

The Impact of the COVID-19 Pandemic on Physician Visits among Patients Diagnosed with Breast Cancer and Heart Failure in the United States

Chia-Yun Hsu, BPharm, MS¹, Dominique Seo, MPH¹, Eberechukwu Onukwugha, PhD¹
¹Department of Practice, Sciences, and Health Outcomes Research, School of Pharmacy, University of Maryland, Baltimore



Introduction

- Cardiovascular care plays a crucial role in reducing the risk of adverse outcomes among breast cancer (BC) survivors.
- Previous evidence has shown that the delivery of cancer care was significantly reduced across all cancer types during the early part of the COVID-19 pandemic.
- The reduced cancer care delivery in the early part of the pandemic may have contemporaneous and longer-term implications for cancer-related and cardiovascular care among women diagnosed with BC and heart failure (HF). However, there is limited evidence about these relationships.

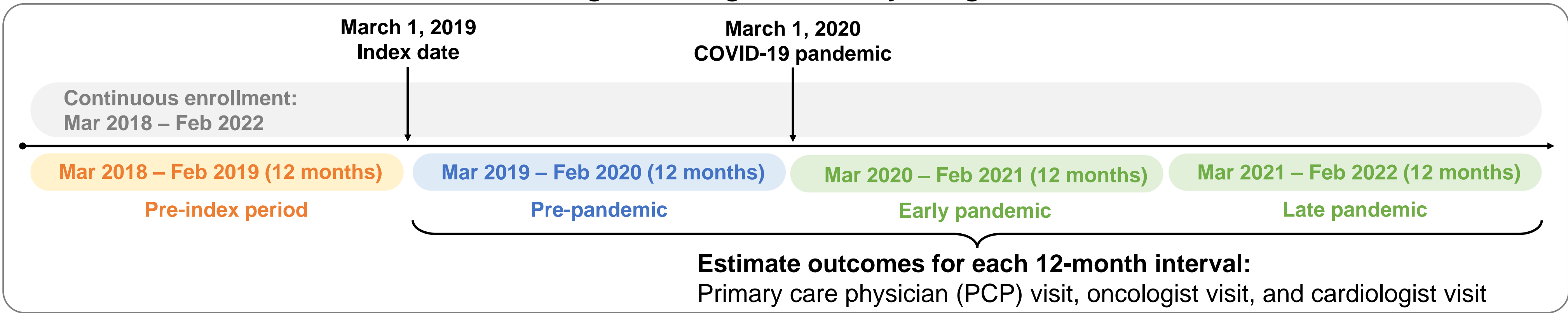
Objective

- This study assesses the impact of the COVID-19 pandemic on the utilization of physician services among female patients diagnosed with BC, comparing those with HF to those without HF.

Methods

- A difference-in-differences analysis was conducted using nationally representative de-identified claims data from the 2018-2022 Komodo Healthcare Map™, which included healthcare encounters from insured individuals in the United States. Females aged 18 years and older at index date (March 1, 2019) and diagnosed with BC during the 12-month pre-index period were included in the study (Figure 1).
- Two key parameters of the difference-in-differences analysis in individuals diagnosed with BC:
 - Exposure: HF; we identified and compared individuals diagnosed with both BC and HF, and those diagnosed with BC but without HF.
 - Periods: before and after the COVID-19 pandemic (Figure 1); we compared early pandemic vs. pre-pandemic, and late pandemic vs. pre-pandemic periods. Physician visits we assessed as outcomes included: primary care physician (PCP) visit, oncologist visit, and cardiologist visit.
- We estimated model parameters using finite mixture negative binomial hurdle models; two-part models were used to calculate adjusted odds ratios (aORs) and adjusted rate ratios (aRRs) for each of the three visit categories. Separate models were tested to compare the early and late pandemic periods against the pre-pandemic period. The models were adjusted for age and cardiovascular-related conditions and medications (X_i):
 - First part: $\text{logit}(Y_i) = \alpha_0 + \alpha_1(HF_i) + \alpha_2(\text{early or late pandemic}) + \alpha_3(HF_i \times \text{early or late pandemic}) + \beta X_i + \varepsilon_i$
 - Second part: $\log(Y_i) = \alpha_0 + \alpha_1(HF_i) + \alpha_2(\text{early or late pandemic}) + \alpha_3(HF_i \times \text{early or late pandemic}) + \beta X_i + \varepsilon_i$
- The interaction effects (α_3) of HF and the pandemic indicators on visits were estimated to examine the impact of the COVID-19 pandemic.

Figure 1. Diagram of study design



Results

Table 1. Characteristics of individuals with BC

	BC with HF n (%)	BC without HF n (%)
N	11,819 (100)	118,487 (100)
Age		
Mean (SD)	69.4 (11.6)	60.5 (11.1)
Median (Q1-Q3)	71 (61-79)	60 (53-68)
Hypertension		
No	4,573 (39)	99,952 (84)
Yes	7,246 (61)	18,535 (16)
Diabetes mellitus		
No	8,100 (69)	110,277 (93)
Yes	3,719 (31)	8,210 (7)
Ischemic heart disease		
No	8,821 (75)	116,432 (98)
Yes	2,998 (25)	2,055 (2)
ACEI/ARB		
No	4,926 (42)	87,734 (74)
Yes	6,893 (58)	30,753 (26)
Beta blockers		
No	4,738 (40)	103,273 (87)
Yes	7,081 (60)	15,214 (13)

