Characterization of Recurrent Pericarditis in Medicare Advantage Patients: Disease Burden, Pharmacotherapy, and Outcomes

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BACKGROUND

- Recurrent pericarditis (RP) is a debilitating inflammatory disease that can occur in up to 30% of patients with an incident episode of pericarditis [1-3], and multiple recurrences may occur in approximately half of RP patients despite the use of conventional therapies, including nonsteroidal anti-inflammatory drugs (NSAIDs)/aspirin, colchicine, and/or corticosteroids (CS) [4, 5]
- The average age of pericarditis patients is typically 40-60 years old, but the disease is not well-characterized in older patients (i.e., those over the age of 65) [6,7]
- Older patients are more likely to have multiple comorbidities, making treatment of RP challenging [8]
- Addition of medication to manage RP on top of those already being used to manage pre-existing comorbidities may increase the risk of medication-related complications, including adverse events, drug-drug interactions, and/or drug-disease interactions for older patients, which are represented in the Beers Criteria for Potentially Inappropriate Medication (PIM) Use in Older Adults [9, 10]
- Appropriate management of RP patients requires a good understanding of their clinical characteristics, comorbidities, and treatment utilization with the goal of recurrence prevention. This is particularly important for older patients whose complex clinical profiles may further complicate optimal disease management. However, few studies have described this RP population.

OBJECTIVE

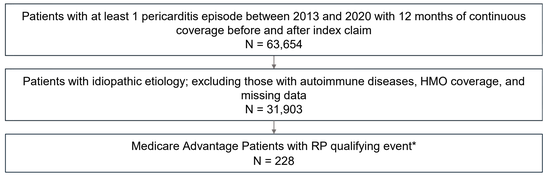
- The goal of this exploratory study was to retrospectively describe clinical characteristics, disease burden, and treatment use in RP patients ≥65 years using a large United States (US) administrative claims database

METHODS

- This retrospective study was conducted using US healthcare claims data between January 2013 and January 2020 from the Inovalon closed claims database
- Pericarditis was identified by primary or secondary diagnosis codes (International Classification of Diseases Clinical Modification, version 9 or 10; ICD-9 or ICD-10) for idiopathic pericarditis associated with inpatient, emergency room, or outpatient visits; discrete episodes of pericarditis were defined based on visits with a maximum gap of <28 days
  - A subsequent recurrence episode was defined based on a pericarditis claim or group of claims occurring ≥28 days after a prior episode
- Prior to the acute pericarditis index event (AP index event), a pre-index period of 12-months with no pericarditis claims was required
- For inclusion in this analysis, patients were required to have had Medicare Advantage coverage and an RP qualifying event, defined as either ≥2 recurrences of pericarditis or 1 recurrence of pericarditis with a serious complication
  - The follow-up period after the RP qualifying event was the end of available data for each patient or the end of the data observation period (January 2020), whichever came first
- Patients with non-idiopathic pericarditis etiologies, missing demographic data, and health maintenance organization (HMO) coverage were excluded
- Patient characteristics, overall disease burden (including RP and comorbidities), and treatment patterns across pericarditis episodes were assessed using descriptive statistics
  - Non-pericarditis treatments were evaluated using therapeutic classes defined by the Micromedex Red Book

RESULTS

FIGURE 1. FLOW DIAGRAM OF PATIENT SELECTION



**A second recurrence or a complication after first recurrence post AP index event*

TABLE 1. PATIENT CHARACTERISTICS AT BASELINE

Characteristic	n, (% of 228)
Age, years, Mean (SD)	73.3 (8.6)
Female, n (%)	123 (54%)
Region, n (%)	
Northeast	36 (16%)
Midwest	88 (39%)
South	73 (32%)
West	27 (12%)
Unknown	4 (2%)
Follow-up time after AP index event, months	
Mean (SD)	39.2 (17.7)
Median [IQR]	37.7 [22.5, 54.9]
Recurrences among patients with 4 years follow-up (n=82)	
≥2 recurrences, n(%)	32 (39%)
≥3 recurrences, n(%)	15 (18%)
≥4 recurrences, n(%)	9 (11%)
Time to Recurrences, months, Mean (SD)	
AP index event to first recurrence	4.4 (3.8)
AP index event to RP qualifying event	6.1 (5.2)

- An RP qualifying event was identified in 228 patients with Medicare Advantage coverage
- The mean (SD) age of the cohort was 73.3 ± 8.6 years; 54% were female
- The average time from the AP index event to the RP qualifying event was 6.1 months

TABLE 2. USE OF CONVENTIONAL THERAPIES AMONG OLDER PATIENTS WITH RP

Characteristic	n, (% of 228)
Any Conventional Therapy Use, n (%)	
During AP index event	44 (19%)
During first recurrence	36 (16%)
During RP qualifying event	31 (14%)
NSAIDs Use, n (%)	
During AP index event	13 (6%)
During first recurrence	(<5%)*
During RP qualifying event	(<5%)*
Colchicine Use, n (%)	
During AP index event	18 (8%)
During first recurrence	(<5%)*
During RP qualifying event	(<5%)*
Corticosteroid Use, n (%)	
During AP index event	27 (12%)
During first recurrence	23 (10%)
During RP qualifying event	22 (10%)

**Values lower than 11 patients are not reported for deidentification purposes*

- Conventional pericarditis therapy use was observed in 19% of patients during the AP index event, 16% of patients at the first recurrence, and 14% of patients at the RP qualifying event
  - CS were the most commonly used conventional therapies, followed by NSAIDs and colchicine
  - Reported rates of conventional therapies were generally low at each episode

