



The High Cost of Heart Failure for Health Systems: Opportunities for Better Management

Prepared by

Kathryn Fitch, RN, MEd
Principal and Healthcare Management Consultant

Tyler Engel, ASA, MAAA
Associate Actuary

Bruce Pyenson, FSA, MAAA
Principal and Consulting Actuary

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EXECUTIVE SUMMARY

Heart Failure (HF) is a major cost and utilization contributor to Medicare as the following statistics highlight¹:

- HF prevalence is 11% in the Medicare fee for service (FFS) population
- HF beneficiaries contribute 34% of the total Medicare population spend. The majority of that cost comes from inpatient admissions
- The HF population contributes:
 - 42% of total Medicare FFS admissions
 - 55% of total Medicare FFS readmissions
 - 49% of total Medicare FFS skilled nursing facility (SNF) admissions
 - 39% of total annual Medicare FFS deaths

Unexplained regional variation in utilization and costs of Medicare HF patients suggests significant opportunity to better manage utilization and costs of the HF population.² To better understand the regional differences in utilization and cost for HF Medicare FFS populations, this report details the utilization and cost of Medicare HF patients at the level of metropolitan statistical areas (MSA). For 440 US regions, we developed details of the services and costs of Medicare beneficiaries with HF. Large differences in utilization and cost persist, even after adjusting for risk and regional price differences.

Using the data and methodology described in Appendix D, we identified the following variation in key metrics when comparing the 10th percentile lowest cost HF population areas to the 90th percentile highest cost HF population areas:

Metric	HF Population Comparison After Risk and Price Adjustment
Cost per HF patient	23% lower for 10 th percentile compared to 90 th percentile MSAs
Inpatient admission rate per HF patient	22% lower for 10 th percentile compared to 90 th percentile MSAs
Annual mortality rate	20.99% versus 21.98% (not risk adjusted)

The difference in cost was mainly driven by the difference in inpatient admissions. Given that costs associated with inpatient admissions from HF beneficiaries (facility / professional inpatient costs and SNF costs) contribute 66% to the total HF population's spend and 22% to the total Medicare FFS spend, reducing inpatient admissions in the Medicare FFS HF population will produce a significant cost impact on the HF population (and total population) spend.

HF is, of course, an important condition for many of Medicare's value based programs, including the Medicare Shared Savings Program (MSSP), Pioneer accountable care organization (ACO), and Next Generation ACO. More efficient management of the HF population can significantly impact Medicare spending for the ACO's attributed population spending. Considering the 34% contribution by the HF population to total Medicare population spending (22% of total Medicare population associated with HF inpatient costs), a reduction in the HF population's costs, and in particular, inpatient admissions can significantly impact the total cost for an ACO's attributed population—the total cost includes spending for beneficiaries who do not have HF.

We modeled a 25,000 member MSSP ACO whose risk- and price-adjusted HF population reflected 60th percentile performance compared to the 10th, 50th and 90th percentile HF performance. The HF prevalence for this ACO was 11% and the HF population contributed 30% to the total ACO population spending. Moving the HF population's experience 50% of the way to the 10th percentile benchmark performance (to the 35th percentile performance) produced a 3.1% reduction in the total ACO population cost, which is more than the 2.5% reduction required for gain sharing for this ACO.³ The majority of the cost reduction was associated with a reduction in inpatient admissions. Note these results reflect the FFS Medicare population and the authors believe a comparison to the experience for

Medicare Advantage HF population performance may demonstrate greater opportunity for utilization and cost reduction.

The high prevalence, cost and mortality of the HF population highlights the need for increased focus on HF. We hope this report gives health systems and providers insight as to the importance of focusing on the HF population as they manage Medicare population health costs.

This report was commissioned by Novartis Pharmaceuticals Corporation. The findings reflect the research of the authors; Milliman does not endorse any product or organization. If this report is reproduced, we ask that it be reproduced in its entirety, as pieces taken out of context can be misleading. As with any economic or actuarial analysis, it is not possible to capture all factors that may be significant. Because we present national average data based on the 2012 Medicare 5% sample data, the findings should be interpreted carefully before they are applied to any particular situation. Findings for particular populations and different time periods will vary from these findings. The American Academy of Actuaries requires its members to identify their qualifications in communications. Tyler Engel and Bruce Pyenson meet the Academy's qualifications to issue this communication.

BACKGROUND AND OBJECTIVES

Burden of HF for Total Medicare Population

Medicare beneficiaries with HF are major contributors to Medicare spending. In a previously published analysis,¹ we identified the portion of total Medicare spending and service use generated by HF beneficiaries. Patients with HF account for:

- 11% of total Medicare FFS population (prevalence)
- 34% of total Medicare spending
- 42% of total Medicare inpatient hospital admissions
- 55% of total Medicare readmissions
- 49% of total Medicare SNF admissions
- 39% of total annual Medicare FFS deaths

(The above percentages are for the Medicare FFS population. We did not analyze beneficiaries enrolled in Medicare Advantage plans)

Compared to the non-HF population, HF patients have approximately:

- 4x the average per member per month (PMPM) costs: \$3,482 compared to \$791
- 5x the annual mortality rate: 22% versus 4%
- Nearly 2x the annual readmission rate: 28% versus 16%
- 6x the annual inpatient hospital admission rate per 1,000 beneficiaries: 1264 versus 218
- Nearly 8x the annual SNF admissions rate per 1,000 beneficiaries: 356 versus 45

Geographic Variation in HF Utilization

Reports of significant geographic variation in utilization of medical services and quality outcomes for HF patients strongly suggest some locales manage patients more efficiently than other locales. One recent study demonstrated the average annual age-adjusted inpatient hospital admission rate for HF is 21.5 per 1,000 Medicare beneficiaries, with US county-level rates ranging from 7 to 61 per 1,000 Medicare beneficiaries. Counties with the highest inpatient hospital admission rates were located primarily in the southeast and the Ohio River Valley, including the Appalachian region.²

Relevance for Health Systems

Because of this large variation and the large contribution to spending, better management of the HF population is a natural goal for providers participating in some of Medicare's innovation programs. In particular, improving HF management could be very attractive to ACOs in various programs, given ACOs generally have strong financial incentives to demonstrate cost savings.

Several of the ACO quality outcomes metrics are directly related to HF management, including: Ambulatory sensitive condition admissions: HF (ACO #10)

- Beta blocker therapy for left ventricular dysfunction (ACO #31)
- ACE inhibitor or ARB therapy for patients with CAD and diabetes and/or LVSD (ACO #33)
- All-cause unplanned admissions for patients with HF (ACO #37)

Several other ACO metrics are significantly impacted by the HF population, including⁴:

- Risk standardized all condition readmissions (ACO #8)
- SNF 30-day all-cause readmission measure (ACO #35)
- All-cause unplanned admissions for patients with multiple chronic conditions (ACO #38)

Improved management of HF members can increase ACO quality scores, which can determine how much savings an organization may receive.

Several other Medicare programs impose penalties on less efficient providers, with HF admissions and readmissions figuring prominently in these programs:

- Medicare's Hospital Readmission Reduction Program (HRRP) imposes financial penalties on hospitals performing worse than targets set by Medicare. HF admissions are one of the 5 admission types (COPD, pneumonia, myocardial infarction, hip and knee replacement) generating readmission penalties.⁵ HF admissions have a high readmission rate.⁶ Therefore, a focus on HF admissions and management of HF patients' transition of care at discharge could favorably impact HRRP outcomes.
- The Medicare spending per beneficiary (MSPB) program measures all Medicare Part A and B claims on all annual admissions for Medicare FFS beneficiary's from 3 days prior to admission to 30 days post-discharge and compares a hospital's risk adjusted performance to the median across all hospitals.⁷ Again, a focus on HF admissions, which often make up a significant portion of a hospital's Medicare admissions, could favorably impact MSPB outcomes.

The high admission and readmission rates of HF patients make these patients a natural target for performance improvement efforts. We note the goals of HRRP and MSPB are consistent with those of MSSP and Pioneer programs and should be especially attractive to hospital-based ACOs participating these programs.

Objectives of This Analysis

For health systems enrolled in the MSSP or Pioneer programs, or those considering the Next Generation Medicare ACO program, understanding opportunities to better manage their attributed population costs are of great interest. The goal of this analysis is to provide claim based metrics identifying the regional variation in HF population utilization and cost and the opportunity associated with better management of the HF population. We produce utilization and cost benchmarks for the 10th percentile, national average and 90th percentile HF performance MSAs. Using these benchmarks, we model the impact of moving a sample ACO's current performance to 10th percentile performance. In addition, we provide an estimate of the impact a HF management program could have on this sample ACO's HRRP and MSPB program penalties.

HF BENCHMARK ANALYSIS

A View of the HF Population as a Contributor to Total Population Spend

Exhibit 1 is a cost model summarizing the 2012 utilization and PMPM cost of the total Medicare FFS population and the HF population as a portion of the total population (see Appendix D for HF identification methodology). The utilization is presented as annual utilization per 1,000 Medicare beneficiaries and the cost as a PMPM amount. Costs are allowed amounts which reflect both Medicare payments and beneficiary cost sharing. The PMPM reflects all 2012 costs for the eligible population divided by the population's eligible member months. Appendix D contains a description of the HF identification criteria and a description of our claim grouping methodology producing the cost model service categories.

