Patterns of Heart Failure in COVID-19 Admitted Patients

Team A: Sam Butler, MD; Lily Rubin-Miller, MPH; Tyler Heist, PhD
Team B: Chris Alban, MD; Alejandro Munoz del Rio, PhD; David Berry, PhD
Last updated 1 April 2021 • Check for updates at EHRN.org

Recent studies have suggested COVID-19 may result in new cardiovascular disease.[1,2] To better understand this, we examined patterns of heart failure diagnoses for patients admitted with COVID-19.

Our study population consists of 55,285 patients who were diagnosed with COVID-19 or tested positive for SARS-CoV-2 and had a COVID-19-related admission by October 1, 2020. These data come from 70 healthcare organizations covering 352 hospitals. We found 23.6% of the 55,285 COVID-19 admitted patients had heart failure documented within 3 months after their COVID positivity. 7.1% of the 55,285 patients had new heart failure with no prior history within 3 months after their COVID positivity.

Heart Failure Documentation in COVID-19 Admitted Patients

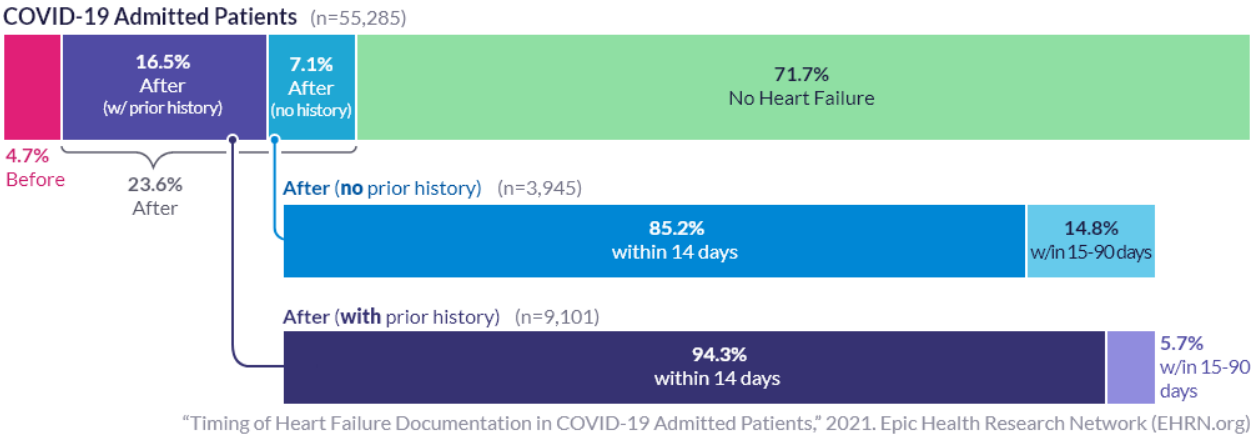

Figure 1. Breakdown of when COVID-19 admitted patients had heart failure documented, including whether heart failure was documented only before, before and after, or only after their COVID-19 positivity.

We found that a large majority of patients had heart failure documented within 14 days of COVID-19 positivity, regardless of whether the patient had a prior history of heart failure. This finding may suggest that new heart failure happens within two weeks of COVID-19 positivity or could be documentation of a pre-existing condition due to increased interaction with healthcare providers during their admission. To further evaluate the impact of increased surveillance during hospital admissions and its impact on new diagnosis of conditions, we will pursue a follow-up study on the timing of documentation for other chronic conditions in relation to admissions to see how this finding of increased heart failure compares.

This study was completed by two teams, each comprised of a clinician and two data scientists, that independently acquired and analyzed data. Both teams were involved in the interpretation of results and drafting of this brief. Overall, the two teams came to similar conclusions. Data are pooled from 70 healthcare organizations representing 352 hospitals that span 48 states and cover 54 million patients.

Term	Definition
Active Patient	Active patients include those who have interacted with the health system in the two years preceding their COVID-19 positive start date, as indicated by either a visit or an order placed in their chart.
COVID-19 Positive Patient	Patient with a positive SARS-CoV-2 lab result or a COVID-19 diagnosis. **Start Date:** The earlier of the earliest positive SARS-CoV-2 lab result collection date or earliest diagnosis noted date.
COVID-19 Diagnosis	One of the following codes in one of the listed diagnosis settings. **Diagnosis Code:** U07.1 (ICD-10-CM) **Diagnosis Setting:** Encounter Diagnosis, Billing Diagnosis, Problem List, Hospital Problem, Discharge Diagnosis **Start Date:** Diagnosis noted date
SARS-CoV-2 Lab Result	A final result for one of the lab tests for SARS-CoV-2, with a lab value that could be interpreted definitively as Positive or Negative. LOINC codes include: 94306-8, 94307-6, 94308-4, 94309-2, 94310-0, 94311-8, 94312-6, 94313-4, 94314-2, 94315-9, 94316-7, 94500-6, 94502-2, 94509-7, 94510-5, 94511-3, 94531-1, 94532-9, 94533-7, 94534-5, 94558-4, 94559-2, 94565-9, 94639-2, 94640-0, 94641-8, 94642-6, 94643-4, 94644-2, 94645-9, 94646-7, 94647-5, 94660-8, 94745-7, 94746-5, 94756-4, 94757-2, 94758-0, 94759-8, 94760-6, 94763-0, 94764-8, 94765-5, 94766-3, 94767-1, 94819-0, 94822-4, 94845-5, 95209-3, 95406-5, 95409-9, 95424-8, 95425-5, 95521-1, 95522-9, 95608-6, 95609-4, 95823-1, 95824-9, 95826-4, 95970-0, 95971-8, 95972-6, 95973-4, 95974-2, 96091-4, 96094-8, 96119-3, 96120-1, 96121-9, 96122-7, 96123-5, 96448-6, 96741-4, 96751-3, 96752-1 **Test Date:** Date when the sample was collected or resulted, if the specimen collection date is not available.
COVID-19 related admission	A hospital admission during which the patient had a positive SARS-CoV-2 lab test or COVID-19 diagnosis, OR a hospital admission with any respiratory diagnosis which happened within 42 days following the patients COVID-19 start date. **Respiratory Diagnosis Codes:** J00-J99 (ICD-10-CM)
Heart Failure Diagnosis	A diagnosis from the Heart Failure (CIR019) category of the Clinical Classifications Software Refined (CCSR). This consists of the following diagnosis codes: I09.81, I10.0, I13.0, I50.1, I50.20, I50.21, I50.22, I50.23, I50.30, I50.31, I50.32, I50.33, I50.40, I50.41, I50.42, I50.43, I50.810, I50.811, I50.812, I50.813, I50.814, I50.82, I50.83, I50.84, I50.89, I50.9 (ICD-10-CM) **Diagnosis Setting:** Encounter Diagnosis, Billing Diagnosis **Start Date**: Within three months (before or after) of their COVID-19 start date

References

1. Topol EJ. COVID-19 can affect the heart. *Science*. 2020;370(6515):408-409. doi:10.1126/science.abe2813
2. Lindner D, Fitzek A, Bräuninger H, et al. Association of Cardiac Infection With SARS-CoV-2 in Confirmed COVID-19 Autopsy Cases. *JAMA Cardiol*. 2020;5(11):1281. doi:10.1001/jamacardio.2020.3551
3. Centers for Disease Control and Prevention. COVID-19 and Your Health. Published February 11, 2020. Accessed March 5, 2021. https://www.cdc.gov/coronavirus/2019-ncov/need-extra-precautions/people-with-medical-conditions.html