Comparison of mortality, morbidities & healthcare resources utilization between patients with and without a diagnosis of Covid-19: A study protocol

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Background

COVID-19 infection caused by the SARS-COV-2 virus is associated with various adverse outcomes impacting multiple organ systems. The short and potentially long-term adverse outcomes of COVID-19 infection including, cardiovascular, neurological, respiratory, immunological, renal, and hepatic morbidity have been reported in review articles and observational studies. [1-3] However, given the limited duration of follow-up of up to 6 months in previous studies, the medium to long-term adverse consequences of COVID-19 remain largely unclear. In addition, it is anticipated that follow-up care for patients recovering from COVID-19 will incur extra healthcare resource utilization. One previous observational study of patients with history of Severe Acute Respiratory Syndrome (SARS) reported over half of SARS survivors presented for consultations in primary care clinics, rehabilitation, and diagnostic testing during their first year following hospital discharge. [4] The prolonged use of mechanical ventilation has also been found to be associated with mortality and increased healthcare resource use among SARS survivors. [5] Given that over 85% of patients admitted to an intensive care unit required mechanical ventilation, the post-infection healthcare utilization is expected to be more profound amongst patients with severe COVID-19. [6,7] As the COVID-19 pandemic progresses, evidence to facilitate better understanding of the risk of long-term adverse clinical outcomes and associated utilization of healthcare resources will be of great public health interest when assessing the impact of COVID-19.

The aim of this study is to determine the impact of COVID-19 infection on the short-, medium- and long-term adverse clinical outcomes and associated healthcare resource utilization amongst patients recovering from COVID-19 compared to non-COVID-19 patients.

Objectives

1. To monitor and evaluate the short-, medium-, and long-term mortality and morbidities following COVID-19 infection.

2. To monitor and evaluate the short-, medium-, and long-term post-infection healthcare resource utilization of COVID-19.

3. To investigate morbidities of COVID-19 post-infection in specific populations, including children, older adults, and people with multi-morbidity.

Method

Electronic health records between 2019 and 2023 from IQVIA Longitudinal Patient Database France

(France LPD IQVIA), IQVIA Disease Analyser Germany (Germany DA IQVIA), Longitudinal Patient Database Italy (Italy LPD IQVIA), IQVIA Medical Research Data UK (UK IMRD), IQVIA Open Claims US (US Open Claims) were mapped to the Observational Medical Outcomes Partnership (OMOP) common data model. France LPD IQVIA and Germany DA IQVIA consisted of data collected from proprietary practice management software used by general practitioners (GPs) and selected specialists. Italy LPD IQVIA and UK IMRD contained patient records from GP practices. US Open Claims included pre-adjudicated health insurance claims collected from GPs and specialists.

The study is a retrospective propensity-score adjusted cohort study using data from December 1st, 2019 (the outbreak of COVID-19 pandemic) to June 30th, 2023 (subject to data availability). COVID-19 patients defined as having a COVID-19 diagnosis with confirmed positive screening test between December 1st 2019 and June 30th 2022 and with at least 365 days of continuous observation before the first COVID-19 diagnosis were matched to non-COVID-19 subjects by propensity score conditioned on the probability of COVID-19 infection with the aim to balance the baseline characteristics across the study cohorts. Logistic regression will be applied to estimate the propensity score based on generic characteristics including demographics, as well as all diagnoses, drug exposures, measurement, and medical procedures observed prior to and on the day of index date for all the subjects. Subjects with COVID-19 will be matched to comparators with similar propensity score. All subjects will be monitored for first diagnosis of cardiovascular, hematological, respiratory, neurological, psychiatric, immunological, endocrine, malignant, dermatological or gastrointestinal disorders after their index date. The number of general practitioner visits, accident and emergency department attendances, length of stay in general ward and intensive care unit during hospital admission will be reported for COVID-19 and non-COVID-19 patients.

Results

As of December 1, 2021, 13,576,915 COVID-19 patients were identified from the five databases (US Open claims 13,327,004 (98.2%), France LPD IQVIA 116,697 (0.9%), Germany DA IQVIA 65,641 (0.5%) Italy LPD IQVIA 37,684 (0.3%) and UK IMRD 29,889 (0.2%)) (Table 1). We are presently developing the study package and obtaining study data through our collaborations with IQVIA and the OHDSI Asia-Pacific (APAC) community.

Table 1. Cumulative number of patients with COVID-19 identified between December 1st, 2019 to December 1st, 2021

Databases	1 Dec 19	1 Jun 20	1 Dec 20	1 Jun 21	1 Dec 21
US Open claims	1,590	671,082	4,095,481	9,170,119	13,327,004
Italy IQVIA	31	4,800	18,990	34,559	37,684
France IQVIA	15	17,178	66,647	107,265	116,697
UK IMRD	3	2,577	12,140	29,889	29,889
Germany IQVIA	2	3,174	19,732	57,126	65,641

Conclusion

To our knowledge, this will be the largest observational study using multi-national healthcare databases to report the medium to long-term adverse outcomes of COVID-19 infection. The study will generate robust evidence to evaluate the adverse clinical outcomes of COVID-19 infection. Information on healthcare resources will inform the policy makers when budgeting future healthcare resources together with, an understanding of the breadth and duration of the long-term effect of COVID-19.

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