



CHRONOS

Real-World Evidence on the Use of ECMO in Hospitalized COVID-19 Patients: Results From a Linked Closed and Open Claims Database in the US

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Background

Describing the occurrence of extracorporeal membrane oxygenation (ECMO) using real-world data (RWD) helps to characterize the severity of coronavirus disease 2019 (COVID-19) in hospitalized patients (1). Understanding the magnitude of missingness in closed claims data (i.e., claims data sourced from payers) can better support the utilization of RWD for health economics and outcomes research.

Objectives

- To describe the use of ECMO among hospitalized COVID-19 patients by quarter of the calendar year.
- To quantify the amount of missing ECMO outcome data using hybrid claims data.

Methods

This analysis identified hospitalized COVID-19 patients between April 1, 2020, and May 31, 2022, using closed claims data in CHRONOS. The index event was the date of hospitalization, defined as an inpatient claim within 21 days of a COVID-19 diagnosis. The occurrence of ECMO in the 30 days after index was identified using closed claims data alone (closed claims) and closed and open claims data in combination (hybrid claims). The analysis excluded patients under the age of 18, patients with a first COVID-19 diagnosis that did not result in hospitalization, and patients with less than 12-months of continuous enrollment before index (Figure 1). Results are reported by quarter of calendar year and claims data source for ECMO outcome.

Identification Period: April 1, 2020, through May 31, 2022

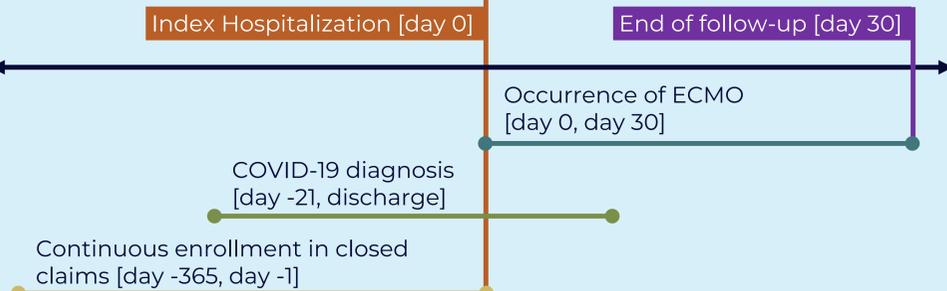


Figure 1. Study Diagram

Results

Of 321,687 patients hospitalized with COVID-19, the mean age was 50.1 (SD: 12.8) and 53.6% were male. Compared to patients with ECMO in the closed claims, patients in the hybrid claims data were more likely to be female and have a public insurance option (Table 1).

The greatest number of hospitalizations occurred in Q3 2021 (N = 62,478; Figure 2). Overall, 0.50% (0.48%-0.52%) of patients in the closed claims data received ECMO, increasing to 0.61% (0.58%-0.64%) in the hybrid claims data with the addition of 361 ECMO events not identified in the closed claims alone. The percent increase in ECMO events in the hybrid claims was largest in Q2 2020, followed by Q4 2021 and Q2 2022 (Figure 3).



Figure 2. ECMO Treatment in the Closed and Hybrid Claims by Quarter

Conclusions

This analysis demonstrates that closed claims data, which is sourced from payers, underestimates the use of ECMO in real-world settings with the magnitude of missing ECMO events inconsistent over time. Open claims data linked with closed claims data provides an opportunity to describe the minimum expected amount of missing data for key study parameters. Opportunities exist to mitigate issues of missing data by linking closed claims, open claims, and other novel real-world data sources.

1. Burn, E. et al. (2021). Use of dialysis, tracheostomy, and extracorporeal membrane oxygenation among 842,928 patients hospitalized with COVID-19 in the United States. MedRxiv: The Preprint Server for Health Sciences, 2020.11.25.20229088.

Table 1. Patient Demographics and Payer Type

	Total	No ECMO	ECMO in Closed Claims	ECMO in Hybrid Claims
Total (N)	321,687	319,720	1,606	361
Age at index (mean, SD)	50.1	12.8	50.1	12.8
Sex (N, %)				
Female	148,614	46.2	148,045	46.3
Male	172,528	53.6	171,134	53.5
Unknown	545	0.2	541	0.2
Payer type (N, %)				
Commercial, closed claims only	121,833	37.9	121,086	37.9
Public, hybrid claims	1357	0.4	1342	0.4
Commercial, hybrid claims	181,591	56.4	180,493	56.5
Commercial and public, hybrid claims	16,906	5.3	16,799	5.3

Note: Insurance status was defined in the 12 months before index. All patients had commercial coverage from the closed claims payers. Open claims data linked to the closed claims identified commercial and public (Medicare/Medicaid) coverage in hybrid claims analysis.



Figure 3. Increase in ECMO Events by Quarter in Hybrid Claims

