Thirty-Day Episode of Care Spending Following Heart Failure Hospitalization Among Medicare Beneficiaries with Heart Failure

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BACKGROUND

- Heart failure (HF) is a leading cause of morbidity and mortality in the United States and is one of the costliest conditions[1]
- Total HF-related health care expenditures are projected to increase from $31 billion in 2012 to $70 billion by 2030[1]
- The majority of these costs come from hospitalizations, which are the main contributor to HF-related expenditures for all age groups[2]

OBJECTIVE

- To characterize current Medicare payments for HF spanning the index hospitalization through 30 days post-discharge, a period during which patients are at particularly high risk for readmission, to find potential areas to improve the value of care
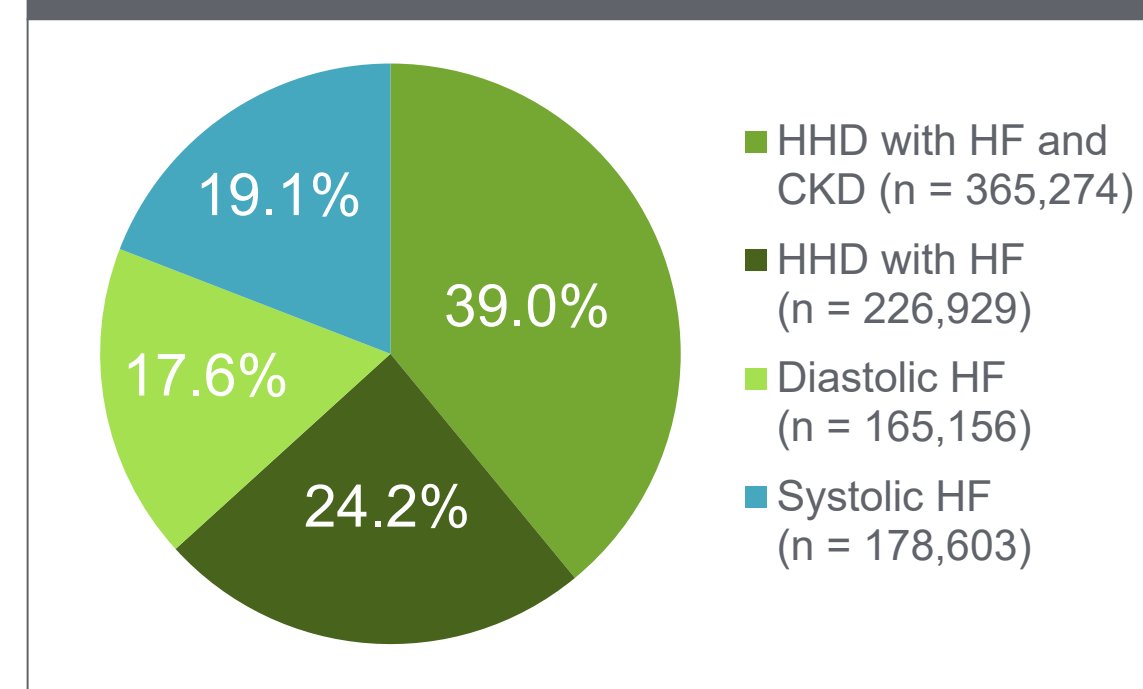
METHODS

- Using Medicare fee-for-service administrative claims data, patients ≥ 65 years of age hospitalized with HF from 2016 to 2018 were identified with the following *International Classification of Diseases, Tenth Revision, Clinical Modification* (ICD-10) primary discharge diagnostic codes:
  - Systolic HF (I50.2x and I50.4x)
  - Diastolic HF (I50.3x)
  - Hypertensive heart disease (HHD) with HF (I11.0)
  - HHD with HF and chronic kidney disease (CKD) (I13.0 and I13.2)
- Comorbidities were identified using ICD-10 codes from Medicare claims within the year before HF admission
- Coding patterns over time across these four groups, mean 30-day episode-of-care spending overall, and proportion of total costs allocated to the index hospitalization and post-acute care were analyzed
- Temporal trends were assessed for hospitalization volume by diagnosis, costs (index hospitalization, post-acute period, and total 30-day payments), 30-day readmission rates, and trends of those outcomes over time

RESULTS

- Overall, 935,962 patients hospitalized with HF were included
- Many patients had a diagnosis of HHD with HF and CKD (**Figure 1**)
- The burden of comorbidities is high in this patient population (**Table 1**)

