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Reassuring cardiac and non-cardiac outcomes for heart failure patients managed in a disease management programme during the COVID-19 pandemic

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The impact of COVID-19 on outcomes for patients with established heart failure (HF) has been limited to the risk of acute heart failure admission (AHF) [1–5] and risk of in-hospital mortality [3]. Little if any commentary has been provided on the threat of the pandemic on non-cardiovascular outcomes among HF patients and also whether the threat to HF outcomes is different dependent on HF phenotype. Furthermore, observations to date have not been stated to have come from within a disease management programme (DMP), the structure of which could mitigate some of the impact of COVID-19 through remote monitoring.

We analysed the impact of the COVID-19 pandemic on all elective and emergency hospitalisations and mortality in a HF population managed in a DMP. We also assessed any difference in outcomes between those with HF with reduced ejection fraction (HFrEF) and HF with preserved ejection fraction (HFpEF).

We undertook a retrospective analysis of hospitalisations and deaths among two sequential HF cohorts attending our HF unit (HFU). Emergency hospitalisation was recorded as AHF, acute cardiovascular but not HF-related (ACV) and non-cardiovascular (ANCV). Elective hospitalisation was noted as cardiovascular (ECV) and non-cardiovascular (ENCV). The first cohort (C1) included all patients who attended the HFU for the first time with a new diagnosis of HF in 2018. Hospitalisation and death rates of this cohort were evaluated in the period January to August 2019. The second cohort (C2) included patients who first attended the HFU in 2019, and the hospitalisation and death rates of this cohort were assessed from January to August 2020. This comparison allowed C1 to act as a form of ‘historical’ control for C2 with patients managed in the same unit. The patient cohorts included new community diagnoses of HF and hospital discharges following AHF admission. The months January to August in 2020 were chosen as they corresponded with the first surge of COVID-19 cases internationally and in Ireland, and the period of maximal disruption to chronic HF management in our HFU. During this period, much of our standard HF outpatient management was delivered remotely through our DMP, including nurse-provided weekly calls to post-discharge patients and doctor telephonic

consultation to any patient reporting concerning issues. These contacts were complemented by virtual consultation services to the family doctor. In-person consultations with patients were restricted to those with likely HF problems not resolving with telephonic advice and those patients requiring face-to-face review following AHF admission. Further detail on service disruption in our unit has been discussed in a recent publication showing good clinician and patient satisfaction with remote telephonic monitoring of HF patients during the COVID-19 pandemic [6]. Patient demographics for this study were taken from the HF database in the HFU. Hospitalisation data were extracted from the Hospital In-Patient Enquiry (HIPE) database from the three hospitals within our region. Mortality data were taken from both the HFU database and www.rip.ie. Statistical analysis was performed using SPSS Statistics 27. A p value < 0.05 was taken as significant.

Hospitalisation and mortality rates were analysed in 479 patients in C1 and 493 patients in C2. Baseline demographics are shown in Table 1. Patients were of similar mean age, gender and had similar baseline comorbidities. Weekly national case numbers of COVID-19 infection in Ireland for this period are shown in Fig. 1.

In the 2020 period (C2) during the first wave of the COVID-19 pandemic, there was a trend to fewer patients admitted for AHF, ANCV, ECV and ENCV in comparison to C1 in 2019, though these findings were not statistically significant. ACV admissions were marginally but not significantly greater in C2 (Fig. 2). In addition, there was a trend to a shorter length of stay for C2 for AHF management (8.6 vs 10 days; $p = 0.3$).

Analysis according to HF phenotype demonstrated similar trends in both HFpEF and HFrEF patients. However, HFrEF patients had a trend towards a larger decrease in the relevant admission categories in C2, during the COVID-19 era (Fig. 3).

Overall mortality was low in each cohort during the time periods analysed with no significant difference found (1.7% in C1 vs. 0.6% in C2, $p = 0.137$).

We report on the morbidity and mortality risk for HF patients managed within a DMP during the first phase of the COVID-19

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Table 1

SD, standard deviation; HFpEF, heart failure with preserved ejection fraction; HFrEF, heart failure with reduced ejection fraction; EF, ejection fraction; NYHA, New York Heart Association *Cohort 1 implies the cohort of patients who first attended the heart failure unit (HFU) in 2018 and whose admissions between January-August 2019 were analysed in this study; Cohort 2 implies the cohort of patients who first attended the HFU in 2019 and whose admissions between January-August 2020 were analysed in this study †EF unknown for 30 patients in Cohort 1 and 37 patients in Cohort 2.

