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Research Letter

Reduction in heart failure admissions with concomitant respiratory viral infections during the novel coronavirus disease-2019 pandemic: Unintended consequence of public health measures in Singapore

To the Editor:

Common respiratory viruses can potentially trigger decompensation in patients with (HF).¹ During the novel coronavirus disease-2019 (COVID-19) pandemic, community-wide measures introduced to decrease the transmission of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), such as universal masking, social distancing, and hand hygiene, may decrease the transmission of common respiratory viral infections (RVIs),² potentially decreasing HF exacerbations. Although various studies have reported decreases in admissions for HF during the pandemic,^{3–5} these observations are confounded by a reluctance to seek care owing to a fear of nosocomial transmission³ and hospitals' efforts to minimize attendances at overwhelmed centres.⁵ Furthermore, because patients with COVID-19 also have a significant incidence of HF,⁶ significant community transmission may further confound causal interpretation. Although the ongoing pandemic provides a rare opportunity to ascertain the impact of public health measures on admissions for HF, such observations are only possible in areas that have mitigated community transmission and maintained public health interventions over a sustained duration.

In Singapore, a Southeast Asian city-state, various public health interventions were implemented after the first COVID-19 case in the end of January 2020, including social distancing and compulsory mask wearing in public.² A surge in April 2020 triggered a 7-week public lockdown.² However, the majority of COVID-19 cases remained confined to the migrant worker population, with limited community transmission. Lockdown measures were lifted on June 2, 2020; however, social distancing and compulsory mask wearing were maintained.² Early in the outbreak, comprehensive infection prevention measures were implemented at the National Heart Centre Singapore, the largest cardiac center in Singapore.⁷ To date, no nosocomial transmission of COVID-19 has been reported at our centre,⁸ and services were continued throughout. We evaluated trends in HF admissions with concomitant RVIs over an unbroken 10-month period during the pandemic, when public health measures were instituted to decrease SARS-CoV-2 transmission.

From January 2018 to October 2020, information on all admissions with a diagnosis of acute HF was extracted from our institution's electronic database. Inclusion criteria included a discharge diagnosis of acute HF according to appropriate *International Classification of Diseases* codes. Acute HF admissions that had a polymerase chain reaction test (PCR)-proven RVI in the same admission were then identified. Prepandemic, patients with HF and concurrent symptoms of upper respiratory tract infection had samples tested for common RVIs via multiplex PCR. During the pandemic, all inpatients with upper respiratory tract infection symptoms were tested for SARS-CoV-2 as well as common RVIs.^{7,8} The rates of HF admissions with PCR-proven RVI before and during the pandemic were compared using the incidence rate ratio method. A waiver of informed consent was obtained.

Our results showed a significant and sustained reduction in HF admissions with concomitant reduction in RVIs during the pandemic period (Fig. 1A). Before the pandemic, 3.2% (204/6351) of HF admissions had a PCR-proven RVI and almost one-third of patients tested for RVIs returned with a positive result (29.2%, 204/697); a 2013 study at our center found PCR-proven RVI in 13% of HF admissions on systematic testing.¹ During the pandemic, only 0.7% (11/1512) of HF admissions had a PCR-proven RVI and only 3.4% (11/328) of patients tested returned with a positive result. The incidence rate of PCR-proven RVI was 7.3 cases per 1000 HF admissions during the pandemic, compared with 32.1 cases per 1000 HF admissions before pandemic; the decline was statistically significant (incidence rate ratio 0.22, 95% confidence interval 0.11–0.41, $P < .001$). Notably, over a 4-month period from July 2020 onward, no admissions for HF had concomitant RVIs, an observation unprecedented in the preceding 2 years. The total number of HF admissions per-month dropped from an average of 254 admissions (standard deviation 22.2) before pandemic to 168 admissions/month (standard deviation 27.7) during the pandemic ($P < .001$) (Fig. 1B). Conversely, although non-HF admissions also decreased during the community-wide lockdown owing to movement restrictions, non-HF admissions subsequently rebounded to prepandemic levels after lifting of lockdown (Fig. 1C). During the pandemic, approximately one-fifth of admissions to our center (22.0%, 1487/6758) were tested for SARS-CoV-2; only 0.34% (5/1487) tested positive for COVID-19, one of whom presented with decompensated HF.⁷

A significant decrease in admissions for HF with PCR-proven RVIs was observed at a large cardiac center,

