

Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Elsevier hereby grants permission to make all its COVID-19-related research that is available on the COVID-19 resource centre - including this research content - immediately available in PubMed Central and other publicly funded repositories, such as the WHO COVID database with rights for unrestricted research re-use and analyses in any form or by any means with acknowledgement of the original source. These permissions are granted for free by Elsevier for as long as the COVID-19 resource centre remains active. case series supports that vasodilator stress MCE in transplant recipients is feasible and has the potential to detect obstructive CAV and microvascular dysfunction by assessing focal or diffuse perfusion abnormalities. Future registry data will provide data on how distinct diffusion defect phenotypes are modifiable and can predict outcomes, and whether MCE can detect CAV at earlier stages compared to current gold standards.



Figure 1: Vasodilator stress myocardial contrast echocardiography perfusion images (MCE)

A. Normal 4 chamber view with arrow demonstrating normal basal attenuation artifact

B. Patient #1: 4 chamber view demonstrating global hypoperfusion

C. Patient #2: 3 chamber view with arrow demonstrating multiple focal perfusion defects in the

D. Patient #3: 4 chamber view with arrow demonstrating small septal perfusion defect

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Evaluation Of A Pharmacist-driven Clinic On Optimization Of Guidelinedirected Medical Therapy

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Introduction: Despite overwhelming evidence showing the mortality and morbidity benefits of guideline-directed medical therapy (GDMT) in patients with HFrEF, use of these evidence-based medications remains suboptimal. There is a need for effective interventions that can bridge the gap between evidence and practice in implementation of GDMT. We aimed to characterize our experience of initiation of a weekly pharmacist-driven clinic to increase use of GDMT in patients with HFrEF and HFmrEF at a tertiary academic center. Methods: Single-center retrospective study of patients with HFrEF (LVEF <40%) and HFmrEF (LVEF 41-49%) who completed at least one visit at the pharmacist-driven clinic between March 18, 2021 and March 18, 2022. Demographics and clinical data were collected using the electronic health record. Data were displayed as medians and interquartile ranges for continuous variables and as counts and proportions for categorical variables. Results: 31 patients completed an initial visit in the pharmacist-driven clinic. Median age was 60 years (IQR 46, 70). Men comprised 68% (n=20); Black patients comprised 35% (n=11). Majority of patients (n=18, 58%) had a nonischemic cardiomyopathy. 23% (n=7) were diabetic, 35% (n=11) had stage 3 CKD or worse, and 52% (n=16) were obese. 17 patients (55%) were referred by a HF cardiologist. Median LVEF at initial visit was 32% (IQR 25, 41). At initial visit, median systolic blood

pressure was 116 mm Hg (IQR 106, 129), median diastolic blood pressure was 70 (IQR 61, 81), and median heart rate was 74 (60, 81). 8 patients (26%) had NYHA II symptoms; 8 patients (26%) were NYHA III. At baseline, 84% (n=26) were on ACEi/ARB/ARNI, and 50% of those patients were on ARNI (n=13). 90% (n=28) were on a beta-blocker (BB), 35% (n=11) were on MRA, and 3% (n=1) were on SGLT2i. 81% (n=25) patients completed at least one follow-up visit in the pharmacist-driven clinic during this time period. Of these patients, 68% (n=17) were seen by the pharmacist for a second visit before having a follow-up visit with their cardiologist, with a median time to second visit of 17.5 days (IQR 14, 35). By the second visit, 6 patients had ACEi/ARB/ARNI dose increased, 5 patients had BB dose increased, and 3 patients were newly initiated on SGLT2i. Conclusions: A pharmacist-driven clinic is an effective tool for initiation and uptitration of GDMT. Patients in our cohort had clinician contact with a pharmacist clinic sooner than regular follow-up with their treating cardiologists, leading to faster GDMT uptitration. Longitudinal follow-up is needed to better understand the efficacy of this intervention on GDMT optimization and on outcomes, including symptoms, cardiac remodeling, and hospitalizations.



