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Reduced Rate of Hospital Presentations for Heart Failure During the COVID-19 Pandemic in Toronto, Canada

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ABSTRACT

Coronavirus disease 2019 (COVID-19) has resulted in public health measures and health care reconfigurations likely to have impact on chronic disease care. We aimed to assess the volume and characteristics of patients presenting to hospitals with acute decompensated heart failure (ADHF) during the 2020 COVID-19 pandemic compared with a time-matched 2019 cohort. Patients presenting to hospitals with ADHF from March 1, to April 19, 2020 and 2019 in an urban hospital were examined. Multivariable logistic-regression models were used to evaluate the difference in probability of ADHF-related hospitalization between the 2 years. During the COVID-19 pandemic, a total of 1106 emergency department (ED) visits for dyspnea or peripheral leg swelling/edema

Since December 2019, the severe acute respiratory syndrome coronavirus 2 and resultant coronavirus disease 2019 (COVID-19) has evolved into an international public health crisis, designated a pandemic as of March 11, 2020, by the World Health Organization. Observational studies have identified that patients with cardiovascular disease, including heart failure (HF), have higher risks of COVID-19–related complications and overall mortality.

The implementation of public health measures aimed at mitigating the spread of COVID-19 and accompanying reconfigurations in health care delivery has affected care for HF. Patients with HF rely on intense regimens of clinical follow-up that may be subject to delay, cancellation, or transition to different platforms, leading to destabilization and risk of hospitalizations. The public lockdown is likely to have exerted unknown sequelae on the psychological, behavioural, and physical states of these patients. The objective of this study was to evaluate the volume and characteristics of patients presenting to hospitals with acute decompensated HF (ADHF) during the 2020 COVID-19 pandemic compared with a time-matched 2019 cohort.

We compared consecutive patients presenting with ADHF to the University Health Network (Toronto General Hospital and Toronto Western Hospital), in Toronto, Canada, from March 1, to April 19, 2020, and from March 1, to April 19, 2019 (time-matched control cohort). This timeframe contains the sentinel public lockdown in Ontario, Canada, of March 12, 2020. This study was approved by the Research Ethics Board (#20-5326). Inclusion criteria consisted of adults patients (≥ 18 years) presenting either to the emergency department (ED) (with triage diagnoses of “shortness of breath” or “leg swelling/edema”) or as direct admission from ambulatory clinics (with an admitting diagnoses of “heart
edema were recorded, compared with 800 ED visits in 2019. A decrease in ADHF-related ED visits of 43.5% (14.8%-79.4%, \( P = 0.002 \)) and ADHF-related admissions of 39.3% (8.6%-78.5%, \( P = 0.009 \)) was observed compared with 2019. Patients with ADHF presenting to hospitals (\( n = 128 \)) were similar in age, sex, and comorbidities compared with the 2019 cohort (\( n = 186 \)); however, a higher proportion had recent diagnoses of heart failure. Upon ED presentation, the relative probability of hospitalization or admission to intensive care was not statistically different. There was a trend toward higher in-hospital mortality in 2020. The decline in ADHF-related hospitalizations raises the timely question of how patients with heart failure are managing beyond the acute-care setting and reinforces the need for public education on the availability and safety of emergency services throughout the COVID-19 pandemic.

All statistical analyses were performed using Stata 16 (StataCorp, College Station, TX).

### Initial Clinical Experience

#### ED volume

From March 1, to April 19, 2020, a total of 1106 ED visits for dyspnea or peripheral edema were recorded, compared with 800 ED visits during the same timeframe in 2019. Of the patients presenting to the emergency department, 128 had diagnoses of ADHF in 2020, with 107 hospitalized, compared with 186 in 2019, with 149 hospitalized (Fig. 1). Of patients hospitalized with ADHF, 16 (15.0%) and 28 (18.8%) were admitted directly from ambulatory clinics in 2020 and 2019, respectively. By mixed-method modeling, there was an average increase in total ED visits of 38.3% (26.3%-51.6%, \( P < 0.001 \)), average decrease in ADHF-related ED visits of 43.5% (14.8%-79.4%, \( P = 0.002 \)), and average decrease in ADHF-related hospitalizations of 39.3% (8.6%-78.5%, \( P = 0.009 \)) between 2020 and 2019. These changes were more significant following the declaration of a public lockdown in Ontario, with an observed increase in total ED visits of 44.0% (29.4%-60.3%, \( P < 0.001 \)), a decrease in ADHF-related ED visits of 79.2% (34.3%-139.0%, \( P < 0.001 \)), and a decrease in ADHF-related hospitalizations of 64.5% (20.0%-225%, \( P = 0.002 \)). Figure 2 exhibits the weekly changes in ED visits and hospitalization volumes over time.