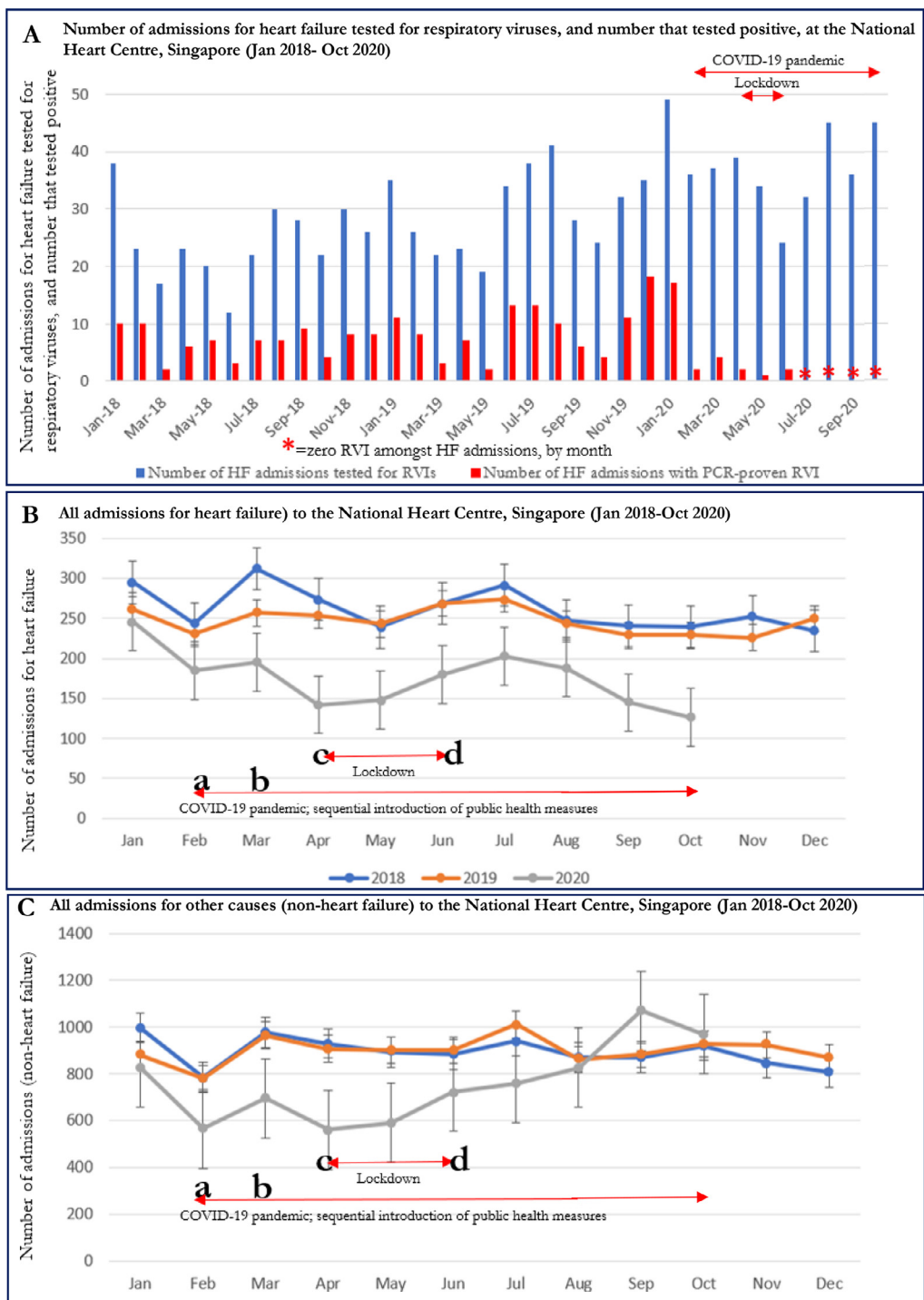


Fig. 1. Admissions for heart failure with concurrent respiratory viral infections, and trend of all-cause admissions at the National Heart Centre, Singapore (January 2018 to October 2020).

coinciding with the widespread adoption of public health measures during a pandemic. This decrease was sustained even after the reversal of community-wide lockdown measures; although non-HF admissions rebounded after lifting of lockdown, the decrease in admissions for HF persisted. The incidence of PCR-proven RVI among admissions for HF was significantly decreased during the COVID-19 pandemic, despite increased sampling in the pandemic period, likely owing to heightened vigilance for respiratory symptoms. Although significant limitations include the single-center nature of these observations and nonrandom sampling for RVIs, which may overestimate the effect of public health measures on HF admissions, the complementary role of simple preventive measures such as wearing of face coverings, hand hygiene, and social distancing in mitigating HF exacerbations deserves further study.

Conflict of interest

The authors report no conflicts of interest.

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