Baseline Demographics			
	Cohort 1* (n = 479)	Cohort 2* (n = 493)	p-value
Age at first attendance, mean (SD)	74 (13.2)	74 (12.3)	
Male	254 (53%)	278 (56.4%)	0.32
Diabetes	102 (21.3%)	84 (17%)	0.11
Hypertension	164 (34.2%)	183 (37.1%)	0.38
Ischaemic heart disease	79 (16.5%)	76 (15.4%)	0.71
Haemoglobin at baseline in g/dL, mean (SD)	12.9 (1.8)	13.2 (6.3)	0.76
Creatinine at baseline in $\mu\text{mol/L}$, mean (SD)	106 (51)	100 (47)	0.31
Heart failure phenotype†			
• HFpEF (EF \geq 50%)	229 (51%)	237 (52%)	0.77
• HFrEF (EF < 50%)	220 (49%)	219 (48%)	0.77
NYHA class, n (%)			
• I	24 (5%)	22 (4.5%)	0.73
• II	163 (34%)	173 (35.1%)	
• III	268 (56%)	275 (55.8%)	
• IV	24 (5)	23 (4.6%)	

pandemic. No increased emergency admission risk was identified across all admission types. In addition, outcomes were similar for the two major HF phenotypes.

These data are encouraging considering the multiple threats that COVID-19 can present to HF patients. A possible explanation is that these threats are counterbalanced by access to a DMP, linking dominantly by virtual means. Telephonic remote assessments of patients were complemented by virtual consultations with general practitioners (GPs) to support community management of patients. A previous study from our unit showed that the majority of patients with established HF experiencing an acute decompensation sought a medical assessment in the community prior to presenting to hospital- most commonly in a HF clinic or GP practice [7]. This, and the anecdotal evidence of patients' reluctance to present directly to hospital during the pandemic, suggests a high likelihood that a significant proportion patients experiencing HF

symptoms sought or would seek care within the infrastructure provided by the DMP.

However, in the recently published GUIDE-HF trial a similar reduction in HF event rates was demonstrated during the COVID-19 era, along with a reduction in pulmonary pressures particularly in the control group [8]. This suggests that there are also other factors that likely interplay to explain changes in disease progression and event rates in HF patients during the pandemic.

The restrictions on movement during the pandemic may also have contributed to protecting against ANCV admissions. A trend towards higher ACV admissions in the COVID-19 era was observed, possibly linked to a reduction in ECV admissions allowing issues to graduate to need for emergency care.

While the results are reassuring, it is important to note that the impact of the pandemic was assessed over a short period. Longer term

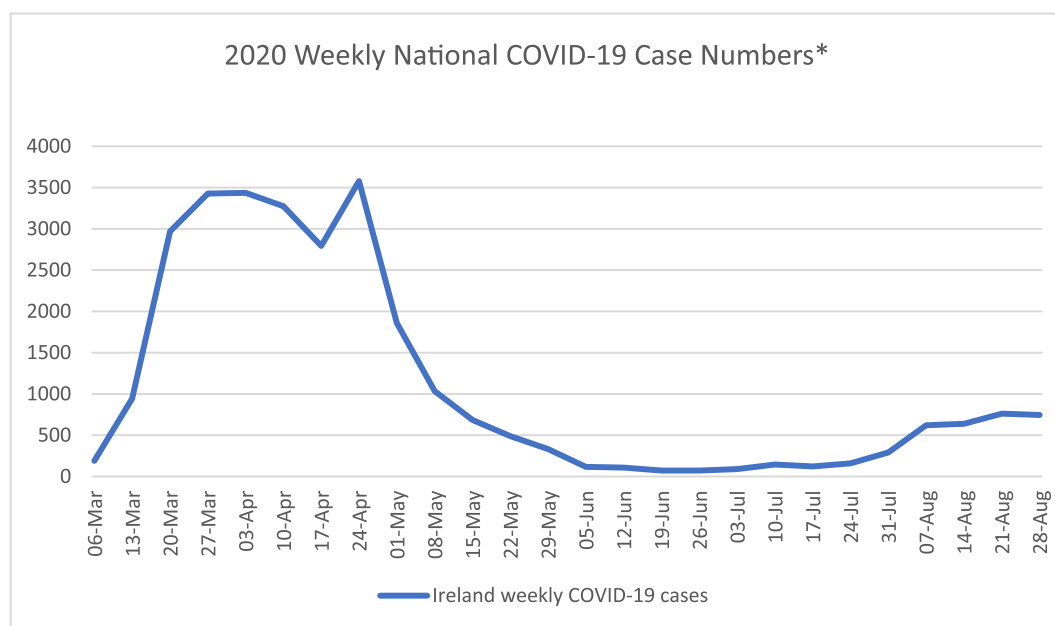


Fig. 1. The first confirmed COVID-19 infection in Ireland was detected on February 28th 2020. The above figures were sourced from the Central Statistics Office of Ireland.