Exhibit 1: HF Population as a Portion of the Total Population – 2012 Medicare 5% Sample

Service Category	Total Medicare FFS Population N=1,461,935		HF Medicare FFS Population N=160,390		
	Total Population Annual Utilization per 1,000	Total Population Allowed PMPM	HF Annual Utilization per 1,000	HF Patients PMPM	HF PMPM as a % of Total Population
Inpatient Facility	356	admits \$364	148	admits \$160	44%
SNF	2,207	days \$89	1,061	days \$43	48%
Inpatient Professional		\$55		\$24	44%
Outpatient Facility		\$188		\$45	24%
Non-Inpatient Professional		\$223		\$38	17%
Other		\$126		\$45	36%
Total		\$1,045		\$354	34%

Source: Milliman Analysis of Medicare 5% Sample 2011-2012 (2012 index year, 2011 look back year)

Exhibit 1: Key Points

- The HF population contributes 34% of the total population spend: \$354 PMPM of the \$1,045 PMPM
- Inpatient admission associated costs for the HF population contribute 22% of the total population spend:
 - Inpatient facility costs: \$160 PMPM
 - Inpatient professional costs: \$24 PMPM
 - SNF costs: \$43 PMPM
 - Total inpatient admission associated cost for the HF population: \$227 PMPM or 22% of the total population \$1,045 PMPM spend
- Inpatient admissions (medical, surgical and other) from the HF population make up 42% of total population admissions

Benchmark Methodology and Findings

This section presents our findings on regional variation, including identifying regions of the US where the HF population exhibited lower utilization and cost than average, even after adjusting for the population's risk and regional price differences.

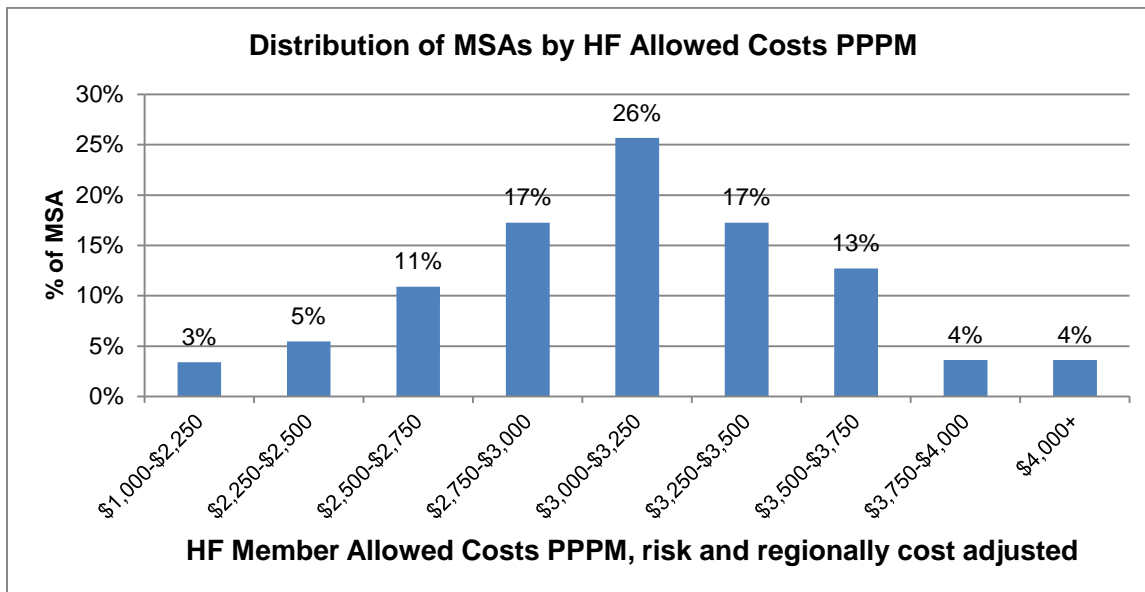
Our high level methodology for the benchmark development included:

- Identified HF patients in the 2012 Medicare 5% sample data using the methodology described in Appendix A
- Split the HF population into their MSAs based on county of residence

- Excluded 21 MSAs with Medicare FFS populations under 10,000 resulting in 440 MSAs remaining
- Calculated the average per HF patient per month (PPPM) cost in each MSA
- Risk adjusted the average costs PPPM in each MSA using the Medicare Hierarchical Condition Category (HCC) risk scoring methodology
- Price adjusted the costs PPPM for each MSA using a regional MSA price adjustment factor from the Milliman Health Cost Guidelines
- Using the risk and regionally price adjusted average costs PPPM, created a PPPM cost distribution by MSA (see Appendix B)
- Identified the 10th percentile lowest cost PPPM MSAs and the national average and the 90th percentile highest cost PPPM MSAs

Exhibit 2 provides a distribution of MSAs falling into each of the cost PPPM ranges. See Appendix B for details by MSA. MSAs are sorted by state and ranking within each state.

Exhibit 2: Distribution of MSAs by HF Costs PPPM



Source: Milliman Analysis of Medicare 5% Sample 2011-2012 (2012 index year, 2011 look back year)

Exhibit 2: Key points

- Approximately 25% of the MSAs fell into the \$3,000-\$3,250 PPPM cost range, which was the most common
- The PPPM cost distribution by MSA illustrates a normal distribution

After identifying the MSAs in the 10th and 90th percentile as well as the national average, we took all claims for the HF populations in those MSAs and allocated to the service line categories shown in Exhibit 3. The grouping methodology used to group each claim to specified service categories is described in Appendix D. Exhibit 3 provides the utilization and cost per service category on a risk and regional price adjusted basis for each of the 3 HF percentile cohorts.

Exhibit 3: Cost Model Comparison by Percentile Performance – HF Population 2012 Medicare 5% Sample

Service Category	National Average			10th Percentile Benchmarks			90th Percentile Benchmarks						
	Annual Utilization per 1,000		Allowed PPM	Annual Utilization per 1,000		Utilization as % of National Average	Allowed PPM	Cost as % of National Average	Annual Utilization per 1,000		Utilization as % of National Average	Allowed PPM	Cost as % of National Average
Inpatient Facility	1,330	admits	\$1,384	1,118	admits	84%	\$1,167	84%	1,441	admits	108%	\$1,499	108%
SNF Facility	10,000	days	\$402	8,270	days	83%	\$333	83%	10,326	days	103%	\$415	103%
Inpatient Professional			\$216				\$154	71%				\$233	108%
Outpatient Facility			\$306				\$309	101%				\$311	102%
Non-Inpatient Professional			\$340				\$297	87%				\$355	104%
Other Total			\$397				\$284	72%				\$494	125%
Total			\$3,046				\$2,544	84%				\$3,308	109%
Average HCC Score			2.23				2.16					2.24	
Average Mortality Rate			21%				21%					22%	

Source: Milliman Analysis of Medicare 5% Sample 2011-2012 (2012 index year, 2011 look back year)

Exhibit 3: Key Points

- 16% lower admission rate comparing 10th percentile to national average: 1,118 versus 1,330 admissions per 1,000
- 22% lower admission rate comparing 10th percentile to 90th percentile: 1,118 versus 1,441 admissions per 1,000
- 16% lower costs PPM comparing 10th percentile to national average: \$2,544 versus \$3,046 PPM
- 23% lower costs PPM comparing 10th percentile to 90th percentile: \$2,544 versus \$3,308 PPM

CASE STUDY

We identified a sample MSSP ACO in the Medicare 5% sample with the following characteristics:

Hospital system characteristics

- 4 hospital system
- 600 affiliated ACO physicians
- 35% of hospital system admissions are from Medicare FFS beneficiaries
- 6% of total Medicare FFS admissions are for HF (DRG 291, 292, 293)
- 30 day readmission rate following DRG 291,292, 293 is 30% (HRRP benchmark is 27%)
- 40% of total Medicare FFS admissions are from people with HF
- Average MSPB is \$24,000 (MSPB benchmark is \$22,800)

MSSP characteristics

- 1/1/14 start date
- 25,000 Medicare FFS attributed lives
- HF prevalence rate 11%
- HF mortality rate 21%
- Average HCC score 2.32
- HF population contributes 30% to total population costs – inpatient admission (facility and professional) and SNF admissions from the HF population contribute 22% of the total population spend
- HF population reflects 60th percentile performance compared to the HF benchmarks
- Costs PPPM for HF beneficiaries - \$3444

Modeling Improved Performance

To estimate the performance level of the sample ACO and model the impact of moving to 10th percentile HF performance, we performed the following steps:

- Identified the HF population in the sample ACO
- Grouped all claims for the HF population into our cost model categories
- Risk adjusted and regionally price adjusted the 10th percentile HF population's benchmarks to reflect the risk mix and regional unit price of the sample ACO. This adjustment to the 10th percentile HF population's benchmarks slightly increased the costs compared to Exhibit 3 and resulted in changes to utilization based on the higher average HCC risk score and higher regional price for the population in this sample ACO compared to the 10th percentile HF population
- Compared the utilization and cost of the sample MSSP ACO HF population to the risk adjusted and regional price adjusted 10th percentile HF performance
- Modeled the impact to the sample ACO HF population's costs if performance moved 50% and 100% of the way to the 10th percentile HF benchmark performance

Exhibit 4 provides:

- Comparison between the sample ACO HF population and the risk and regional price adjusted 10th percentile HF population
- Utilization and cost impact if the sample ACO HF population experience moved 50% of the way and 100% of the way to the 10th percentile HF performance