%; column percentage; ACEI/ARB: angiotensin-converting enzyme inhibitor/angiotensin receptor blocker

Table 2. Summary statistics of physician visits

	BC with HF (N=11,819)			BC without HF (N=118,487)		
	n of individual with visit (%)	Mean (SD)	Median (Q1-Q3)	n of individual with visit (%)	Mean (SD)	Median (Q1-Q3)
PCP visit						
Pre-pandemic	10,265 (87)	9 (10)	6 (2-12)	99,132 (84)	5.1 (6)	4 (1-7)
Early pandemic	9,874 (84)	7 (10)	5 (1-10)	96,454 (81)	4.7 (6)	3 (1-6)
Late pandemic	9,952 (84)	8 (10)	5 (2-11)	98,100 (83)	5.1 (6)	3 (1-7)
Oncologist visit						
Pre-pandemic	5,782 (49)	3 (8)	0 (0-3)	70,281 (59)	3.4 (8)	1 (0-3)
Early pandemic	4,942 (42)	2 (7)	0 (0-2)	61,117 (52)	2.3 (6)	1 (0-2)
Late pandemic	4,632 (39)	2 (8)	0 (0-2)	57,443 (49)	2.2 (6)	0 (0-2)
Cardiologist visit						
Pre-pandemic	8,047 (68)	4 (5)	2 (0-5)	27,844 (24)	0.7 (2)	0 (0-0)
Early pandemic	7,226 (61)	3 (5)	1 (0-4)	24,611 (21)	0.6 (2)	0 (0-0)
Late pandemic	7,072 (60)	3 (5)	1 (0-4)	27,150 (23)	0.7 (2)	0 (0-0)

Table 3. Parameter estimate: early pandemic

	aOR (95% CI)	aRR (95% CI)
Primary care visit		
HF	0.99 (0.93-1.05)	1.19 (1.17-1.22) *
Early pandemic	0.85 (0.84-0.87) *	0.93 (0.92-0.94) *
HF × early pandemic	0.90 (0.83-0.97) *	0.96 (0.93-0.99) *
Oncologist visit		
HF	0.93 (0.89-0.97) *	1.22 (1.14-1.29) *
Early pandemic	0.73 (0.71-0.74) *	0.68 (0.66-0.69) *
HF × early pandemic	1.02 (0.97-1.08)	1.12 (1.03-1.21) *
Cardiologist visit		
HF	2.93 (2.79-3.06) *	1.69 (1.62-1.76) *
Early pandemic	0.85 (0.83-0.86) *	0.99 (0.97-1.02)
HF × early pandemic	0.84 (0.79-0.89) *	0.90 (0.86-0.95) *

*p-value< 0.05

Table 4. Parameter estimate: late pandemic

	aOR (95% CI)	aRR (95% CI)
Primary care visit		
HF	1.04 (0.98-1.11)	1.20 (1.17-1.22) *
Late pandemic	0.94 (0.92-0.96) *	1.03 (1.02-1.03) *
HF × late pandemic	0.86 (0.79-0.92) *	0.94 (0.92-0.97) *
Oncologist visit		
HF	0.93 (0.89-0.97) *	1.24 (1.17-1.32) *
Late pandemic	0.64 (0.63-0.65) *	0.72 (0.70-0.73) *
HF × late pandemic	1.04 (0.98-1.09)	1.06 (0.98-1.16)
Cardiologist visit		
HF	3.01 (2.87-3.15) *	1.67 (1.61-1.74) *
Late pandemic	0.97 (0.95-0.99) *	1.08 (1.05-1.10) *
HF × late pandemic	0.70 (0.66-0.74) *	0.88 (0.84-0.93) *

*p-value< 0.05

- We identified 11,819 individuals diagnosed with both BC and HF, while 118,487 individuals were diagnosed with BC and no HF.
- Individuals with both BC and HF had higher mean age and prevalence of cardiovascular-related conditions (Table 1).
- Individuals with HF had a higher proportion and a higher count of physician visits compared to those without HF, except for oncologist visits, which decreased (Table 2).
- Cardiologist visit
 - Compared to individuals with comorbid HF in the pre-pandemic period, comorbid HF in the early pandemic was associated with lower odds and rate of a cardiologist visit (aOR: 0.84 [0.79-0.89]; aRR: 0.90 [0.86-0.95]) (Table 3).
- Lower odds and rate of cardiologist visit persisted in the late pandemic (aOR:0.70 [0.66-0.74]; aRR: 0.88 [0.84-0.93]) (Table 4).
- Oncologist visit
 - Among individuals with comorbid HF in the early pandemic compared to the pre-pandemic period, only oncologist visit was associated with higher rate (aRR: 1.12 [1.03-1.21]) (Table 3).
- Higher rate of oncologist visit did not persist in the late pandemic period (aRR: 1.06 [0.98-1.16]) (Table 4).

Conclusion

- We identified reduced utilization of cardiologist and PCP services in the early pandemic period and this persisted through the late pandemic period. The higher intensity of oncologist visits in the early pandemic period was not sustained in the late pandemic period.
- Additional research is needed to determine the net effect of these visit patterns on health outcomes among individuals with BC and comorbid HF.