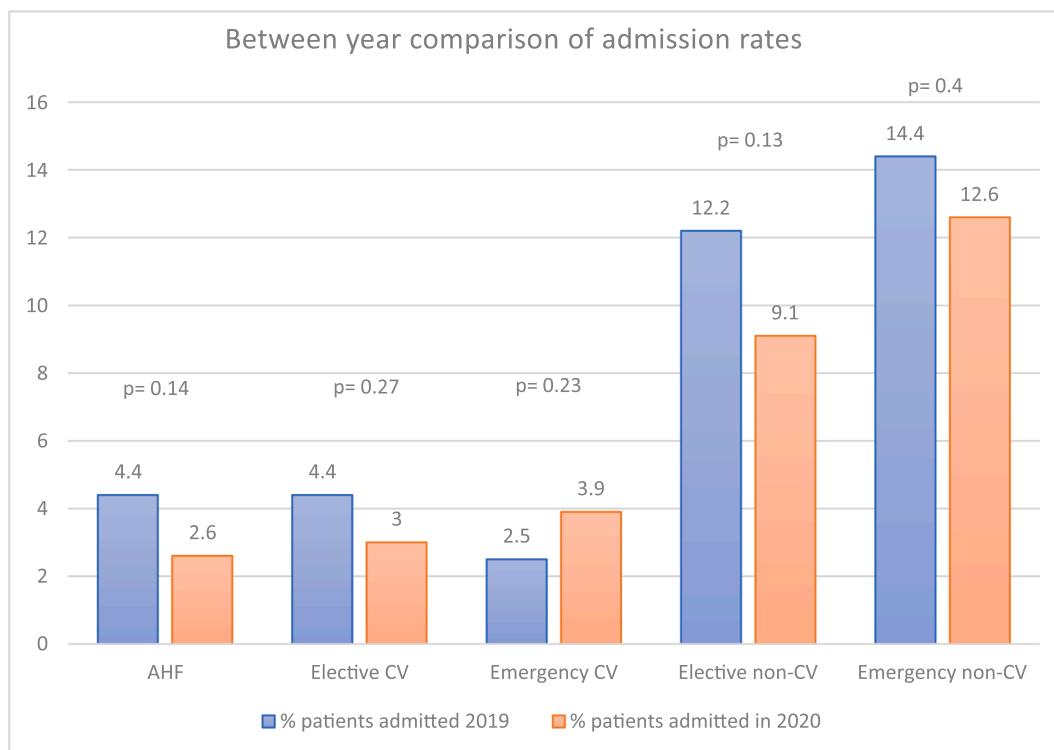


Fig. 2. AHF, acute heart failure; CV, cardiovascular; non-CV, non-cardiovascular.