Exhibit 4: Cost Reduction Impact Model – HF Patients – for Sample MSSP ACO

Service Category	MSSP ACO HF Population			10th Percentile Benchmarks for HF Population (risk and cost adjusted)			Reduction in MSSP ACO HF Population if HF Population Management Moved 50% of the Way to 10th percentile			Reduction in MSSP ACO HF Population if HF Population Management Moved 100% of the Way to 10th percentile				
	Annual Utilization per 1,000	Allowed PPPM	Cost as % of HF Population PPPM	Annual Utilization per 1,000	Allowed PPPM	Cost as % of HF Population PPPM	Annual Utilization per 1,000	Allowed PPPM	Cost as % of HF Population PPPM	Annual Utilization per 1,000	Allowed PPPM	Cost as % of HF Population PPPM		
Inpatient Facility	1,219	admits	\$1,601	1,108	admits	\$1,254	56	admits	\$173	11%	111	admits	\$346	22%
SNF Facility	12,918	days	\$583	7,871	days	\$355	2,524	days	\$114	20%	5,047	days	\$228	39%
Inpatient Professional			\$322			\$167			\$77	24%			\$155	48%
Outpatient Facility			\$238			\$291			-\$27	-11%			-\$54	-23%
Non-Inpatient Professional			\$399			\$328			\$36	9%			\$72	18%
Other			\$301			\$327			-\$13	-4%			-\$26	-9%
Total			\$3,444			\$2,723			\$361	10%			\$721	21%

Source: Milliman Analysis of Medicare 5% Sample 2011-2012 (2012 index year, 2011 look back year)

Exhibit 4: Key Points

- Moving 50% of the way toward the 10th percentile HF performance would reduce the HF population costs by 10% (\$361 PPPM):
 - Inpatient reductions account for most of the cost reduction - \$173 from inpatient facility and \$77 from inpatient professional = \$250
 - SNF reductions account for \$114, most of which are associated with inpatient admissions
 - Some outpatient services increase under better management including home health care and emergency room (stand-alone ER visits without inpatient admission)
- Moving 100% of the way toward 10th percentile HF performance would reduce the HF population costs by 21% (\$721 PPPM)
 - Inpatient reductions account for most of the cost reduction - \$346 from inpatient facility and \$155 from inpatient professional = \$501
 - SNF reductions account for \$228, most of which are associated with inpatient admissions
 - Some outpatient services increase under better management including home health care and emergency room (stand-alone ER visits without inpatient admission)

In Exhibit 5 we provide the impact on the total population costs if the sample ACO HF population moved toward 10th percentile HF performance.

Similar to Exhibit 1, Exhibit 5 provides utilization and cost metrics for the total sample ACO population and the portion of the utilization and cost contributed by the HF population to the total sample ACO population (total population columns highlighted in peach). We provide the impact on the total population utilization and costs if the HF population experience moved 50% and 100% to the 10th percentile HF performance.

Exhibit 5: Cost Reduction Impact Model of HF Patients on the Total Population for Sample MSSP ACO

Service Category	MSSP ACO Population		MSSP ACO HF Population				Reduction in Total Population if HF Population Management Moved 50% of the Way to 10th percentile			Reduction in Total Population if HF Population Management Moved 100% of the Way to 10th percentile						
	Annual Utilization per 1,000	Allowed PMPM	Annual Utilization per 1,000	Utilization as % of MSSP ACO Population	Allowed PMPM	Cost as % of MSSP ACO Population	Annual Utilization per 1,000	Allowed PMPM	Cost as % of MSSP ACO Population	Annual Utilization per 1,000	Allowed PMPM	Cost as % of MSSP ACO Population				
Inpatient Facility	331	admits	\$388	121	admits	37%	\$159	41%	6	admits	\$17	4%	11	admits	\$34	9%
SNF Facility	2,845	days	\$127	1,281	days	45%	\$58	46%	250	days	\$11	9%	501	days	\$23	18%
Inpatient Professional			\$77				\$32	42%			\$8	10%			\$15	20%
Outpatient Facility			\$161				\$24	15%			-\$3	-2%			-\$5	-3%
Non-Inpatient Professional			\$283				\$40	14%			\$4	1%			\$7	2%
Other			\$104				\$30	29%			-\$1	-1%			-\$3	-2%
Total			\$1,140				\$342	30%			\$36	3%			\$72	6%

Source: Milliman Analysis of Medicare 5% Sample 2011-2012 (2012 index year, 2011 look back year)

Exhibit 5: Key points

- Moving the HF population 50% of the way toward the 10th percentile HF performance would reduce the total population costs by 3% (\$36 PPPM):
 - Inpatient reductions account for most of the cost reduction - \$17 from inpatient facility and \$8 from inpatient professional = \$25
 - SNF reductions account for \$11, most of which are associated with inpatient admissions
 - Some outpatient services increase under better management including home health care and emergency room (stand-alone ER visits without inpatient admission)
- Moving the HF population 100% of the way toward 10th percentile HF performance would reduce the total population costs by 6% (\$72 PPPM)
 - Inpatient reductions account for most of the cost reduction - \$34 from inpatient facility and \$15 from inpatient professional = \$49
 - SNF reductions account for \$23 most of which are associated with inpatient admissions
 - Some outpatient services increase under better management including home health care and emergency room (stand-alone ER visits without inpatient admission)

Implications for the model ACO hospital system’s impact on HRR and MSPB

A focus on the HF ACO population will impact HRRP and MSPB performance considering the following statistics for this model ACO:

- 6% of this hospital system’s total Medicare admissions are for HF DRG 291, 292, 293
- This hospital system’s 30 day readmission rate for HF DRG 291, 292, 293 is 30% compared to its threshold target of 27%
- With a movement toward 10th percentile HF performance for the HF population, the readmission rate will be reduced
- 40% of this hospital system’s Medicare admissions are for beneficiaries with HF
- Average MSPB is \$24,000 (MSPB benchmark is \$22,800)
- A focus on transition of care programs for the HF beneficiaries will impact post-acute care spend which directly impacts spend for the MSPB calculation

APPROACHES TO ENHANCE HF POPULATION MANAGEMENT

Prominent efforts to improve the quality of care and reduce costs for HF patients are evident, including:

- Disease management programs for HF patients have been standard health plan offerings for two decades. Successful disease management programs promote adherence to clinical guidelines which enables providers to promote and monitor patient compliance. More recently, medical home programs generally implement HF disease management programs in Medicare populations, including HF clinics.
- Quality metrics relevant to HF have been established. Professional organizations have designed and updated quality performance reporting that encourages compliance with treatment guidelines, patient assessment and patient education for HF patients.⁸ Medicare physician P4P programs include quality reporting for HF patients and Medicare Hospital Compare reporting includes HF effective care measures.^{9,10}
- Medicare payment reforms for hospitals, including the HRRP, incentivize hospitals to improve post-acute care for HF Medicare beneficiaries to avoid financial penalties for readmissions.¹¹ The Medicare Spending per Beneficiary (MSPB) program (start date was 10/1/2014) will further direct hospitals' attention to HF patients as they work to lower the cost of all care during and 30 days after all admissions.¹²
- Medicare payment reform voluntary initiatives focus attention on HF. The MSSP for ACOs incentivizes providers to reduce costs for the Medicare beneficiaries attributed to their ACO,¹³ and HF patients should be a significant focus for utilization and cost reduction. The Bundled Payment for Care Improvement Program (BPCI) has the option to select bundled payment for HF admissions, which will additionally focus attention on reducing post-acute care utilization and cost after HF admissions.¹⁴
- Although not specific to HF, Medicare Advantage Star ratings include measures relevant to HF, particularly the rate of all-cause readmissions to which HF patients contribute significantly.¹⁵
- Clinical guidelines for the prevention and treatment of HF, most recently published in 2013, suggest a comprehensive approach to HF care including pharmacologic intervention, non-pharmacologic interventions (lifestyle recommendations and treatment of comorbidities), cardiac device therapy, care of the HF patient during hospitalization, as well as care coordination and palliative care recommendations.¹⁶
- HF outpatient clinics, HF registries and HF transition of care programs have been implemented in some regions with the intention of improving HF management.
- Medicare implemented enhanced physician payments for several services related to HF, including:
 - Cardiac rehabilitation for HF patients with left ventricular ejection fraction (LVEF) of 35% or less and New York Heart Association class II to IV symptoms despite being on optimal HF therapy for at least 6 weeks.¹⁷
 - Chronic care management for beneficiaries with 2+ chronic conditions expected to last at least 12 months or until the death of the patient qualify for this care and physician payment. The chronic conditions must place the patient at significant risk of death, acute exacerbation/decompensation or functional decline – HF meets these criteria.¹⁸
 - Transitional care management (TCM) for patients whose medical and/or psychosocial problems require moderate- or high-complexity medical decision making during transitions in care from an inpatient hospital setting (including acute care hospital and rehabilitation facility), long-term care hospital, partial hospitalization, hospital outpatient observation, or skilled nursing facility to the patient's community setting. TCM commences upon the date of discharge and continues for the following 29 days.¹⁹

Taken collectively, these efforts represent a significant investment in ensuring the delivery of high quality care for HF patients. Our findings highlight the regional variation in HF utilization and costs among Medicare FFS beneficiaries, which provides evidence of the opportunity to more efficiently manage the HF population. In particular, we identified that inpatient admission reduction provides the greatest opportunity for reducing costs. These results reflect the Medicare FFS population, and the authors believe the experience for Medicare Advantage HF population performance may demonstrate greater opportunity for utilization and cost reduction.