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Heart Failure With Severely Reduced Ejection Fraction Following Covid-19 Vaccine: A Case Series

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Introduction: With the rise of the pandemic, the development of the COVID-19 vaccine has helped alleviate the burden on the healthcare system. However, rare cardiac side effects have been reported, especially within the young healthy population. Herein, we present a case series of four patients who received the Pfizer mRNA COVID-19 vaccine and were noted to have heart failure with severely reduced ejection fraction ($\leq 25\%$) a few weeks following the 2nd dose of the Pfizer vaccine. **Methods:** This is a retrospective study from January 2021 to August 2021. Patient cases were identified from hospitalizations or clinic visits. Each case was evaluated for underlying predisposing conditions, vaccination type, symp-toms onset, diagnostic studies, and outcomes. **Results:** A total of four patients were identified (table). Patients' ages ranged from 22-43 years old. Seventy-five percent of the patient population were male. All patients commonly reported clinical symptoms of heart failure including fatigue, orthopnea, paroxysmal nocturnal dyspnea, and peripheral edema starting within three weeks from receiving the second dose of the Pfizer COVID-19 Vaccine. Patients had no prior known cardiac history or predisposing conditions. Diagnostic workup including a left heart catheterization showed normal coronaries. Echocardiograms showed significantly reduced left ventricular ejection fraction (LVEF) \leq 25%. Three patients were confirmed to have non-inflammatory cardiomyopathy via endomyocardial biopsy or cardiac MRI. One patient was unable to get a cardiac MRI due to a concomitant acute renal injury. Patients were started on Guideline-directed medical therapy (GDMT). Two patients were noted to have an improvement in their ejection fraction with one patient achieving full recovery to LVEF of 62%. One patient is currently undergoing evaluation for advanced heart failure therapy while the last patient has relocated. Conclusion: s The relationship between the novel mRNA COVID-19 vaccine and cardiomyopathy remains to be an area in need of further investigation. Despite the unclear mechanism, management remains to be with GDMT and advanced therapies as indicated. EF recovery and improved clinical outcomes can be achieved in some.

Table: Clinical and diagnostic findings of four patient cases

Patient	Symptom onset	Diagnostic studies	GDMT	Outcomes
43 yo M	1 week after 2 nd dose of Pfizer	Troponin: < 0.03; BNP 1841 LHC: No disease TTE: LVEF 22%, S3DD, RVSP 50-55 mmHg	Carvedilol	Repeat TTE 4 months later: LVEF 62%
28 yo M	3 weeks after 2 nd dose of Pfizer	Troponin: <0.03; BNP 1399 CRP < 0.5; Sed Rate 12 LHC: No disease; RHC: mild pHTN TTE: severe 4 chamber dilatation. LVEF 15-20% EMB: No inflammatory infiltrates or granulomas	Carvedilol, Valsartan, Empagliflozin, Spironolactone	Out of state cardiology follow up
22 yo M	2 weeks after 2 nd dose of Pfizer	Troponin: < 0.03; BNP 2187; sed rate 10 LHC: No disease; RHC: mild pHTN; TTE: LVEF 15% Cardiac MRI: Moderate to severely dilated LV; no gadolinium enhancement	Sacubitril-Valsartan, Dapagliflozin, Carvedilol, Spironolactone	Repeat TTE in 1 month: LVEF 30-33%.
42 yo F	1 day after 2 nd dose of Pfizer	BNP 310; Ferritin 47.4; Sed rate 17 LHC: No disease; TTE: LVEF 20-25% Cardia MRI: dilated LV; no gadolinium enhancement	Lisinopril, Metoprolol, Sacubitril-Valsartan, Spironolactone	ICD placed. Currently undergoing cardiac transplant evaluation.

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Implementing A Pre-visit Virtual Care Model In A Tertiary Care Heart Failure Clinic

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Introduction: Heart failure (HF) tertiary care specialty clinics often provide care to patients who travel long distances for evaluation. Patients frequently provide new information at their face-to-face consultation that prompts additional testing and evaluations from other specialties. Inability to accommodate these new lines of investigation on short notice can lead to patient and clinician dissatisfaction. To improve the experience, we implemented a HF pre-visit program, where new patients could have a virtual pre-visit appointment with a HF cardiologist in advance of their in-person visit at the Mayo Clinic Heart Failure Clinic. The goals of the pre-visit were to set expectations for the face-to-face visit and gather information to develop an efficient and personalized itinerary to meet each patient's unique needs. Methods: The HF pre-visit model consisted of two appointments with the same HF cardiologist- a virtual visit and an in-person visit 2-4 weeks later for all new patients referred to the HF clinic. To evaluate the impact of the pre-visit model, we established two cohorts of adult patients referred for a new HF clinic visit. The cases were patients in the new previsit model that completed both their pre-visit and in-person visit between February 1, 2021 (start of pre-visit model) and July 31, 2021. The controls were those under the old model with no pre-visit between February 1, 2019 (pre-pandemic) and July 31, 2019. As there were no statistically significant differences in baseline characteristics between cases and controls observed, a matched analysis was not performed. Days on campus, number of visits on campus, and visits outside of the standard HF orderset were compared using the Wilcoxon Mann-Whitney test. Physician, scheduling staff and patient experience were assessed using semi-structured interviews. Results: A total of 173 pre-visit cases (mean age 62 years, 54% men) and 196 historical controls (mean age 63 years, 61% men) were included in the analysis. In total, 7% of patients were local, 66% regional, 26% national, and 2% international. Pre-visit cases had more visits outside of the standard HF clinic orderset (median [25th-75th percentile] 3 [2-6] vs. 2 [1-5], p<0.001) compared with historical controls. Median costs (p=0.97), time spent on campus (p=0.10), and total number of visits (p=0.25) did not differ between cases and controls. Patient experience with the pre-visit model was overwhelmingly positive and physician and staff experience was positive with some suggestions for improvement. Conclusions: Our findings suggest a more personalized patient experience with the HF previsit model compared with the previous model of care. This model could be adapted and implemented across a wide variety of tertiary referral settings.

