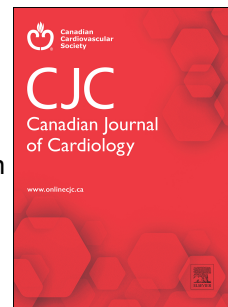


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The COVID-19 pandemic did not adversely impact follow-up patterns for patients with heart failure discharged from emergency departments

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PII: S0828-282X(23)00130-7

DOI: <https://doi.org/10.1016/j.cjca.2023.02.005>

Reference: CJCA 4583

To appear in: *Canadian Journal of Cardiology*

Received Date: 19 December 2022

Revised Date: 27 January 2023

Accepted Date: 7 February 2023

Please cite this article as: McAlister FA, Dong Y, The COVID-19 pandemic did not adversely impact follow-up patterns for patients with heart failure discharged from emergency departments, *Canadian Journal of Cardiology* (2023), doi: <https://doi.org/10.1016/j.cjca.2023.02.005>.

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The COVID-19 pandemic did not adversely impact follow-up patterns for patients with heart failure discharged from emergency departments

Short title: Post-emergency heart failure care during COVID-19

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Funding: None

Disclosures: None

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Word Count for this Research Letter: 800 text words, 5 references, 1 table

In patients with heart failure (HF) released from an emergency department (ED), timely follow-up care (within 7 days ideally, but even up to 30 days) is associated with lower rates of hospitalization or death.[1,2] As it is unknown whether the COVID-19 pandemic adversely impacted prompt follow-up after ED visits for patients with HF, we conducted a retrospective cohort study using linked administrative healthcare databases for the entire Canadian province of Alberta and compared outpatient care for patients seen and discharged from an ED between March 1 2019 to February 29 2020 ('pre-pandemic') versus March 1, 2020 to February 28, 2021 ('pandemic').

This is a sub-study from a larger study examining all healthcare encounters for 3.1 million Albertan adults pre-pandemic vs. pandemic and full details on methodology and case definitions have been previously published.[3] In this sub-study, we examined rates of follow-up with any physician (primary care physician or specialist) for patients who were treated and released from an ED in Alberta with a primary diagnosis of HF in the year pre-pandemic (n=5015) and during the first year of the pandemic (n=3693). Of note, we only included the first ED visit for HF for each patient in this sub-study.

Demographics and comorbidity burdens of the patients were similar in both years. There were no appreciable differences in the frequency of outpatient follow-up within 7 days, 14 days, or 30 days of an ED visit for HF in Albertan adults in the 12 months pre and post pandemic onset (Table 1), although approximately 1/3 of outpatient encounters were virtual in the first year of the pandemic (compared to none pre-pandemic). However, the proportion who were seen by a specialist within each of the timeframes after ED discharge was lower during the pandemic than pre-pandemic (all $p < 0.01$, Table 1), which is not surprising since many specialists are based in acute care facilities where outpatient in-person visits were most stringently restricted. There was also no statistically significant difference in short-term outcomes after ED discharge comparing pandemic vs. the prior year (Table 1), even after adjustment for age, sex, Charlson score, urban residence, and Pampalon deprivation index: aOR 1.12 (95% CI 0.95 to 1.32) at 7 days, aOR 1.05 (95% CI 0.92 to 1.20) at 14 days, and aOR 1.06 (95% CI 0.95 to 1.18) at 30 days.

Our findings provide reassurance that at least in Alberta, a jurisdiction where the health ministry modified billing codes on March 17, 2020 to reimburse virtual outpatient encounters (by telephone or video) at the same amount as in-person visits, there was no negative impact of the COVID-19 pandemic on promptness of follow-up for adults treated and discharged from an ED with a primary diagnosis of HF. Whether virtual outpatient encounters confer the same benefits as in-person encounters is an area of active research, with two[3,4] of three[5] studies published thus far suggesting that they do, although all three of these studies were of short duration and observational and thus are subject to the usual limitations of non-experimental investigations.