TABLE 3. COMORBIDITY BURDEN AMONG OLDER PATIENTS WITH RP

Charlson Comorbidity Index (CCI) Score Characteristics	Mean, (SD) or n, (% of 228)
CCI Score, Mean (SD)	
12 months prior to AP index event	2.1 (2.6)
12 months prior to first recurrence	3.4 (3.1)
12 months prior to RP qualifying event	3.7 (3.2)
Top 5 CCI Comorbidities in 12 months prior to AP index event, n (%)	
Chronic Pulmonary Disease	69 (30%)
Diabetes without complication	50 (22%)
Cancer	42 (18%)
Congestive Heart Failure	38 (17%)
Cerebrovascular Disease	33 (14%)
Top 5 CCI Comorbidities in 12 months prior to first recurrence, n (%)	
Chronic Pulmonary Disease	102 (45%)
Congestive Heart Failure	68 (30%)
Diabetes without complication	65 (29%)
Cancer	62 (27%)
Cerebrovascular Disease	59 (26%)
Top 5 CCI Comorbidities in 12 months prior to RP qualifying event, n (%)	
Chronic Pulmonary Disease	109 (48%)
Congestive Heart Failure	78 (34%)
Diabetes without complication	69 (30%)
Cancer	69 (30%)
Cerebrovascular Disease	67 (29%)

Conditions included in the Charlson Comorbidity Index (CCI) were AIDS/HIV, Cancer, Cerebrovascular Disease, Chronic Pulmonary Disease, Congestive Heart Failure, Dementia, Diabetes with complication, Diabetes without complication, Hemiplegia or Paraplegia, Metastatic Solid Tumor, Mild Liver Disease, Moderate or Severe Liver Disease, Myocardial Infarction, Peptic Ulcer Disease, Peripheral Vascular Disease, Renal Disease, Rheumatic Disease

- Based on analyses of the Charlson Comorbidity Index (CCI) patients experienced multiple comorbidities prior to their RP event, and their comorbidity burden increased over time
  - The mean (SD) CCI score in the 12 months prior to the AP index event was 2.1 (2.6)
  - The mean (SD) CCI score in the 12 months prior to the RP qualifying event increased to 3.7 (3.2), a statistically significant increase versus the mean score at the AP index event ($p<0.01$)
  - The most common comorbidities in the 12 months prior to the RP qualifying event included chronic obstructive pulmonary disease (48%), diabetes (42%), and congestive heart failure (34%)

TABLE 4. USE OF OTHER THERAPEUTIC DRUG CLASSES AMONG OLDER PATIENTS WITH RP

Cohort Characteristics	n, (% of 228)
Top 10 therapeutic class prescribed in 12 months prior to RP qualifying event, n (%)	
Antihyperlipidemic Drugs	120 (53%)
Beta Blockers	116 (51%)
Calcium Channel Blockers	77 (34%)
Adrenal steroids (oral and inhaled)	75 (33%)
Gastrointestinal Drugs	71 (31%)
Analgesics/Antipyretics, Opiate Agonists	69 (30%)
ACE Inhibitors	63 (28%)
Antidepressants	63 (28%)
Anticoagulants	62 (27%)
Quinolones	60 (26%)

TABLE 5. USE OF MEDICATIONS TO BE PRESCRIBED WITH CAUTION IN OLDER PATIENTS*

Cohort Characteristics	N = 228
Therapies to be used with caution in older adults*, n (%)	
Proton-pump inhibitors	70 (31%)
Aspirin	11 (5%)
NSAIDs	33 (14%)

**Based on Beers Criteria for Potentially Inappropriate Medication (PIM) Use in Older Adults*

- Beyond conventional therapies for RP, patients in this analysis were prescribed pharmacotherapies from multiple therapeutic drug classes in the 12 months prior to the RP qualifying event
  - Antihyperlipidemics (53%), beta blockers (51%), calcium channel blockers (34%), steroids (oral and inhaled) (33%), and gastrointestinal drugs (31%) were the most prescribed drugs
- Multiple medications that have been identified as requiring complex management in older patients with comorbid conditions according to the Beers Criteria were demonstrated to be commonly prescribed in the study cohort

LIMITATIONS

- Despite using a large claims data base containing approximately 6% Medicare Advantage patients, whether and by how much the cohort selected in this analysis may differ from the general US population of older patients is unknown
- The AP index event was identified based on a 12-month pre-index period with no pericarditis claims, however, that does not guarantee that a patient had had no prior pericarditis episode in a period outside the study period
- The algorithms used for patient and event identification in this study depend on comprehensive and accurate medical coding; there is misclassification bias in coding for pericardial diseases
- Claims data do not provide any contextual information on treatment choices by clinicians
- NSAIDs/aspirin are over-the-counter medications and may not be adequately captured in prescription claims data
- Matched cohorts (by age, presence/absence of pericarditis, or other factors) were not examined in this study

CONCLUSIONS

- Consistent with their age, older patients with RP displayed multiple systemic comorbidities, and the observed comorbidity burden increased between the AP index event and RP qualifying event
  - Although the comorbidity burden increased over a short time period, the relationship between individual or composite comorbidities to pericarditis episodes was not examined
  - The presence of comorbidities may complicate the clinical profile of the older patients with RP and impact the prescribing decisions by their health care providers for management of their pericarditis
- Use of conventional therapy for pericarditis appeared to be lower across pericarditis episodes among older patients with RP in this claims analysis versus previously reported broader RP populations, although the data do not point to an obvious explanation [10, 11]
- Although further studies in larger populations are required, this exploratory study suggests that pharmacotherapy for older patients with RP may not be optimized and may be complicated due to comorbidities
  - Additional studies using a larger or different data sources should examine the treatment of pericarditis, healthcare resource utilization, pericarditis outcomes, and safety outcomes in older patients with RP to support the efforts of optimizing RP management approaches

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