# Real-World Economic and Clinical Burden of Worsening Heart Failure in the US: Administrative Claims Database Analysis

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## Introduction

Worsening heart failure (WHF) represents a pivotal stage in the progression of chronic heart failure, marked by acute symptom escalation and frequent hospitalizations.[1,2] In the United States, approximately 2.5 million WHF episodes occur each year, imposing a significant burden on patients, caregivers, and the healthcare system.[3] These episodes are associated with high rates of rehospitalization, emergency department visits, and complex care needs, all of which drive substantial healthcare resource utilization and costs.[3,4] A clearer understanding of the clinical and economic impact of WHF is essential to inform strategies that address the unmet needs in this high-risk population. **This study aimed to describe healthcare resource utilization (HCRU) and costs among patients with WHF using real-world claims data.**

## Methods

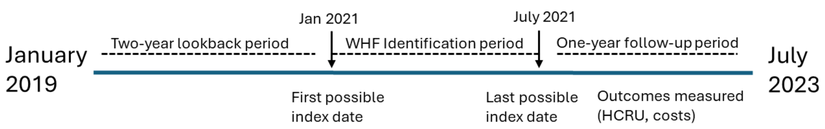
**Study Design:**

- This study utilized MerativeTM MarketScan® Commercial, and Medicare claims database (2019-2023) that contain individual-level, de-identified, healthcare claims information from employers, health plans, hospitals, and Medicare and Medicaid programs
- Patients with WHF (defined as hospitalization with heart failure (primary diagnosis) [ICD-10-CM: I50.X, I11.0, I13.0, I13.2]) were identified during an identification period from January 2021 to July 2022. The date of first occurrence of WHF within the identification period was used as index date, and patients were followed for one year to measure outcomes

**Inclusion Criteria**

- At least 1 diagnosis of HF within the two years prior to index (lookback period), that occurs that at least 3 months or greater prior to hospitalization (Index date)
- Age 18 or greater at time of HF diagnosis during the lookback period
- Continuously enrolled at least 6 month before and 12 month after Index Date
- Individuals who were pregnant during the study period January 2019 to July 2023 were excluded

**Figure 1** Study Timeline




**Outcomes Measures**

- Outpatient visits (Outpatient office visits, Emergency room (ER) visits Urgent Care visits, Home healthcare visits, and Other outpatient visits); Inpatient visits (re-hospitalization); Healthcare Expenditure (Pharmacy Costs, Inpatient Costs, and Outpatients Costs); Medication usage following 90-days of discharge
- Time to hospital readmission was analyzed using Kaplan-Meier (KM)

## Results

- Sample demographics and clinical characteristics are presented in **Table 1**
- **Table 2** highlights the HCRU of the WHF population, at 3 months and 1 year, following the initial index hospitalization; 3,049 (57.9%) patients had at least one rehospitalization within a year. **Figure 2** displays the KM estimation for time to readmission; the median (IQR) for time to first readmission was 268 (257 – 283) days
- HF medication usage was collected; **Figure 3** displays the proportion of individuals with at least one pharmacy fill, by each medication class
- In total, the average health (SD) health expenditure was $24,964 ($72,712) at 90 days and $86,066 ($156,423) at 365 days (**Figure 4**).