Figure 1. Medicare patients hospitalized with HF

- HHD with HF and CKD (n = 365,274) — 39.0%
- HHD with HF (n = 226,929) — 24.2%
- Diastolic HF (n = 165,156) — 17.6%
- Systolic HF (n = 178,603) — 19.1%

CKD, chronic kidney disease; HF, heart failure; HHD, hypertensive heart disease

**Table 1. Demographics and clinical characteristics of Medicare patients hospitalized with HF**

Standardized payments	Overall	Systolic HF	Diastolic HF	HHD with HF	HHD with HF and CKD
Total population, N (%)	935,962 (100.0)	178,603 (19.1)	165,156 (17.6)	226,929 (24.2)	365,274 (39.0)
Age, mean (SD)	81.2 (8.5)	80.6 (8.4)	82.1 (8.5)	81.5 (8.6)	80.9 (8.4)
Female, n (%)	504,259 (53.9)	79,513 (44.5)	107,721 (65.2)	135,891 (59.9)	181,134 (49.6)
Race, n (%)					
White	781,317 (83.5)	151,747 (85.0)	144,246 (87.3)	194,450 (85.7)	290,874 (79.6)
Black	106,726 (11.4)	18,554 (10.4)	13,723 (8.3)	21,546 (9.5)	52,903 (14.5)
Other	47,919 (5.1)	8,302 (4.6)	7,187 (4.4)	10,933 (4.8)	21,497 (5.9)
Medicare/Medicaid dual eligibility, n (%)	160,115 (17.1)	27,545 (15.4)	29,696 (18.0)	36,422 (16.1)	66,452 (18.2)
Comorbid conditions, n (%)					
Morbid obesity, other endocrine, metabolic, and nutritional disorders	848,504 (90.7)	157,084 (88.0)	147,708 (89.4)	201,824 (88.9)	341,888 (93.6)
Hypertension	782,781 (83.6)	145,737 (81.6)	142,216 (86.1)	191,990 (84.6)	302,838 (82.9)
Other musculoskeletal and connective tissue disorders	703,711 (75.2)	127,675 (71.5)	128,524 (77.8)	164,789 (72.6)	282,723 (77.4)
Angina pectoris/old myocardial infarction	653,439 (69.8)	136,495 (76.4)	98,932 (59.9)	146,163 (64.4)	271,849 (74.4)
Arrhythmias	635,763 (67.9)	123,325 (69.0)	111,496 (67.5)	147,198 (64.9)	253,744 (69.5)
Renal failure	622,273 (66.5)	103,625 (58.0)	91,695 (55.5)	62,890 (27.7)	364,063 (99.7)
Other gastrointestinal disorders	617,894 (66.0)	112,934 (63.2)	112,344 (68.0)	142,147 (62.6)	250,469 (68.6)
Vascular or circulatory disease	500,306 (53.5)	92,583 (51.8)	88,263 (53.4)	108,131 (47.6)	211,329 (57.9)
Diabetes	498,973 (53.3)	89,993 (50.4)	83,397 (50.5)	104,555 (46.1)	221,028 (60.5)

Presented comorbid conditions are those with incidence > 50% overall. CKD, chronic kidney disease; HF, heart failure; HHD, hypertensive heart disease; SD, standard deviation

Changes in Admissions of HF Types Over Time

- There was a substantial increase over time in admissions coded for a primary diagnosis of HHD with HF with or without CKD (**Figure 2**)