It should be recognized that, since our study used administrative data, we were unable to adjust for clinical confounders such as severity of HF. As such, we do not know whether patients with HF discharged from EDs during the pandemic were healthier than those discharged pre-pandemic: this could have happened if pandemic-era patients with

advanced HF were either more likely to avoid the ED and/or more likely to contract COVID-19 and be admitted or die. Indeed, we have previously reported that during the first year of the pandemic the proportion of community-dwelling Albertan adults who presented to an ED declined (from 40.1% to 34.3% for those with any ambulatory care sensitive condition, and from 75.2% to 69.9% in those with HF).[3] Moreover, while the follow-up patterns we observed were similar throughout the first year of the pandemic, whether this was maintained in the second and third years of the pandemic remains to be investigated. Whether our findings are generalizable to health systems which are less integrated (Alberta has a single government funded health authority) or don't reimburse virtual outpatient encounters at the same rate as in-person encounters is another open research question. A third limitation is that since we only had access to data after March 2018 for this project we were unable to use the standard 5 year wash-out definition to designate which patients had incident vs. prevalent HF.

As we work to address the care deficits induced by the COVID-19 pandemic and shore up the healthcare deficiencies exposed by the pandemic, we need to embrace those innovations used during the pandemic that appear to have improved at least some aspects of the quality of care. To that end, we should prioritize research to investigate the efficacy and cost-effectiveness of outpatient care models that balance virtual and in-person assessments.

Data Sharing Statement:

This study was approved by the University of Alberta Health Ethics Review board (Pro00101096), with waiver of individual patient signed consent as we analyzed de-identified healthcare administrative data. The dataset used for this study is held securely in coded form within the Alberta Strategy for Patient Oriented Research Support Unit (AbSPORU) Data and Research Services Platform. While legal data sharing agreements between the investigators, AbSPORU, and Alberta Health Services/Alberta Health prohibit us from making the dataset publicly available, access may be granted to those who meet pre-specified criteria for confidential access, available at www.absporu.ca, and sign the required Data Disclosure Agreements.

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Table 1: Baseline characteristics and frequency of outpatient follow-up after being discharged from an emergency department for a primary diagnosis of heart failure

	Pre-pandemic (Mar 1, 2019 to Feb 28, 2020) n=5015 (%)	Pandemic (Mar 1, 2020 to Feb 28, 2021) n=3693 (%)	P value comparing pandemic vs. pre- timeframes
Median age (IQR)	75.0 (64.0, 83.0)	74.0 (64.0, 83.0)	0.79
Female	2025 (40.4)	1518 (41.1)	0.50
Charlson comorbidity Index Score, excluding HF			
-Mean (SD)	2.56 (2.23)	2.49 (2.27)	0.16
-Median, Q1-Q3	2.00 (1.00, 4.00)	2.00 (1.00, 4.00)	0.06
Urban Residence	3922 (78.2)	2866 (77.6)	0.51
Pampalon deprivation index			
1 (least deprived)	707 (14.1)	497 (13.5)	0.79
2	785 (15.7)	584 (15.8)	
3	825 (16.5)	598 (16.2)	
4	1049 (20.9)	817 (22.1)	
5 (most deprived)	1196 (23.8)	874 (23.7)	
missing	453 (9.0)	323 (8.7)	
Outpatient physician follow- up within 7 days [†]	3526 (70.3) All in-person	2620 (70.9) 893 virtual and 1727 in-person	0.52
Outpatient follow-up with a specialist within 7 days ^{*†}	2065 (41.2% of all patients and 58.6% of outpatient visits in that timeframe)	1302 (35.3% of all patients and 49.7% of outpatient visits in that timeframe) 403 virtual and 899 in-person	<0.01
Outpatient physician follow- up within 14 days ^{*†}	3904 (83.4) All in-person	2860 (83.6) 981 virtual and 1879 in-person	0.80
Outpatient follow-up with a specialist within 14 days ^{*†}	2388 (47.6% of all patients and 61.2% of outpatient visits in that timeframe)	1584 (42.9% of all patients and 55.4% of outpatient visits in that timeframe) 505 virtual and 1079 in-person	<0.01
Outpatient physician follow- up within 30 days	4103 (92.8) All in-person	3011 (92.6)	0.81

		1055 virtual and 1956 in-person	
Outpatient follow-up with a specialist within 30 days**†	2886 (57.5% of all patients and 70.3% of outpatient visits in that timeframe)	2015 (54.6% of all patients and 66.9% of outpatient visits in that timeframe) 671 virtual and 1344 in-person	0.06
Hospitalized or died within 7 days	335 (6.7)	273 (7.4)	0.20
Hospitalized or died within 14 days	578 (11.5)	442 (12.0)	0.53
Hospitalized or died within 30 days	953 (19.0)	731 (19.8)	0.36

† excluding patients who died/were hospitalized before then

* With or without primary care follow-up as well