#### Patients presenting to hospitals with ADHF

The demographic characteristics of patients presenting to hospitals with ADHF were not significantly different between years. The median population age was 75 years; 161 (51%) patients were female, and 81 (26%) had underlying ischemic
cardiomyopathies. A higher proportion of patients presenting in 2020 did, however, have more recent diagnoses of HF. A comparable proportion of patients were on guideline-directed medical therapy.

By multivariable analysis, odds of hospitalization following ED presentation for ADHF was not significantly increased (odds ratio [OR], 1.07; 95% confidence interval [CI], 0.52-2.27) in 2020 compared with 2019 after adjusting for age, sex, LVEF, body mass index (BMI), New York Heart Association (NYHA) functional class, recency of HF diagnosis, hypertension, systolic blood pressure, heart rate, and respiratory rate. Similarly, the odds of being hospitalized was
not significantly different for patients presenting to emergency departments post-lockdown vs the 2019 time-matched cohort (adjusted OR, 0.66; 95% CI, 0.26-1.69); neither was the probability of being admitted to intensive care units. Among patients hospitalized with ADHF, there was a trend toward higher in-hospital mortality in 2020. The Supplementary Material features an extended version of the study findings.

Impact of COVID-19 pandemic on patients with HF

As a testament to the collateral damage of the COVID-19 pandemic, parallel trends in the volume of patients seeking medical care for non–COVID-19 medical concerns have been witnessed in jurisdictions around the world. In a retrospective analysis of 15 centres in the United States, a 43% reduction in hospitalization rates for acute cardiovascular conditions, including HF, ACS, and stroke from January to March 2020, was observed when compared with 2019, mirroring trends in the decline of ACS across the world. In Mississippi, a 50% decline in the number of hospitalizations for HF has been noted, mirrored by a likewise dramatic decline in HF hospitalizations in New York City.

The observed phenomenon of reduced ADHF-related ED visit and hospitalization volumes is likely secondary to a complex interplay of public health and social factors. It is conceivable that fear of acquisition of COVID-19 associated with the medical environment, and strict social isolation imperatives, may have prejudiced patients with HF to either attempt to self-manage their conditions at home or defer pursuit of medical care. Conversely, public health measures resulting in limited access to the commercial food industry, increased medication adherence in the absence of otherwise habitual diversions (eg, work, travel), increased time for leg elevation, and lower total daily energy expenditure may be contributors to lower ADHF. In addition, increased access to medical care via telecommunication may have resulted in more rapidly available follow-up and management, obviating the need for ADHF-related admission.

An important query raised by the decline in ADHF-related ED visits observed in this study pertains to the state of health and vital status of patients with HF who are no longer being seen in acute hospital settings, highlighting the critical and timely question of “where have all the patients gone?” An understanding of patients’ perspectives driving their behaviour is needed to target and mitigate deleterious health decisions. The reduced volume of patients presenting and hospitalized with ADHF may inevitably engender higher morbidity and mortality in the coming months. Ongoing surveillance of the cascade of the pandemic’s consequences on rates of adverse outcomes in patients presenting with ADHF is warranted to provide valuable lessons in cardiovascular patient care. Ongoing public education efforts on the continued availability of emergency care services and importance of seeking timely medical care, in addition to the close surveillance and management of patients with HF by clinicians throughout the COVID-19 pandemic, are likely needed.

Conclusions

Our description of the trends in ADHF-related ED volumes and hospitalization rates offers early insight into the indirect effects of the COVID-19 pandemic on patient care. Management of chronic HF is likely to be an integral component of the health system’s response to the COVID-19 pandemic, both in protecting this vulnerable population from acute and severe decompensations and in reducing the burden on hospital resources. The precipitous decline observed in
ADHF-related ED visits and hospitalizations raises the timely question of how these patients are managing beyond the acute-care setting and reinforces the need for broad public education on the continued availability and safety of emergency services throughout the COVID-19 pandemic.

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