Figure 2. Hospital admissions for Medicare patients with HF, 2016–2018
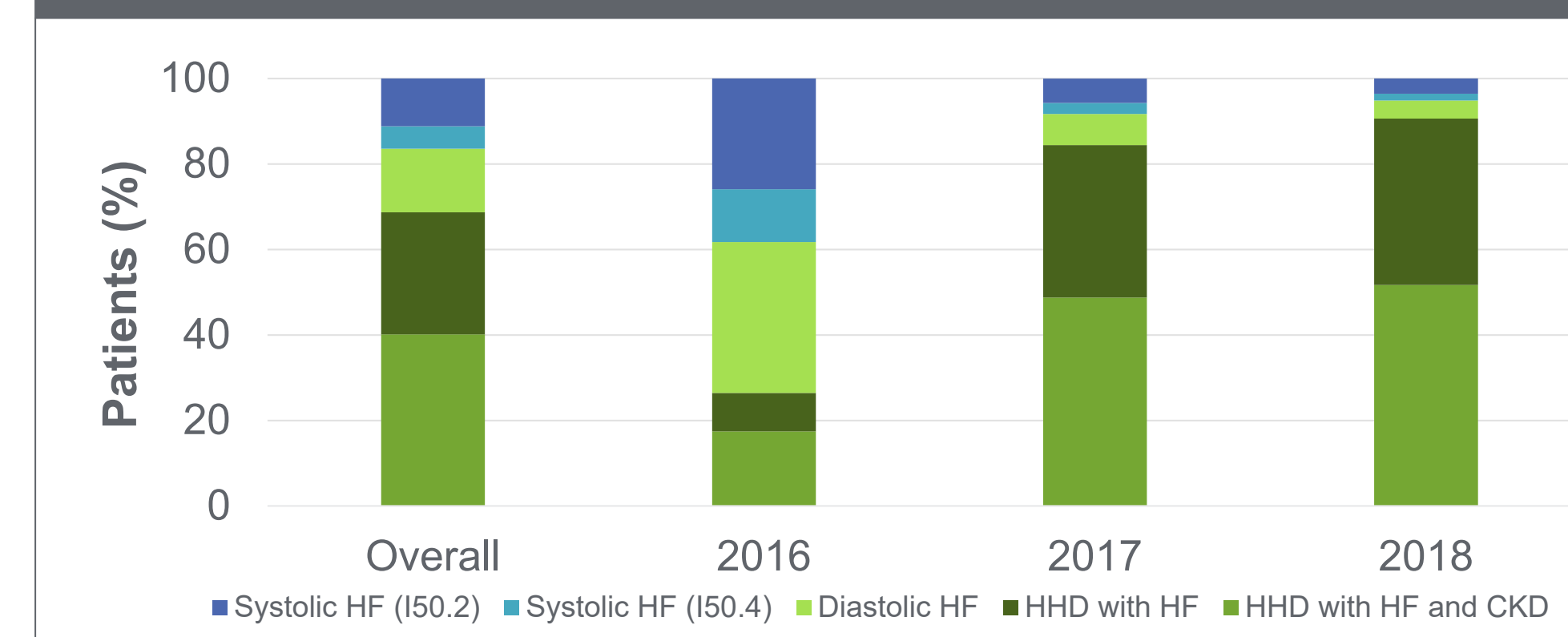
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Payment Trends

- Total estimated mean Medicare 30-day payments for HF care were approximately $16.5 billion over the 3-year study period
- Payments varied across the HF diagnosis codes; the highest payments were for patients with HHD with HF and CKD (**Table 2**)

Table 2. Medicare 30-day episode payments by code

Standardized Payments, $	Overall	Systolic HF	Diastolic HF	HHD with HF	HHD with HF and CKD
	Median (IQR)				
Total index	9,518 (6,871–10,610)	8,903 (6,545–10,656)	9,179 (6,530–10,373)	7,779 (6,206–9,813)	9,962 (9,332–11,104)
Total post-acute care	2,970 (705–11,384)	2,902 (630–11,031)	3,264 (814–12,049)	2,421 (560–10,237)	3,275 (829–11,810)
Total 30-day	13,330 (9,912–22,489)	13,087 (9,201–22,440)	13,143 (9,475–22,184)	11,328 (8,135–19,989)	14,750 (10,922–23,961)
	Mean (SD)				
Total index	10,500 (7,863)	10,735 (9,487)	9,619 (6,654)	8,979 (7,124)	11,729 (7,715)
Total post-acute care	7,126 (9,767)	7,060 (10,069)	7,411 (10,175)	6,469 (9,292)	7,438 (9,697)
Total 30-day	17,626 (12,641)	17,795 (13,876)	17,030 (12,341)	15,448 (11,855)	19,167 (12,396)

CKD, chronic kidney disease; HF, heart failure; HHD, hypertensive heart disease; IQR, interquartile range; SD, standard deviation

- Overall, payments remained fairly stable over the 3-year period, rising by about $300 over the 3-year period (**Table 3**)
- Median payments for systolic HF rose steadily from 2016 to 2018 (**Figure 3**)
- In contrast, 30-day payments for HHD with HF and CKD decreased slightly each year from 2016 through 2018

