is at play in these cases."

Furman and colleagues are using artificial intelligence and machine learning to pursue other COVID-related research. Efforts are underway to predict patients likely to become COVID "long haulers"—those who experience ongoing debilitating symptoms long after they recover from acute disease. Researchers are also correlating earlier

data that identified aging phenotypes within individual proteomes (the entire complement of proteins expressed within our cells and tissues) with the proteomes of those infected with the [coronavirus](#). Furman says preliminary data suggests that there is a subgroup of COVID-19 patients who are aging faster in regards to their proteome. He says the hope is to identify interventions that would restore their protein expression to a younger state.

More information: Yingxiang Huang et al, COVID-19 Patients Seeking Treatment: Modeling Predictive Age-dependent and Independent Symptoms and Comorbidities (Preprint), *Journal of Medical Internet Research* (2021). DOI: 10.2196/25696

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