APPENDIX A: DETAILED COST MODELS

Appendix A1: Heart Failure Population as a Portion of Total Medicare 5% Sample

Service Category	Total Population Annual Utilization per 1,000		Total Population Allowed PMPM	HF Annual Utilization per 1,000		HF Patients PMPM	HF PMPM as a % of Total Population
Facility							
Inpatient							
Medical	252	admits	\$194	119	admits	\$98	50%
Surgical	86	admits	\$155	26	admits	\$60	39%
Psychiatric	15	admits	\$12	2	admits	\$2	14%
Alcohol/Drug	3	admits	\$1	0	admits	\$0	16%
Maternity	1	admits	\$0	0	admits	\$0	2%
Inpatient Subtotal	356	admits	\$364	148	admits	\$160	44%
SNF	2,207	days	\$89	1,061	days	\$43	48%
Outpatient							
Emergency Room	440	cases	\$17	95	cases	\$4	25%
Outpatient Surgery	389	cases	\$55	57	cases	\$11	21%
Radiology – General	515	cases	\$9	82	cases	\$1	15%
Radiology - CT/MRI/PET	198	cases	\$8	28	cases	\$1	13%
Pathology/Lab	2,045	cases	\$8	492	cases	\$2	21%
Pharmacy	1,375	cases	\$24	525	cases	\$5	21%
Cardiovascular	175	cases	\$4	44	cases	\$1	32%
PT/OT/ST	1,467	cases	\$13	341	cases	\$3	25%
Alcohol/Drug	7	cases	\$0	0	cases	\$0	6%
Psychiatric	136	cases	\$2	14	cases	\$0	12%
Preventive	582	cases	\$3	74	cases	\$0	10%
Dialysis	1,425	cases	\$21	614	cases	\$6	28%
Other	2,332	cases	\$25	614	cases	\$6	24%
Outpatient Subtotal			\$188			\$45	24%
Facility Total			\$641			\$247	39%
Professional							
Inpatient Surgery	538	procs	\$13	180	procs	\$4	30%
Inpatient Anesthesia	150	procs	\$3	46	procs	\$1	30%
Maternity	2	procs	\$0	0	procs	\$0	1%
Outpatient Surgery	698	procs	\$15	112	procs	\$2	14%
Office Surgery	1,998	procs	\$20	281	procs	\$3	16%
Outpatient Anesthesia	335	procs	\$3	42	procs	\$0	13%
Hospital Visits	4,507	visits	\$36	2,204	visits	\$18	50%
Office/Home Visits	7,892	visits	\$56	1,346	visits	\$10	17%
Office Administered Drugs	2,183	procs	\$38	378	procs	\$6	16%
Urgent Care Visits	48	visits	\$0	5	visits	\$0	10%
Allergy Testing	11	procs	\$0	1	procs	\$0	10%
Allergy Immunotherapy	116	visits	\$0	6	visits	\$0	6%
Emergency Room & Obs Visits	773	visits	\$8	227	visits	\$3	32%
Physical Therapy	919	visits	\$7	102	visits	\$1	11%
Cardiovascular	1,753	procs	\$6	624	procs	\$2	33%
Chiropractor	665	visits	\$2	48	visits	\$0	7%
Radiology IP - General	953	procs	\$2	467	procs	\$1	44%
Radiology IP - CT/MRI/PET	214	procs	\$1	85	procs	\$0	39%
Radiology Office - General	1,266	procs	\$10	182	procs	\$1	14%
Radiology Office - CT/MRI/PET	231	procs	\$6	28	procs	\$1	12%
Radiology OP - General	1,261	procs	\$2	271	procs	\$0	19%
Radiology OP - CT/MRI/PET	454	procs	\$2	92	procs	\$0	19%
Pathology/Lab IP & OP	410	procs	\$2	99	procs	\$0	21%
Pathology/Lab Office	12,340	procs	\$18	2,198	procs	\$3	15%
Preventive Immunizations	1,002	procs	\$2	95	procs	\$0	10%
Preventive Physical Exams	131	visits	\$1	9	visits	\$0	7%
Preventive Well Baby Exams	0	visits	\$0	0	visits	\$0	0%
Preventive Other	1,104	procs	\$3	109	procs	\$0	7%
Vision Exams	664	visits	\$6	78	visits	\$1	12%
Hearing/Speech Exams	49	visits	\$0	6	visits	\$0	12%
Outpatient Psychiatric	589	visits	\$3	56	visits	\$0	10%
Outpatient Alcohol/Drug	8	visits	\$0	0	visits	\$0	7%
Miscellaneous Medical	2,175	procs	\$13	510	procs	\$3	24%
Professional Total			\$278			\$62	22%
Other							
Home Health Care	4,008	visits	\$79	1,680	visits	\$29	37%
Ambulance	484	units	\$18	226	units	\$8	45%
Durable Medical Equipment	3,088	units	\$25	816	units	\$7	27%
Prosthetics	41	units	\$2	9	units	\$1	24%
Glasses/Contacts	15	units	\$0	2	units	\$0	11%
Unknown	1,472	units	\$2	258	units	\$0	20%
Other Total						\$45	0%
Total			\$1,045			\$354	34%

Appendix A2: Heart Failure Cost Models for National Average, 10th Percentile, 90th Percentile

Service Category	National Average			10th Percentile Benchmarks			90th Percentile Benchmarks		
	Annual Utilization per 1,000	Allowed PPPM		Annual Utilization per 1,000	Allowed PPPM		Annual Utilization per 1,000	Allowed PPPM	
Facility									
Inpatient									
Medical	1,077	admits	\$854	908	admits	\$719	1,163	admits	\$922
Surgical	229	admits	\$513	196	admits	\$437	249	admits	\$556
Psychiatric	20	admits	\$15	11	admits	\$9	25	admits	\$19
Alcohol/Drug	3	admits	\$2	4	admits	\$2	4	admits	\$2
Maternity	0	admits	\$0	0	admits	\$0	0	admits	\$0
Inpatient Subtotal	1,330	admits	\$1,384	1,118	admits	\$1,167	1,441	admits	\$1,499
SNF	10,000	days	\$402	8,270	days	\$333	10,326	days	\$415
Outpatient									
Emergency Room	874	cases	\$39	905	cases	\$41	911	cases	\$41
Outpatient Surgery	509	cases	\$98	479	cases	\$92	562	cases	\$108
Radiology - General	781	cases	\$13	830	cases	\$14	736	cases	\$12
Radiology - CT/MRI/PET	271	cases	\$10	246	cases	\$9	264	cases	\$10
Pathology/Lab	4,138	cases	\$14	5,120	cases	\$18	3,553	cases	\$12
Pharmacy	740	cases	\$26	666	cases	\$24	684	cases	\$24
Cardiovascular	415	cases	\$11	479	cases	\$13	344	cases	\$9
PT/OT/ST	3,280	cases	\$32	2,699	cases	\$26	3,346	cases	\$33
Alcohol/Drug	4	cases	\$0	6	cases	\$0	1	cases	\$0
Psychiatric	140	cases	\$2	71	cases	\$1	342	cases	\$5
Preventive	586	cases	\$2	687	cases	\$3	545	cases	\$2
Dialysis	246	cases	\$4	146	cases	\$2	251	cases	\$4
Other	3,512	cases	\$54	4,342	cases	\$67	3,272	cases	\$50
Outpatient Subtotal			\$306			\$309			\$311
Facility Total			\$2,092			\$1,809			\$2,225
Professional									
Inpatient Surgery	1,620	procs	\$36	1,351	procs	\$30	1,656	procs	\$37
Inpatient Anesthesia	401	procs	\$7	291	procs	\$5	436	procs	\$8
Maternity	0	procs	\$0	0	procs	\$0	0	procs	\$0
Outpatient Surgery	983	procs	\$19	947	procs	\$18	1,058	procs	\$20
Office Surgery	2,643	procs	\$24	2,452	procs	\$22	2,498	procs	\$23
Outpatient Anesthesia	376	procs	\$4	293	procs	\$3	416	procs	\$4
Hospital Visits	19,730	visits	\$162	13,420	visits	\$110	21,522	visits	\$176
Office/Home Visits	12,943	visits	\$92	12,193	visits	\$87	12,965	visits	\$92
Office Administered Drugs	3,622	procs	\$59	2,758	procs	\$45	4,332	procs	\$71
Urgent Care Visits	47	visits	\$0	47	visits	\$0	38	visits	\$0
Allergy Testing	9	procs	\$0	6	procs	\$0	9	procs	\$0
Allergy Immunotherapy	59	visits	\$0	48	visits	\$0	70	visits	\$0
Emergency Room & Obs Visits	2,078	visits	\$24	1,988	visits	\$23	2,196	visits	\$25
Physical Therapy	999	visits	\$8	852	visits	\$7	673	visits	\$6
Cardiovascular	5,855	procs	\$19	5,191	procs	\$17	6,023	procs	\$19
Chiropractor	475	visits	\$1	413	visits	\$1	353	visits	\$1
Radiology IP - General	4,277	procs	\$7	3,216	procs	\$5	4,672	procs	\$8
Radiology IP - CT/MRI/PET	779	procs	\$4	601	procs	\$3	843	procs	\$4
Radiology Office - General	1,720	procs	\$13	1,427	procs	\$11	2,008	procs	\$15
Radiology Office - CT/MRI/PET	274	procs	\$7	249	procs	\$6	345	procs	\$8
Radiology OP - General	2,501	procs	\$4	2,436	procs	\$4	2,558	procs	\$4
Radiology OP - CT/MRI/PET	868	procs	\$4	782	procs	\$4	891	procs	\$5
Pathology/Lab IP & OP	911	procs	\$3	653	procs	\$2	798	procs	\$3
Pathology/Lab Office	20,932	procs	\$26	16,164	procs	\$20	21,469	procs	\$26
Preventive Immunizations	948	procs	\$2	954	procs	\$2	906	procs	\$1
Preventive Physical Exams	85	visits	\$1	89	visits	\$1	78	visits	\$1
Preventive Well Baby Exams	0	visits	\$0	0	visits	\$0	0	visits	\$0
Preventive Other	1,044	procs	\$2	799	procs	\$1	1,132	procs	\$2
Vision Exams	754	visits	\$7	764	visits	\$7	770	visits	\$7
Hearing/Speech Exams	57	visits	\$0	49	visits	\$0	51	visits	\$0
Outpatient Psychiatric	540	visits	\$3	353	visits	\$2	507	visits	\$3
Outpatient Alcohol/Drug	5	visits	\$0	5	visits	\$0	2	visits	\$0
Miscellaneous Medical	4,115	procs	\$19	3,142	procs	\$14	4,021	procs	\$18
Professional Total			\$557			\$451			\$589
Other									
Home Health Care	14,863	visits	\$266	9,319	visits	\$167	20,118	visits	\$360
Ambulance	1,538	units	\$60	1,347	units	\$52	1,524	units	\$59
Durable Medical Equipment	7,695	units	\$64	7,107	units	\$59	8,150	units	\$67
Prosthetics	68	units	\$4	61	units	\$4	71	units	\$4
Glasses/Contacts	15	units	\$0	16	units	\$0	14	units	\$0
Unknown	2,432	units	\$3	1,858	units	\$2	2,574	units	\$3
Other Total			\$397			\$284			\$494
Total			\$3,046			\$2,544			\$3,308