Table 3. Overall Medicare 30-day episode payments for HF by year

Standardized Payments, $	2016	2017	2018
	Median (IQR)		
Total index	9,370 (6,622–10,574)	9,683 (7,123–10,730)	9,420 (7,630–10,508)
Total post-acute care	2,952 (699–11,371)	2,987 (703–11,485)	2,970 (713–11,292)
Total 30-day	13,046 (9,538–22,207)	13,530 (10,117–22,790)	13,369 (9,939–22,429)
	Mean (SD)		
Total index	10,214 (7,885)	10,707 (7,883)	10,550 (7,816)
Total post-acute care	7,105 (10,048)	7,165 (9,684)	7,106 (9,596)
Total 30-day	17,318 (12,888)	17,872 (12,600)	17,656 (12,454)

IQR, interquartile range; SD, standard deviation

Figure 3. Total 30-day episode payments by code by year
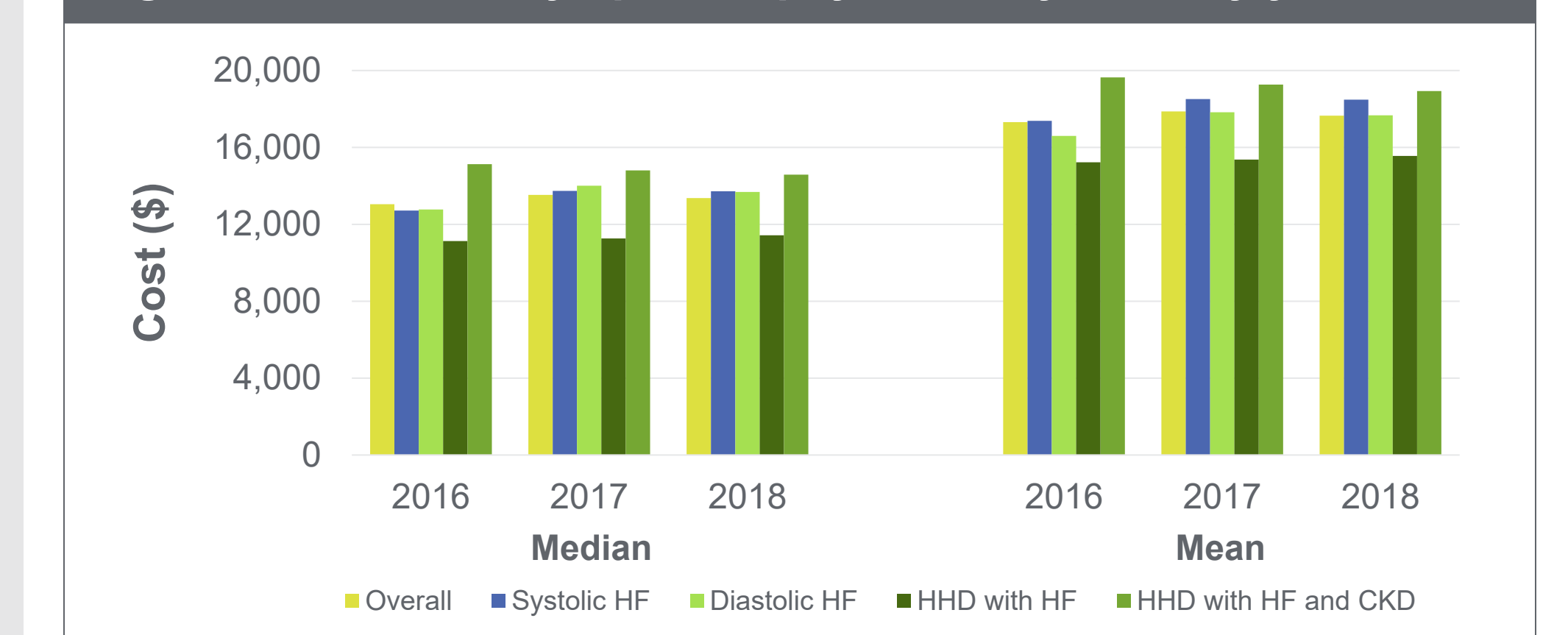
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CONCLUSIONS

- HF is responsible for substantial 30-day Medicare spending: approximately $16.5 billion over 3 years
- A substantial change in coding patterns was observed between 2016 and 2018, resulting in an increase in HHD with HF and CKD
- Despite this, overall payments by year and by diagnosis largely remained stable

References
1. Heidenreich et al. (2013). *Circ Heart Fail.* 6(3):606–619.
2. Dunlay et al. (2011). *Circ Cardiovasc Qual Outcomes.* 4(1):68–75.