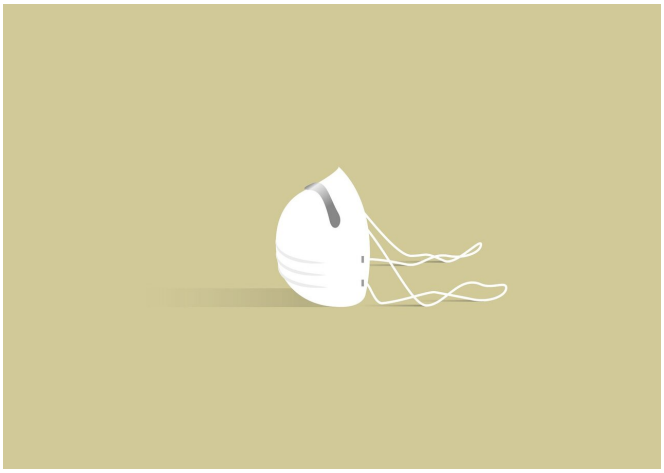
Discovery of four COVID-19 risk groups helps guide treatment

9 September 2020



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People who are admitted to hospital with COVID-19 can be divided into four distinct groups, according to data from the world's largest study of patients with the disease.

Researchers identified the groups using clinical information and tests carried out upon arrival at hospital to predict the patients' risk of death—ranging from low to very high.

A COVID-19 risk identification tool—the most accurate to date—has been designed using the groupings to help clinical staff choose the best course of treatment for patients admitted to hospital.

The tool was built by the ISARIC Coronavirus Clinical Characterisation Consortium involving researchers from Universities of Edinburgh, Glasgow, Liverpool and Imperial College London using data from some 35,000 patients admitted to hospital between February and May 2020 who met the criteria for one of the four groups.

The tool was then tested and confirmed to be accurate using data from a further 22,000 patients hospitalised from the end of May to the end of June 2020.

Some of the data used to identify which group a person falls into—and, therefore, their risk of dying—included age, sex, the number of pre-existing conditions, respiratory rate on admission, and the results of two blood tests.

One in every hundred patients in the low-risk group was found to be at risk of dying. It was 10 in a hundred patients in the intermediate-risk group, 31 in a hundred in the high-risk group and 62 in a hundred in the very high-risk group.

The categorisations make new treatment pathways possible, researchers say.

For example, it might be more appropriate for those who fall into the low-risk subgroup to be treated at home. In contrast, people in the high or very high risk groups could benefit from more aggressive treatment, such as the use of antivirals and early admission to critical care.

Until now there has not been an accurate risk tool for COVID-19 patients. Existing tools for pneumonia or sepsis do not offer accurate predictions due to the differences between diseases.

Previous attempts to build a risk prediction tool for COVID-19 have had limited success due to small sample sizes and lack of formal validation. One limitation of this new tool, however, is that it can only be used on hospital patients and not within the community.

The work is the latest result from ISARIC—a global network of clinicians and scientists who have been preparing to prevent disease and death from severe outbreaks since 2012 in readiness for a

pandemic such as this. It involved 260 hospitals across England, Wales and Scotland. The ISARIC 4C study includes two thirds of all people admitted to hospital with COVID-19.

The research was funded by UK Research and Innovation (UKRI) and by the Department of Health and Social Care through the National Institute for Health Research (NIHR) as part of the UK Government's COVID-19 rapid research response.

The research findings are published in the *BMJ*.

Professor Ewen Harrison, Senior author and Professor of Surgery and Data Science at the University of Edinburgh, said: "As doctors, we want to identify groups of patients most at risk of dying from COVID-19. If we can do that at the front door of the hospital, then treatment can be better planned. This easy-to-use tool will help doctors make decisions to provide patients with the optimal care."

Dr. Antonia Ho, Co-Lead Author Clinical Senior Lecturer and Consultant in Infectious Diseases at the University of Glasgow, said: "This simple tool will help doctors at the front door to make informed decisions on how to manage patients with COVID-19. On one hand, allow targeting of early treatment and admission to critical care in patients at high risk of dying, and conversely, identifying low-risk patients that may be safely managed at home."

Professor Calum Semple, Chief Investigator and Professor in Outbreak Medicine and Child Health at the University of Liverpool, said: "This winter is likely to see great pressures on our health services, with staff being redeployed to less familiar acute care areas. In these difficult circumstances the 4C mortality score is likely to be a valuable tool for supporting decisions that allowing prompt escalation of care to those most likely to benefit. The scale of success of the ISARIC 4C study is testament to the group's commitment in preparing for pandemic public health research."

Dr. Stephen Knight, Co-Lead Author and NIHR Clinical Research Fellow at the University of Edinburgh, said: ""This accurate and simple risk identification tool, applicable across all groups within society, will help detect at risk individuals quickly on arrival to hospital. As importantly, we will be able to reassure and potentially treat at home those patients who fall within the low risk group."

Professor Fiona Watt, Executive Chair of the Medical Research Council, part of UKRI, said: "These results highlight the benefits of being prepared in advance of the emergence of new pandemics such as COVID-19. ISARIC is a global network of clinicians and scientists that was set up in 2012 in readiness for a pandemic such as COVID-19, and its value is evident from the findings described today."

Minister for Innovation Lord Bethell, said: "Protecting the most vulnerable from COVID-19 is a priority which is why we're supporting valuable research like this to help doctors make the best possible decisions for NHS patients, and I am delighted to see my former University leading the way on it. We look forward to seeing how this new tool can help clinicians target treatments more effectively for coronavirus patients admitted to hospital now and in the future, potentially saving countless lives."

More information: Risk stratification of patients admitted to hospital with covid-19 using the ISARIC, *BMJ* (2020). DOI: 10.1136/bmj.m3339 , www.bmj.com/content/370/bmj.m3339

Provided by University of Edinburgh

APA citation: Discovery of four COVID-19 risk groups helps guide treatment (2020, September 9) retrieved 28 January 2022 from https://medicalxpress.com/news/2020-09-discovery-covid-groups-treatment.html

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