Appendix A3: Cost Savings Model for Sample ACO Population – HF Costs PPPM

Service Category	MSSP ACO HF Population		10th Percentile Benchmarks for HF Population (risk and cost adjusted)		Reduction in MSSP ACO HF Population if HF Population Management Moved 50% of the way to 10th percentile			Reduction in MSSP ACO HF Population if HF Population Management Moved 100% of the way to 10th percentile						
	Annual Utilization per 1,000	Allowed PPPM	Annual Utilization per 1,000	Allowed PPPM	Annual Utilization per 1,000	Allowed PPPM	Cost As % of HF Population PPPM	Annual Utilization per 1,000	Allowed PPPM	Cost As % of HF Population PPPM				
Facility														
Inpatient														
Medical	964	admits	\$914	895	admits	\$745	34	admits	\$84	9%	69	admits	\$169	18%
Surgical	234	admits	\$669	196	admits	\$497	19	admits	\$86	13%	38	admits	\$172	26%
Psychiatric	19	admits	\$17	13	admits	\$10	3	admits	\$3	21%	6	admits	\$7	41%
Alcohol/Drug	2	admits	\$1	3	admits	\$2	-1	admits	-\$1	-59%	-2	admits	-\$1	-119%
Maternity	0	admits	\$0	0	admits	\$0	0	admits	\$0	0%	0	admits	\$0	0%
Inpatient Subtotal	1,219	admits	\$1,601	1,108	admits	\$1,254	56	admits	\$173	11%	111	admits	\$346	22%
SNF	12,918	days	\$583	7,871	days	\$355	2,524	days	\$114	20%	5,047	days	\$228	39%
Outpatient														
Emergency Room	535	cases	\$22	921	cases	\$41	-193	cases	-\$9	-40%	-386	cases	-\$18	-80%
Outpatient Surgery	461	cases	\$93	480	cases	\$86	-10	cases	\$4	4%	-19	cases	\$7	8%
Radiology – General	595	cases	\$14	826	cases	\$14	-115	cases	\$0	0%	-231	cases	\$0	1%
Radiology - CT/MRI/PET	192	cases	\$7	246	cases	\$9	-27	cases	-\$1	-13%	-54	cases	-\$2	-27%
Pathology/Lab	2037	cases	\$7	5026	cases	\$18	-1,494	cases	-\$6	-90%	-2,989	cases	-\$12	-180%
Pharmacy	361	cases	\$15	668	cases	\$21	-153	cases	-\$3	-21%	-307	cases	-\$6	-42%
Cardiovascular	377	cases	\$14	473	cases	\$12	-48	cases	\$1	7%	-95	cases	\$2	15%
PT/OT/ST	2946	cases	\$28	2469	cases	\$22	239	cases	\$3	10%	478	cases	\$5	19%
Alcohol/Drug	0	cases	\$0	5	cases	\$0	-3	cases	\$0	0%	-5	cases	\$0	0%
Psychiatric	31	cases	\$0	76	cases	\$1	-23	cases	\$0	-78%	-45	cases	-\$1	-155%
Preventive	395	cases	\$1	668	cases	\$3	-136	cases	-\$1	-62%	-272	cases	-\$2	-125%
Dialysis	2	cases	\$0	147	cases	\$2	-72	cases	-\$1	-6387%	-144	cases	-\$2	-12773%
Other	1755	cases	\$36	4288	cases	\$62	-1,266	cases	-\$13	-36%	-2,533	cases	-\$26	-73%
Outpatient Subtotal			\$238			\$291			-\$27	-11%			-\$54	-23%
Facility Total														
Professional														
Inpatient Surgery	2,156	procs	\$45	1,330	procs	\$34	413	procs	\$5	12%	826	procs	\$11	24%
Inpatient Anesthesia	478	procs	\$10	278	procs	\$5	100	procs	\$2	22%	201	procs	\$4	44%
Maternity	0	procs	\$0	0	procs	\$0	0	procs	\$0	0%	0	procs	\$0	0%
Outpatient Surgery	1,002	procs	\$20	944	procs	\$20	29	procs	\$0	1%	58	procs	\$0	2%
Office Surgery	3,650	procs	\$31	2,447	procs	\$23	602	procs	\$4	12%	1,203	procs	\$8	25%
Outpatient Anesthesia	380	procs	\$5	282	procs	\$3	49	procs	\$1	21%	98	procs	\$2	41%
Hospital Visits	28,382	visits	\$257	12,861	visits	\$117	7,760	visits	\$70	27%	15,521	visits	\$140	55%
Office/Home Visits	14,445	visits	\$114	12,307	visits	\$97	1,069	visits	\$9	8%	2,138	visits	\$17	15%
Office Administered Drugs	3,343	procs	\$48	2,858	procs	\$43	243	procs	\$2	5%	485	procs	\$5	10%
Urgent Care Visits	17	visits	\$0	53	visits	\$0	-18	visits	\$0	-86%	-35	visits	\$0	-173%
Allergy Testing	23	procs	\$0	6	procs	\$0	8	procs	\$0	28%	17	procs	\$0	56%
Allergy Immunotherapy	25	visits	\$0	52	visits	\$0	-13	visits	\$0	-3%	-27	visits	\$0	-7%
Emergency Room & Obs Visits	1,539	visits	\$19	1,975	visits	\$24	-218	visits	-\$2	-11%	-436	visits	-\$4	-22%
Physical Therapy	2,006	visits	\$18	870	visits	\$8	568	visits	\$5	28%	1,136	visits	\$10	57%
Cardiovascular	7,165	procs	\$24	5,067	procs	\$19	1,049	procs	\$3	12%	2,098	procs	\$6	24%
Chiropractor	520	visits	\$2	417	visits	\$1	51	visits	\$1	11%	103	visits	\$0	22%
Radiology IP – General	4,459	procs	\$7	3,119	procs	\$7	670	procs	\$0	0%	1,340	procs	\$0	1%
Radiology IP - CT/MRI/PET	746	procs	\$4	592	procs	\$4	77	procs	\$0	-2%	154	procs	\$0	-5%
Radiology Office - General	1,644	procs	\$16	1,454	procs	\$16	95	procs	\$0	-1%	190	procs	\$0	-1%
Radiology Office - CT/MRI/PET	259	procs	\$7	257	procs	\$8	1	procs	\$0	-7%	2	procs	-\$1	-14%
Radiology OP – General	2,116	procs	\$4	2,403	procs	\$5	-143	procs	\$0	-11%	-286	procs	-\$1	-22%
Radiology OP - CT/MRI/PET	701	procs	\$4	773	procs	\$5	-36	procs	-\$1	-23%	-72	procs	-\$2	-46%
Pathology/Lab IP & OP	720	procs	\$3	655	procs	\$2	33	procs	\$0	9%	65	procs	\$1	17%
Pathology/Lab Office	29,842	procs	\$35	15,978	procs	\$22	6,932	procs	\$7	19%	13,864	procs	\$13	38%
Preventive Immunizations	1,032	procs	\$2	953	procs	\$2	39	procs	\$0	-6%	79	procs	\$0	-12%
Preventive Physical Exams	126	visits	\$1	85	visits	\$1	21	visits	\$0	10%	41	visits	\$0	21%
Preventive Well Baby Exams	0	visits	\$0	0	visits	\$0	0	visits	\$0	0%	0	visits	\$0	0%
Preventive Other	1,515	procs	\$3	791	procs	\$2	362	procs	\$1	19%	724	procs	\$1	38%
Vision Exams	898	visits	\$9	756	visits	\$7	71	visits	\$1	8%	142	visits	\$1	16%
Hearing/Speech Exams	81	visits	\$0	47	visits	\$0	17	visits	\$0	24%	35	visits	\$0	49%
Outpatient Psychiatric	718	visits	\$5	338	visits	\$2	190	visits	\$1	27%	379	visits	\$3	53%
Outpatient Alcohol/Drug	1	visits	\$0	4	visits	\$0	-2	visits	\$0	-136%	-4	visits	\$0	-273%
Miscellaneous Medical	5,682	procs	\$28	3,102	procs	\$16	1,290	procs	\$6	21%	2,580	procs	\$12	43%
Professional Total			\$721			\$495			\$113	16%			\$226	31%
Other														
Home Health Care	7,011	visits	\$187	9,199	visits	\$210	-1,094	visits	-\$12	-6%	-2,188	visits	-\$23	-13%
Ambulance	1,691	visits	\$57	1,282	visits	\$54	204	visits	\$2	3%	408	visits	\$3	5%
Durable Medical Equipment	6,221	procs	\$52	7,203	procs	\$58	-491	procs	-\$3	-6%	-982	procs	-\$6	-11%
Prosthetics	67	procs	\$3	67	procs	\$3	0	procs	\$0	-6%	0	procs	\$0	-12%
Glasses/Contacts	10	visits	\$0	15	visits	\$0	-3	visits	\$0	-17%	-5	visits	\$0	-35%
Unknown	2,414	procs	\$3	1,878	procs	\$2	268	procs	\$0	13%	537	procs	\$1	25%
Other Total			\$301			\$327			-\$13	-4%			-\$26	-9%
Total			\$3,444			\$2,723			\$361	10%			\$721	21%

