COVID-19 reinfections study from different statistical approaches

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Recovery from a SARS-CoV-2 infection might confer some degree of immunity to reinfection for a period of time. However, a small percentage of patients contracts (or reinfects from) COVID-19 a second time. A total of 380,074 adult patients were infected with SARS-CoV-2 from March 1, 2020 to January 9, 2022 in the Basque Country; from those, 10,968 (2.89%) were reinfected.

The aim of this study is to analyse which factors are related to the probability of reinfection. We are as well interested in studying the effect that different transition paths after the first infection might have on a worst prognosis after reinfection, taking into account patient's sociodemographic, comorbidity and other clinically relevant factors described in the literature.

The use of different statistical techniques allow for a more comprehensive analysis of the data, providing insights into the complex relationships between the various factors. Logistic regression is used to examine the association between individual factors and the likelihood of reinfection, while the competing risks model is used to assess the time to reinfection and its impact on outcomes considering death as a competing risk. Finally, multistate models are employed to estimate different transition probabilities, such as the probability from infection to hospital admission or from infection to ICU.

Summarizing, this is a preliminar population study on reinfected SARS-CoV-2 patients showing, on one hand, those factors associated with a reinfection and, on the other, which is the likelihood of a worst prognosis among reinfected patients.

Keywords: Reinfections, multistate models, competing risks model.