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Incomplete Reporting Of Echocardiography Parameters In Heart Failure Patients

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Introduction: Left ventricular ejection fraction (LVEF) has for decades reflected a measure of cardiac function and equated as a valuable diagnostic and prognostic tool. The well-known ventricular interdependence between the LV and the right ventricle (RV) clearly describes the close interplay between LV filling characteristics and markers of RV systolic function. This closely linked interaction has shown to be directly responsible for symptoms, disease progression, and overall outcome. In the case of follow-up of Heart failure (HF) with reduced ejection fraction (EF) patients outside research studies, a standard transthoracic echocardiogram (TTE) is optimal for management once valvular diseases have been excluded. Based on

preliminary data from our group, measures of LV diastolic function, RV systolic, and pulmonary artery systolic pressures should be included in all studies. Assessment of RV systolic function by tricuspid annular plane systolic excursion (TAPSE) may also provide prognostic information. However, we hypothesize that most TTEs of HF patients do not include these variables, and this information is critical in managing these patients. Objective & Hypothesis: To prove our hypothesis, we reviewed the echocardiographic database at our Institution and randomly collected data from routine TTEs of chronic HF patients referred to our HF clinic. Methods: TTE data from consecutive reports were reviewed. We randomly selected 97 HF patients referred to our outpatient HF clinic of a safety net hospital for this study. All data were obtained by manual chart review of the electronic health records and analyzed using SAS version 9.4 (SAS Institute, Cary, NC). Results: Our selected sample had the following phenotype distribution HFrEF 82.5%, heart failure with mid-range ejection fraction 8.2%, and preserved EF (HFpEF) 9.3%. Coronary artery disease was present in 29% of the cases, while a non-ischemic etiology was documented in 59% of patients. The mean and SD measures of LVEF were 30.7% (13.2). In our sample, 35% of TTE reports did not include comments on LV diastolic function while pulmonary artery systolic pressures were not reported in 34% of cases, and RV systolic function was not mentioned in 10 % of TTE reports, and in most cases was done by visual assessment rather than using TAPSE. Conclusions: TTE findings are essential in diagnosing and guiding the management of HF, particularly when significant valvular abnormalities are present. However, our contention is that routine TTE among HF patients should include the measures we have listed above to better guide therapy. Consequently, an isolated measure of LVEF should not be the sole focus of our echocardiographic examination.





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Increasing Utilization Of Sodium Glucose Cotransport 2 Inhibitors Use, A Quality Improvement Project

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Sodium Glucose Cotransport 2 inhibitors or commonly referred to SGLT2inhibitors have become a concrete addition to the heart failure community over the past several years. From reports benefits in reducing heart failure admissions, cardiovascular mortality and even slowing the progression of chronic kidney disease. Studies have even shown that SGLT2-inhibitors are safe to be acutely started and the benefits seen are independent of mineralocorticoid antagonist use. However, despite these findings, and even recommendations by the American College of Cardiology and Federal Drug Administration, SGLT2-inhibitors continue to be underutilized. With one study reporting prescribing rates as high as only 14% in 2019. Many factors might be contributing to these low prescribing rates and clinical hesitancy, such as concern for hypoglycemia, needing to adjust baseline diabetic medications prescribed by other providers and concern for noncardiac side effects such as having to counsel on urogenital infections risk, in addition to new guidelines, and costs all playing a factor. With this study, we aim to evaluate and increase utilization of SGLT2 use in those with known heart failure with reduced ejection fraction through multistage inpatient education and initiation prior to hospital discharge. Our hospital system is unique because within our hospital system, we can essentially remove medication costs of SGLT2 inhibitors through a government subsidized drug pricing program. Within our hospital we identified patients with a known ejection fraction of less than 40% and GFR greater than 30ml/min. From there, clinical providers were contacted directly about the patient's eligibility and recommendations from the current literature. Educational material was