Appendix A4: PMPM Cost Reduction for Sample ACO Population Associated with Improved HF Management

Service Category	MSSP ACO Population			MSSP ACO HF Population				Reduction in Total Population if HF Population Management Moved 50% of the way to 10th percentile			Reduction in Total Population if HF Population Management Moved 100% of the way to 10th percentile					
	Annual Utilization per 1,000	Allowed PMPM		Annual Utilization per 1,000	Utilization As % of MSSP ACO Population	Allowed PMPM	Cost As % of MSSP ACO Population	Annual Utilization per 1,000	Allowed PMPM	Cost As % of MSSP ACO Population	Annual Utilization per 1,000	Allowed PMPM	Cost As % of MSSP ACO Population			
Facility																
Inpatient																
Medical	233	admits	\$201	96	admits	41%	\$91	45%	3	admits	\$8	4%	7	admits	\$17	8%
Surgical	82	admits	\$173	23	admits	28%	\$66	38%	2	admits	\$9	5%	4	admits	\$17	10%
Psychiatric	13	admits	\$12	2	admits	14%	\$2	13%	0	admits	\$0	3%	1	admits	\$1	6%
Alcohol/Drug	3	admits	\$2	0	admits	6%	\$0	6%	0	admits	\$0	-4%	0	admits	\$0	-7%
Maternity	0	admits	\$0	0	admits	0%	\$0	0%	0	admits	\$0	0%	0	admits	\$0	0%
Inpatient Subtotal	331	admits	\$388	121	admits	37%	\$159	41%	6	admits	\$17	4%	11	admits	\$34	9%
SNF	2,845	days	\$127	1,281	days	45%	\$58	46%	250	days	\$11	9%	501	days	\$23	18%
Outpatient																
Emergency Room	288	cases	\$11	53	cases	18%	\$2	20%	-19	cases	-\$1	-8%	-38	cases	-\$2	-16%
Outpatient Surgery	348	cases	\$46	46	cases	13%	\$9	20%	-1	cases	\$0	1%	-2	cases	\$1	2%
Radiology – General	387	cases	\$9	59	cases	15%	\$1	16%	-11	cases	\$0	0%	-23	cases	\$0	0%
Radiology - CT/MRI/PET	133	cases	\$6	19	cases	14%	\$1	12%	-3	cases	\$0	-2%	-5	cases	\$0	-3%
Pathology/Lab	1084	cases	\$4	202	cases	19%	\$1	15%	-148	cases	-\$1	-14%	-296	cases	-\$1	-28%
Pharmacy	1484	cases	\$25	36	cases	2%	\$1	6%	-15	cases	\$0	-1%	-30	cases	-\$1	-2%
Cardiovascular	158	cases	\$4	37	cases	24%	\$1	32%	-5	cases	\$0	2%	-9	cases	\$0	5%
PT/OT/ST	1304	cases	\$12	292	cases	22%	\$3	23%	24	cases	\$0	2%	47	cases	\$1	5%
Alcohol/Drug	6	cases	\$0	0	cases	0%	\$0	0%	0	cases	\$0	-4%	-1	cases	\$0	-8%
Psychiatric	153	cases	\$2	3	cases	2%	\$0	2%	-2	cases	\$0	-2%	-4	cases	\$0	-4%
Preventive	335	cases	\$2	39	cases	12%	\$0	6%	-13	cases	\$0	-4%	-27	cases	\$0	-8%
Dialysis	1611	cases	\$24	0	cases	0%	\$0	0%	-7	cases	\$0	0%	-14	cases	\$0	-1%
Other	1684	cases	\$16	174	cases	10%	\$4	23%	-126	cases	-\$1	-8%	-251	cases	-\$3	-16%
Outpatient Subtotal			\$161				\$24	15%			-\$3	-2%			-\$5	-3%
Facility Total																
Professional																
Inpatient Surgery	663	procs	\$15	214	procs	32%	\$4	30%	41	procs	\$1	4%	82	procs	\$1	7%
Inpatient Anesthesia	168	procs	\$3	47	procs	28%	\$1	30%	10	procs	\$0	7%	20	procs	\$0	13%
Maternity	1	procs	\$0	0	procs	0%	\$0	0%	0	procs	\$0	0%	0	procs	\$0	0%
Outpatient Surgery	587	procs	\$14	99	procs	17%	\$2	14%	3	procs	\$0	0%	6	procs	\$0	0%
Office Surgery	2,575	procs	\$26	362	procs	14%	\$3	12%	60	procs	\$0	1%	119	procs	\$1	3%
Outpatient Anesthesia	320	procs	\$4	38	procs	12%	\$1	12%	5	procs	\$0	3%	10	procs	\$0	5%
Hospital Visits	6,341	visits	\$56	2,815	visits	44%	\$25	46%	770	visits	\$7	12%	1,539	visits	\$14	25%
Office/Home Visits	8,793	visits	\$70	1,433	visits	16%	\$11	16%	106	visits	\$1	1%	212	visits	\$2	2%
Office Administered Drugs	2,202	procs	\$44	332	procs	15%	\$5	11%	24	procs	\$0	1%	48	procs	\$0	1%
Urgent Care Visits	26	visits	\$0	2	visits	7%	\$0	7%	-2	visits	\$0	-6%	-4	visits	\$0	-13%
Allergy Testing	15	procs	\$0	2	procs	16%	\$0	13%	1	procs	\$0	4%	2	procs	\$0	7%
Allergy Immunotherapy	64	visits	\$0	2	visits	4%	\$0	6%	-1	visits	\$0	0%	-3	visits	\$0	0%
Emergency Room & Obs Visits	571	visits	\$7	153	visits	27%	\$2	29%	-22	visits	\$0	-3%	-43	visits	\$0	-6%
Physical Therapy	1,655	visits	\$14	199	visits	12%	\$2	13%	56	visits	\$0	4%	113	visits	\$1	7%
Cardiovascular	2,273	procs	\$8	711	procs	31%	\$2	29%	104	procs	\$0	3%	208	procs	\$1	7%
Chiropractor	722	visits	\$2	52	visits	7%	\$0	7%	5	visits	\$0	1%	10	visits	\$0	2%
Radiology IP – General	999	procs	\$2	442	procs	44%	\$1	37%	66	procs	\$0	0%	133	procs	\$0	0%
Radiology IP - CT/MRI/PET	205	procs	\$1	74	procs	36%	\$0	35%	8	procs	\$0	-1%	15	procs	\$0	-2%
Radiology Office – General	1,410	procs	\$13	163	procs	12%	\$2	11%	9	procs	\$0	0%	19	procs	\$0	0%
Radiology Office - CT/MRI/PET	281	procs	\$8	26	procs	9%	\$1	8%	0	procs	\$0	-1%	0	procs	\$0	-1%
Radiology OP – General	973	procs	\$2	210	procs	22%	\$0	19%	-14	procs	\$0	-2%	-28	procs	\$0	-4%
Radiology OP - CT/MRI/PET	351	procs	\$2	70	procs	20%	\$0	18%	-4	procs	\$0	-4%	-7	procs	\$0	-8%
Pathology/Lab IP & OP	326	procs	\$2	71	procs	22%	\$0	19%	3	procs	\$0	2%	6	procs	\$0	3%
Pathology/Lab Office	17,858	procs	\$26	2,959	procs	17%	\$4	14%	687	procs	\$1	3%	1,375	procs	\$1	5%
Preventive Immunizations	1,137	procs	\$2	102	procs	9%	\$0	9%	4	procs	\$0	-1%	8	procs	\$0	-1%
Preventive Physical Exams	187	visits	\$2	12	visits	7%	\$0	7%	2	visits	\$0	1%	4	visits	\$0	2%
Preventive Well Baby Exams	0	visits	\$0	0	visits	0%	\$0	0%	0	visits	\$0	0%	0	visits	\$0	0%
Preventive Other	1,446	procs	\$4	150	procs	10%	\$0	7%	36	procs	\$0	1%	72	procs	\$0	3%
Vision Exams	858	visits	\$8	89	visits	10%	\$1	10%	7	visits	\$0	1%	14	visits	\$0	2%
Hearing/Speech Exams	68	visits	\$0	8	visits	12%	\$0	12%	2	visits	\$0	3%	3	visits	\$0	6%
Outpatient Psychiatric	724	visits	\$5	71	visits	10%	\$1	11%	19	visits	\$0	3%	38	visits	\$0	6%
Outpatient Alcohol/Drug	1	visits	\$0	0	visits	6%	\$0	7%	0	visits	\$0	-9%	0	visits	\$0	-18%
Miscellaneous Medical	2,927	procs	\$19	564	procs	19%	\$3	15%	128	procs	\$1	3%	256	procs	\$1	6%
Professional Total			\$360				\$72	20%			\$11	3%			\$22	6%
Other																
Home Health Care	1,867	visits	\$53	695	visits	37%	\$19	35%	-109	visits	-\$1	-2%	-217	visits	-\$2	-4%
Ambulance	857	visits	\$29	168	visits	20%	\$6	19%	20	visits	\$0	1%	41	visits	\$0	1%
Durable Medical Equipment	2,200	procs	\$18	617	procs	28%	\$5	28%	-49	procs	\$0	-2%	-97	procs	-\$1	-3%
Prosthetics	31	procs	\$2	7	procs	21%	\$0	17%	0	procs	\$0	-1%	0	procs	\$0	-2%
Glasses/Contacts	10	visits	\$0	1	visits	10%	\$0	11%	0	visits	\$0	-2%	-1	visits	\$0	-4%
Unknown	1,177	procs	\$2	239	procs	20%	\$0	17%	27	procs	\$0	2%	53	procs	\$0	4%
Other Total			\$104				\$30	29%			-\$1	-1%			-\$3	-2%
Total			\$1,140				\$342	30%			\$36	3%			\$72	6%