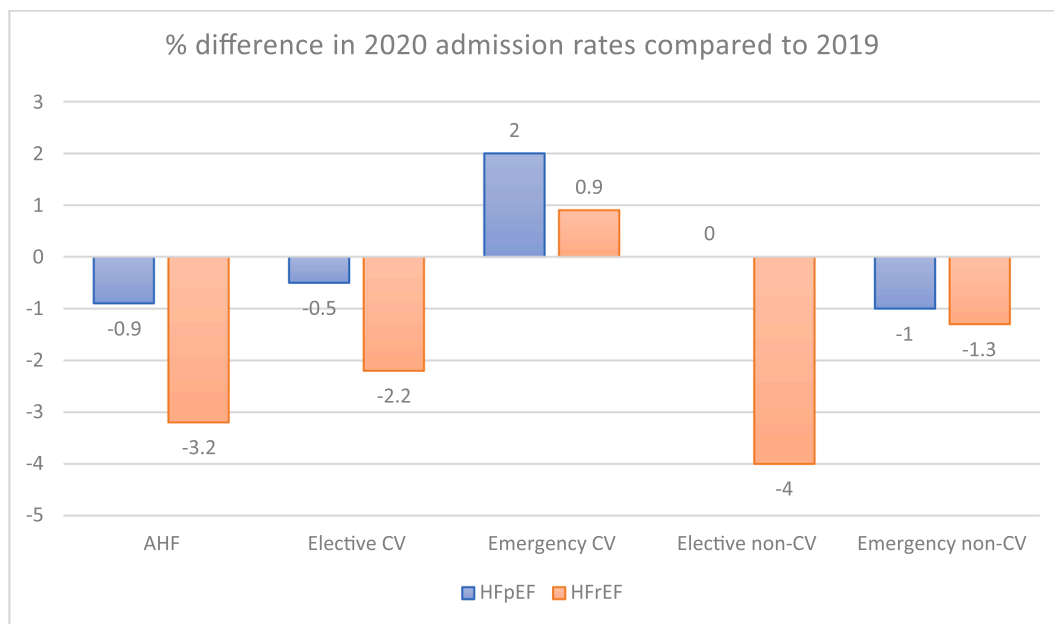


Fig. 3. AHF, acute heart failure; CV, cardiovascular; non-CV, non-cardiovascular; HFpEF, heart failure with preserved ejection fraction; HFrEF, heart failure with reduced ejection fraction.

impact requires analysis and in particular the impact on titration of disease modifying therapy that might have resulted from lack of face-to-face appointments. Additional limitations include our retrospective design and the small number of events. However, our analysis provides a direct comparison of patients at the same stage of their HF syndrome managed in the same setting.

In conclusion, we found no deleterious short-term impact of the COVID-19 pandemic on emergency admissions or mortality in a HF

cohort. These encouraging data might reflect the beneficial impact of continuing access to care through the DMP structure of care.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

References:

- [1] D.I. Bromage, A. Cannatà, I.A. Rind, C. Gregorio, S. Piper, A.M. Shah, T. A. McDonagh, The impact of COVID-19 on heart failure hospitalization and management: report from a Heart Failure Unit in London during the peak of the pandemic, *Eur. J. Heart Fail.* 22 (6) (2020) 978–984.
- [2] L. Toner, A.N. Koshy, J. Ko, A. Driscoll, O. Farouque, Clinical characteristics and trends in heart failure hospitalizations: an Australian experience during the COVID-19 lockdown, *J. Am. Coll. Cardiol. HF* 8 (10) (2020) 872–875.
- [3] A. Cannatà, D.I. Bromage, I.A. Rind, C. Gregorio, C. Bannister, M. Albarjas, S. Piper, A.M. Shah, T.A. McDonagh, Temporal trends in decompensated heart failure and outcomes during COVID-19: a multisite report from heart failure referral centres in London, *Eur. J. Heart Fail.* 22 (12) (2020) 2219–2224.
- [4] M.E. Hall, M. Vaduganathan, M.S. Khan, L. Papadimitriou, R.C. Long, G. A. Hernandez, C.K. Moore, B.W. Lennep, M.R. McMullan, J. Butler, Reductions in heart failure hospitalizations during the COVID-19 pandemic, *J. Card Fail* 26 (6) (2020) 462–463.
- [5] J. Wu, M.A. Mamas, M.A. de Belder, J.E. Deanfield, C.P. Gale, Second decline in admissions with heart failure and myocardial infarction during the COVID-19 pandemic, *J. Am. Coll. Cardiol.* 77 (8) (2021) 1141–1143.
- [6] B. Kerr, R.B. Pharithi, M. Barrett, C. Halley, J. Gallagher, M. Ledwidge, K. McDonald, Changing to remote management of a community heart failure population during COVID-19- Clinician and patient perspectives, *IJC Heart Vasc.* 2020 (31) (2020), 100665.
- [7] J. McCambridge, C. Keane, M. Walshe, P. Campbell, J. Heyes, P.R. Kalra, M. R. Cowie, J.P. Riley, R. O’Hanlon, M. Ledwidge, J. Gallagher, K. McDonald, The prehospital patient pathway and experience of care with acute heart failure: a comparison of two health care systems, *ESC Heart Fail* 8 (2) (2021) 1076–1084.
- [8] J.A. Lindenfeld, M.R. Zile, A.S. Desai, K Bhatt, A. Ducharme, D. Horstmanshof, S. R. Krim, A. Maisel, M.R. Mehra, S. Paul, S.F. Sears, A.J. Sauer, F. Smart, M. Zughaib, P. Castaneda, J. Kelly, N. Johnson, P. Sood, G. Ginn, J. Henderson, P.B. Adamson, M. R. Costanzo, Haemodynamic-guided management of heart failure (GUIDE-HF): a randomised controlled trial, *Lancet* 398 (10304) (2021) 991–1001, [https://doi.org/10.1016/S0140-6736\(21\)01754-2](https://doi.org/10.1016/S0140-6736(21)01754-2), 8.