**Table 1** Population Demographics and Clinical Characteristics (6-months pre-index), n = 5,263

| Demographics | N | % |
|---|---|---|
| **Age at Index** | | |
| Mean (SD) | 72.4 (13.7) | |
| Median (IQR) | 75.0 (21.0) | |
| **Gender** | | |
| Male | 2,867 | 54.5% |
| Female | 2,396 | 45.5% |
| **Geographic Regions** | | |
| North Central | 2,611 | 49.6% |
| South | 1,606 | 30.5% |
| Northeast | 742 | 14.1% |
| West | 299 | 5.7% |
| Unknown | 5 | 0.1% |
| **Charlson Comorbidity Index (CCI) score** | | |
| Mean (SD) | 6.9 (5.1) | |
| Median (IQR) | 5.0 (10.0) | |
| **CCI Categories** | | |
| 0* | 214 | 4.1% |
| 1 | 514 | 9.8% |
| 2 | 698 | 13.3% |
| ≥ 3 | 3,837 | 72.9% |
| **Baseline clinical conditions** | | |
| Other cardiovascular disease | 4,968 | 94.4% |
| Glomerular diseases | 39 | 0.7% |
| Renal Tubulo-interstitial Disease | 158 | 3.0% |
| Other disorder of kidney and ureter | 763 | 14.5% |
| Obesity | 1,783 | 33.9% |
| Diabetes Mellitus (Type II) | 2,868 | 54.5% |
| Hyperlipidemia | 3,004 | 57.1% |
| Asthma | 433 | 8.2% |
| Chronic obstructive pulmonary disease | 1,326 | 25.2% |
| Acute kidney disease | 1,047 | 19.9% |
| Chronic kidney disease | 2,105 | 40.0% |
| Unspecific kidney failure | 81 | 1.5% |
| **Heart failure type** | | |
| Systolic HF (I50.2x) | 1,788 | 34.0% |
| Diastolic HF (I50.3x) | 1,828 | 34.7% |
| Combined Systolic and Diastolic HF (I50.4x) | 834 | 15.8% |
| Right side HF (I50.8x) | 193 | 3.7% |
| Hypertensive heart disease with heart failure (I11.0X) | 1,806 | 34.3% |
| Hypertensive heart and chronic kidney disease with heart failure (I13.0X) | 1,227 | 23.3% |
| Heart failure, unspecified (I50.9X) | 2,531 | 48.1% |

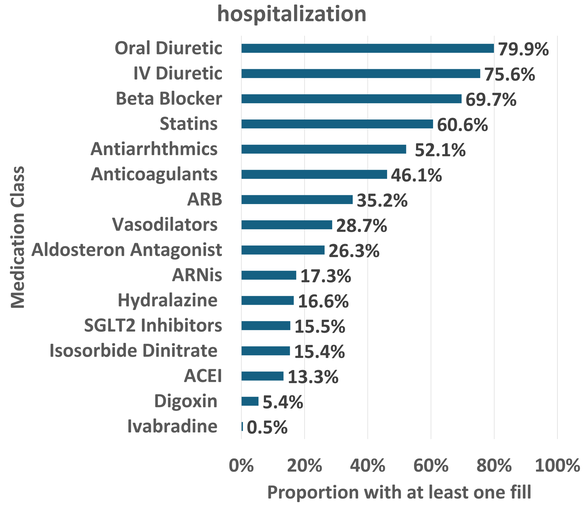
*CCI score of 0 was possible as 6-months pre-index was used to calculate CCI, while 2-years pre-index was used to confirm HF diagnosis
**Heart Failure type categories are not mutually exclusive

**Table 2** Healthcare resource utilization, 90 and 365 days following initial worsening heart failure hospital admission, n = 5,263

| Healthcare Resource Utilization | 90 days Mean (SD) | 1 year Mean (SD) |
|---|---|---|
| **Outpatient visits total** | 18.6 (13.4) | 62.5 (49.4) |
| Outpatient office visits | 5.6 (4.1) | 18.3 (13.9) |
| Emergency room visits | 1.6 (1.1) | 2.6 (2.4) |
| Urgent care visits | 1.2 (0.5) | 1.5 (1.0) |
| Home healthcare visits | 7.9 (8.9) | 19.6 (23.5) |
| Other outpatient visits* | 10.8 (11.7) | 36.2 (44.9) |
| | n | % |
| **≥1 Follow-up hospitalization**** | 3,049 | 57.9% |
| **Time to first readmission** | | |
| 0 - 1 month | 654 | 12.4% |
| 0 - 3 months | 1,341 | 25.5% |
| 4-6 months | 774 | 14.7% |
| 7-9 months | 522 | 9.9% |
| 10-12 months | 412 | 7.8% |