APPENDIX B: MSA DISTRIBUTION BY HF POPULATION PPPM COSTS

MSA	MSA Description	State	Number of Medicare Beneficiaries in the 100% Data	Prevalence of HF in the 5% Sample Data	Sample Size of HF in the 5% Sample	Average HCC of HF Members	Area & Risk Adjusted PPPM Cost of HF Members	Mortality Rates Among HF	PPPM Rank/ Percentile
11260	Anchorage	AK	35,889	5%	85	2.05	\$2,401	21%	22 / 5.0%
02999	Non-MSA Area	AK	12,406	6%	31	2.08	\$3,400	16%	322 / 73.2%
17980	Columbus	AL	37,139	10%	162	2.29	\$2,883	22%	121 / 27.5%
26620	Huntsville	AL	55,693	9%	230	2.29	\$3,012	25%	170 / 38.6%
22520	Florence-Muscle Shoals	AL	29,653	10%	133	2.14	\$3,100	17%	208 / 47.3%
13820	Birmingham-Hoover	AL	119,037	10%	581	2.06	\$3,150	20%	235 / 53.4%
01999	Non-MSA Area	AL	215,816	11%	1,111	2.07	\$3,171	22%	245 / 55.7%
11500	Anniston-Oxford-Jacksonville	AL	22,546	11%	118	1.97	\$3,226	18%	263 / 59.8%
19460	Decatur	AL	26,980	9%	124	2.09	\$3,231	21%	266 / 60.5%
46220	Tuscaloosa	AL	34,654	11%	179	2.12	\$3,246	22%	275 / 62.5%
20020	Dothan	AL	25,654	10%	119	2.11	\$3,394	23%	319 / 72.5%
33660	Mobile	AL	42,810	10%	192	2.12	\$3,494	26%	350 / 79.5%
33860	Montgomery	AL	44,865	9%	171	2.06	\$3,580	18%	372 / 84.5%
19300	Daphne-Fairhope-Foley	AL	27,647	8%	107	2.34	\$3,600	22%	376 / 85.5%
23460	Gadsden	AL	19,371	9%	83	1.86	\$3,993	24%	424 / 96.4%
12220	Auburn-Opelika	AL	14,521	7%	46	1.87	\$4,565	22%	437 / 99.3%
38220	Pine Bluff	AR	15,123	9%	65	1.81	\$2,817	20%	104 / 23.6%
27860	Jonesboro	AR	19,724	10%	87	2.25	\$2,986	18%	159 / 36.1%
32820	Memphis	AR	147,216	10%	697	2.11	\$3,222	19%	261 / 59.3%
30780	Little Rock-North Little Rock	AR	95,281	8%	379	2.16	\$3,285	23%	290 / 65.9%
22900	Fort Smith	AR	40,574	10%	200	2.11	\$3,319	21%	300 / 68.2%
05999	Non-MSA Area	AR	219,141	11%	1,128	2.05	\$3,481	22%	343 / 78.0%
45500	Texarkana	AR	23,954	12%	139	2.13	\$3,614	19%	381 / 86.6%
26300	Hot Springs	AR	24,660	9%	100	1.96	\$3,639	24%	385 / 87.5%
22220	Fayetteville-Springdale	AR	49,646	10%	205	2.06	\$3,749	20%	408 / 92.7%
43420	Sierra Vista-Douglas	AZ	17,911	7%	60	2.51	\$2,560	20%	56 / 12.7%
39140	Prescott	AZ	43,226	6%	119	2.06	\$3,067	27%	191 / 43.4%
46060	Tucson	AZ	93,471	6%	273	2.05	\$3,089	18%	203 / 46.1%
29420	Lake Havasu City-Kingman	AZ	39,715	8%	141	2.04	\$3,144	18%	232 / 52.7%
38060	Phoenix-Mesa-Scottsdale	AZ	323,045	6%	974	2.10	\$3,152	19%	237 / 53.9%
49740	Yuma	AZ	21,613	7%	71	2.31	\$3,183	24%	251 / 57.0%
04999	Non-MSA Area	AZ	45,489	8%	161	1.91	\$3,310	18%	294 / 66.8%
22380	Flagstaff	AZ	15,603	6%	41	1.86	\$3,627	29%	384 / 87.3%
32900	Merced	CA	26,480	11%	135	2.26	\$2,215	21%	12 / 2.7%
34900	Napa	CA	14,946	9%	70	2.48	\$2,237	20%	14 / 3.2%
33700	Modesto	CA	41,716	9%	167	2.03	\$2,423	20%	23 / 5.2%
41884	San Francisco-Redwood City	CA	127,296	7%	407	2.16	\$2,491	18%	36 / 8.2%
42220	Santa Rosa	CA	49,177	8%	190	2.13	\$2,495	21%	38 / 8.6%
42200	Santa Maria-Santa Barbara	CA	53,228	8%	200	2.02	\$2,503	20%	40 / 9.1%
31460	Madera	CA	14,555	11%	80	2.10	\$2,510	26%	43 / 9.8%
25260	Hanford-Corcoran	CA	12,177	9%	51	2.26	\$2,513	24%	44 / 10.0%
42034	San Rafael	CA	29,512	6%	90	2.21	\$2,520	22%	45 / 10.2%
06999	Non-MSA Area	CA	160,987	7%	571	2.19	\$2,531	21%	50 / 11.4%
20940	El Centro	CA	20,706	9%	82	2.11	\$2,539	21%	51 / 11.6%
42100	Santa Cruz-Watsonville	CA	33,623	9%	145	1.96	\$2,540	15%	52 / 11.8%
47300	Visalia-Porterville	CA	44,856	10%	222	2.05	\$2,557	23%	55 / 12.5%
12540	Bakersfield	CA	61,278	9%	246	2.38	\$2,708	17%	78 / 17.7%
41940	San Jose-Sunnyvale-Santa Clara	CA	134,687	6%	397	2.16	\$2,712	18%	79 / 18.0%

