Medical Xpress

Increased risk of acute myocardial infarction the first two weeks following COVID-19

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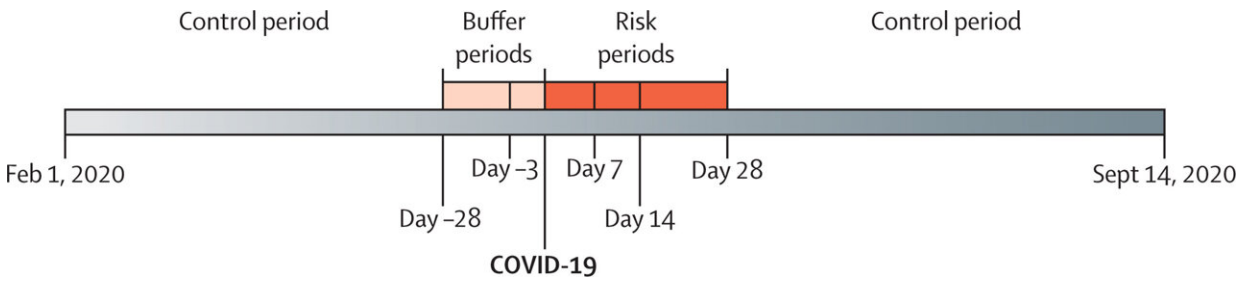

Figure 1. Overview of the self-controlled case series study design. Credit: DOI: 10.1016/S0140-6736(21)00896-5

A large nationwide study based on all COVID-19 patients in Sweden performed at Umeå University, concludes that the risk of acute myocardial infarction and stroke is three-fold increased the first two weeks following COVID-19. The study was published in *The Lancet*.

"COVID-19 is a complex disease that affects many organs, and we therefore aimed to determine if COVID-19 is an acute risk factor for acute myocardial infarction and stroke," says Anne-Marie Fors Connolly who is a principal investigator at the Dept. of Clinical Microbiology and responsible for the study.

The study is based on 86 742 COVID-19 patients and 348 481 control individuals, and at the time of acceptance for publication in *The Lancet*,

it was the biggest study of its kind to determine the association between acute myocardial infarction and stroke following COVID-19. In the study, the researchers compared the occurrence of myocardial infarction and stroke in COVID-19 patients with the control individuals during the study period 1st of February to 14th of September 2020. Using two powerful statistical methods, the risk of acute myocardial infarction and stroke was calculated following COVID-19 disease onset.

Three-fold increased risk—We found a three-fold increased risk of acute myocardial infarction and stroke in the first two weeks following COVID-19 using both statistical methods, and even after adjusting for known risk factors for acute myocardial infarction and stroke such as comorbidities, age, gender and socio-economic factors, says Osvaldo Fonseca Rodriguez, epidemiologist at the Dept. of Epidemiology and Global Health and Clinical Microbiology, and co-first author of the study with Ioannis Katsoularis.

"The results indicate that acute cardiovascular complications represent an important clinical manifestation of COVID-19. Our results also show how important it is to vaccinate against COVID-19, in particular the elderly who are at increased risk of acute cardiovascular events," says Ioannis Katsoularis, consultant physician in cardiology and Ph.D. student at the Dept. of Public Health and Clinical Medicine.

In the study information from national registries from the Public Health Agency of Sweden, Statistics Sweden and the National Board of Health and Welfare were crosslinked for all reported COVID-19 patients and a control group consisting of four individuals matched to every COVID-19 case on age, gender and county of residence, that had not tested positive for COVID-19. By using historical registry data from the National Board of Health and Welfare´s inpatient registry, individuals with a previous myocardial infarction and stroke were identified and excluded from the study.

"It would have been difficult to calculate the risk that COVID-19 contributes to acute myocardial infarction and stroke, if individuals with a prior event were included. This is because the risk of a recurrent acute myocardial infarction and stroke is increased following a first acute myocardial infarction or stroke," says Krister Lindmark, a consultant medical doctor in cardiology and a co-author of the study.

Two statistical methods

The matched cohort study and the self-controlled case series study were the two statistical methods used in the study.

"The self-controlled case series study is a method that was originally invented by the statistician Paddy Farrington to determine the risk of complications following vaccines. Previously this method was used to show an increased risk of acute myocardial infarction, stroke and venous thromboembolism following the disease hemorrhagic fever with renal syndrome, that is caused by Puumala orthohantavirus. We had the privilege to collaborate with Farrington in this study, which ensured a high scientific standard. This was also noted by one of the scientific reviewers of our study for *The Lancet*," says Anne-Marie Fors Connolly.

More information: Ioannis Katsoularis et al, Risk of acute myocardial infarction and ischaemic stroke following COVID-19 in Sweden: a self-controlled case series and matched cohort study, *The Lancet* (2021). DOI: 10.1016/S0140-6736(21)00896-5

Provided by Umea University

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