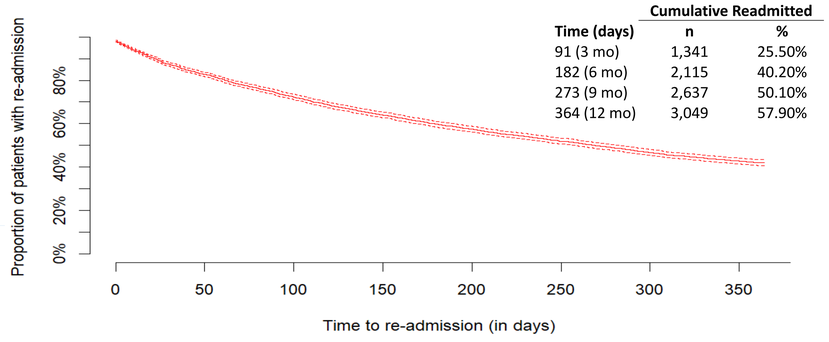
*Other outpatient visits included (to be added)
**Hospital readmission calculated for 365 days following initial discharge

**Figure 3** Heart failure medication usage* among patients with worsening heart failure, within 90 days following hospital admission, n = 5,263



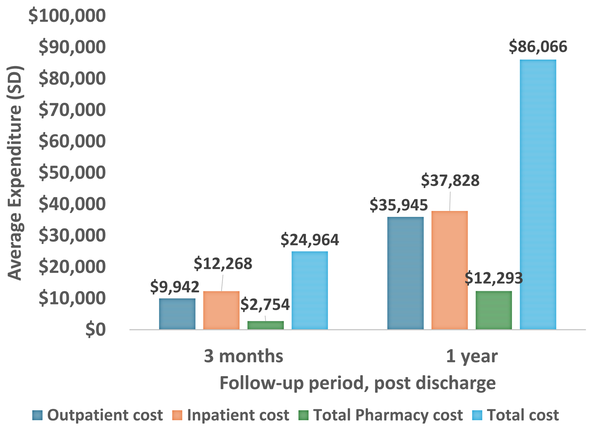

SGLT2, Sodium-Glucose Transport Protein 2; ARB, angiotensin receptor blocker; ACEI, Angiotensin-Converting Enzyme Inhibitors; ARNI, angiotensin receptor/neprilysin inhibitor
*Medication use considered at least one pharmacy fill for medication class

**Figure 2** Kaplan-Meier curve estimating time to readmission following hospitalization for worsening heart failure, n = 5,263




| Time (days) | Cumulative Readmitted n | % |
|---|---|---|
| 91 (3 mo) | 1,341 | 25.50% |
| 182 (6 mo) | 2,115 | 40.20% |
| 273 (9 mo) | 2,637 | 50.10% |
| 364 (12 mo) | 3,049 | 57.90% |

**Figure 4** Medical costs, among worsening heart failure patients, 3 months and 1 year following initial hospital discharge




## Limitations

Several limitations should be noted when considering this study's results. First, The MarketScan database relies on administrative claims, which may include coding inaccuracies or omissions, and the study's continuous enrolment requirements may introduce selection bias. Additionally, WHF was defined based on diagnosis coding and hospitalization, which may not capture all instances of WHF. HCRU and costs observed in this study may not be generalizable to WHF populations that differ in characteristics from those in MarketScan.

## Conclusions

- Study findings highlight substantial health burden experienced by patients with WHF following hospitalization, including an average of 2.6 ER visits and a 57.9% rehospitalization rate in the following year
- Medication usage observed suggest gaps in used of evidence-based therapy: notably, only 15.5% of individuals received SGLT2 inhibitors robust evidence supporting their efficacy in heart failure management
- The high HCRU and costs, averaging $86,066 per patient in the year following hospitalization discharge, suggest an unmet need for effective interventions, including innovative therapies and care management strategies

## References

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