MSA	MSA Description	State	Number of Medicare Beneficiaries in the 100% Data	Prevalence of HF in the 5% Sample Data	Sample Size of HF in the 5% Sample	Average HCC of HF Members	Area & Risk Adjusted PPM Cost of HF Members	Mortality Rates Among HF	PPPM Rank/ Percentile
40900	Sacramento-Roseville-Arden	CA	171,287	7%	550	2.23	\$2,717	23%	80 / 18.2%
46700	Vallejo-Fairfield	CA	30,193	7%	92	2.25	\$2,746	23%	86 / 19.5%
41500	Salinas	CA	49,569	7%	169	2.11	\$2,754	24%	88 / 20.0%
23420	Fresno	CA	79,531	8%	316	1.95	\$2,784	21%	93 / 21.1%
40140	Riverside-San Bernardino-Ontario	CA	239,082	10%	1,065	2.21	\$2,811	18%	100 / 22.7%
17020	Chico	CA	42,425	7%	127	2.26	\$2,814	21%	103 / 23.4%
41740	San Diego-Carlsbad	CA	220,855	9%	893	2.27	\$2,852	18%	114 / 25.9%
39820	Redding	CA	38,540	7%	127	2.13	\$2,922	20%	136 / 30.9%
36084	Oakland-Hayward-Berkeley	CA	179,531	8%	657	2.18	\$2,938	19%	144 / 32.7%
44700	Stockton-Lodi	CA	58,580	9%	227	2.28	\$3,047	22%	184 / 41.8%
11244	Anaheim-Santa Ana-Irvine	CA	209,910	8%	780	2.37	\$3,126	19%	221 / 50.2%
37100	Oxnard-Thousand Oaks-Ventura	CA	80,325	8%	306	2.20	\$3,138	21%	225 / 51.1%
31084	Los Angeles-Long Beach-Glendale	CA	658,761	10%	3,139	2.42	\$3,322	19%	301 / 68.4%
42020	San Luis Obispo-Paso Robles	CA	44,123	6%	121	2.15	\$3,328	26%	304 / 69.1%
49700	Yuba City	CA	23,406	9%	108	2.08	\$3,342	31%	310 / 70.5%
39380	Pueblo	CO	21,233	6%	68	2.36	\$2,812	22%	101 / 23.0%
17820	Colorado Springs	CO	58,995	6%	163	2.04	\$2,853	21%	115 / 26.1%
24540	Greeley	CO	21,289	8%	78	1.85	\$2,923	22%	137 / 31.1%
22660	Fort Collins	CO	31,634	6%	100	2.13	\$2,950	17%	151 / 34.3%
08999	Non-MSA Area	CO	92,101	7%	302	1.99	\$3,006	21%	168 / 38.2%
19740	Denver-Aurora-Lakewood	CO	151,856	6%	467	2.26	\$3,105	24%	212 / 48.2%
24300	Grand Junction	CO	15,670	5%	35	1.68	\$3,400	14%	321 / 73.0%
14500	Boulder	CO	25,469	6%	72	1.96	\$3,774	26%	412 / 93.6%
25540	Hartford	CT	148,488	10%	678	2.32	\$2,737	23%	84 / 19.1%
35300	New Haven-Milford	CT	101,341	12%	562	2.42	\$2,773	24%	91 / 20.7%
49340	Worcester	CT	95,185	8%	373	2.25	\$3,089	26%	199 / 45.2%
14860	Bridgeport-Stamford-Norwalk	CT	101,192	10%	494	2.45	\$3,231	25%	265 / 60.2%
35980	Norwich-New London	CT	38,528	9%	173	2.29	\$3,277	24%	284 / 64.5%
09999	Non-MSA Area	CT	28,812	9%	121	2.46	\$3,450	29%	334 / 75.9%
47894	Washington-Arlington	DC	393,851	8%	1,401	2.21	\$3,545	21%	365 / 83.0%
20100	Dover	DE	26,480	6%	72	2.58	\$3,649	24%	388 / 88.2%
48864	Wilmington	DE	99,123	8%	402	2.27	\$3,731	21%	404 / 91.8%
41540	Salisbury	DE	81,060	8%	330	2.34	\$4,368	20%	433 / 98.4%
26140	Homosassa Springs	FL	34,103	10%	159	2.17	\$2,424	26%	24 / 5.5%
33124	Miami-Miami Beach-Kendall	FL	181,357	11%	978	2.51	\$3,163	20%	240 / 54.5%
36100	Ocala	FL	64,908	12%	358	2.25	\$3,255	20%	277 / 63.0%
38940	Port St. Lucie	FL	72,124	8%	292	2.23	\$3,278	24%	286 / 65.0%
37340	Palm Bay-Melbourne-Titusville	FL	85,310	9%	358	2.29	\$3,316	21%	298 / 67.7%
27260	Jacksonville	FL	166,540	9%	663	2.35	\$3,353	20%	312 / 70.9%
36740	Orlando-Kissimmee-Sanford	FL	245,881	9%	968	2.33	\$3,387	23%	317 / 72.0%
48424	West Palm Beach-Boca Raton	FL	181,679	9%	819	2.35	\$3,427	21%	329 / 74.8%
45220	Tallahassee	FL	27,854	8%	103	2.06	\$3,452	15%	335 / 76.1%
42680	Sebastian-Vero Beach	FL	32,743	8%	114	2.09	\$3,489	24%	349 / 79.3%
23540	Gainesville	FL	33,302	8%	119	2.14	\$3,496	22%	352 / 80.0%
45300	Tampa-St. Petersburg-Clearwater	FL	310,812	9%	1,330	2.37	\$3,501	24%	354 / 80.5%
39460	Punta Gorda	FL	36,466	11%	201	2.43	\$3,515	20%	358 / 81.4%
35840	North Port-Bradenton-Sarasota	FL	150,067	8%	562	2.33	\$3,567	24%	369 / 83.9%
19660	Deltona-Daytona Beach	FL	90,958	8%	376	2.30	\$3,573	26%	370 / 84.1%

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37860	Pensacola-Ferry Pass-Brent	FL	65,514	9%	278	2.42	\$3,610	24%	380 / 86.4%
18880	Crestview-Fort Walton Beach	FL	37,400	9%	144	2.23	\$3,679	22%	391 / 88.9%
34940	Naples-Immokalee-Marco Island	FL	64,334	7%	222	2.33	\$3,729	23%	402 / 91.4%
15980	Cape Coral-Fort Myers	FL	103,973	8%	394	2.36	\$3,731	22%	403 / 91.6%
37460	Panama City	FL	32,232	11%	163	2.41	\$3,731	18%	405 / 92.0%
29460	Lakeland-Winter Haven	FL	71,572	9%	290	2.33	\$3,735	21%	406 / 92.3%
12999	Non-MSA Area	FL	111,257	9%	495	2.30	\$3,735	21%	407 / 92.5%
22744	Fort Lauderdale-Pompano Beach	FL	129,130	9%	557	2.45	\$3,852	24%	418 / 95.0%
42700	Sebring	FL	23,580	11%	128	2.37	\$4,079	22%	427 / 97.0%
12020	Athens-Clarke County	GA	20,537	7%	68	2.00	\$2,477	12%	32 / 7.3%
15260	Brunswick	GA	16,571	6%	48	2.09	\$2,646	21%	69 / 15.7%
10500	Albany	GA	19,969	9%	74	2.07	\$2,674	24%	72 / 16.4%
23580	Gainesville	GA	19,654	7%	69	2.24	\$2,794	20%	96 / 21.8%
16860	Chattanooga	GA	72,599	9%	309	2.24	\$2,885	19%	124 / 28.2%
19140	Dalton	GA	18,566	10%	89	2.11	\$2,891	26%	128 / 29.1%
12060	Atlanta-Sandy Springs-Roswell	GA	431,750	8%	1,584	2.30	\$3,053	21%	188 / 42.7%
12260	Augusta-Richmond County	GA	69,620	7%	242	2.17	\$3,087	22%	198 / 45.0%
13999	Non-MSA Area	GA	253,971	10%	1,223	2.22	\$3,139	20%	227 / 51.6%
40660	Rome	GA	15,039	10%	70	2.04	\$3,238	21%	270 / 61.4%
42340	Savannah	GA	37,391	8%	134	2.23	\$3,483	27%	344 / 78.2%
31420	Macon	GA	29,397	9%	109	2.16	\$3,584	19%	373 / 84.8%
46660	Valdosta	GA	15,901	7%	52	1.80	\$4,262	17%	430 / 97.7%
47580	Warner Robins	GA	22,483	10%	99	2.13	\$4,285	23%	432 / 98.2%
15999	Non-MSA Area	HI	24,560	7%	83	1.82	\$2,152	11%	8 / 1.8%
27980	Kahului-Waikulu-Lahaina	HI	10,546	6%	30	1.96	\$2,699	20%	76 / 17.3%
46520	Urban Honolulu	HI	74,333	6%	189	1.93	\$2,960	24%	152 / 34.5%
19780	Des Moines-West Des Moines	IA	64,400	7%	227	2.10	\$2,827	24%	108 / 24.5%
26980	Iowa City	IA	15,218	7%	52	1.93	\$2,903	31%	132 / 30.0%
19999	Non-MSA Area	IA	240,930	9%	1,081	2.01	\$3,052	25%	187 / 42.5%
16300	Cedar Rapids	IA	31,116	8%	114	2.11	\$3,090	21%	206 / 46.8%
43580	Sioux City	IA	21,880	8%	82	2.13	\$3,139	16%	226 / 51.4%
36540	Omaha-Council Bluffs	IA	93,585	7%	335	2.24	\$3,188	25%	252 / 57.3%
20220	Dubuque	IA	10,506	6%	27	2.36	\$3,229	48%	264 / 60.0%
47940	Waterloo-Cedar Falls	IA	26,011	9%	109	2.11	\$3,463	21%	338 / 76.8%
30300	Lewiston	ID	11,817	10%	56	2.22	\$2,497	27%	39 / 8.9%
26820	Idaho Falls	ID	14,583	6%	44	1.69	\$2,946	30%	149 / 33.9%
16999	Non-MSA Area	ID	69,373	8%	253	2.13	\$2,978	17%	156 / 35.5%
14260	Boise City	ID	48,781	6%	151	2.18	\$3,114	23%	216 / 49.1%
17660	Coeur d'Alene	ID	18,743	6%	52	1.71	\$4,012	31%	425 / 96.6%
28100	Kankakee	IL	18,508	9%	76	2.40	\$2,527	20%	46 / 10.5%
14010	Bloomington	IL	21,101	8%	77	2.32	\$2,625	25%	67 / 15.2%
40420	Rockford	IL	46,876	10%	237	2.18	\$2,679	24%	73 / 16.6%
19500	Decatur	IL	20,648	10%	104	2.18	\$2,834	21%	110 / 25.0%
16580	Champaign-Urbana	IL	23,838	9%	94	2.05	\$2,933	18%	141 / 32.0%
19180	Danville	IL	12,425	10%	59	2.16	\$2,981	17%	158 / 35.9%
16020	Cape Girardeau	IL	16,379	7%	59	2.18	\$3,002	19%	166 / 37.7%
44100	Springfield	IL	34,563	10%	176	2.27	\$3,013	21%	171 / 38.9%
20994	Elgin	IL	68,018	9%	275	2.20	\$3,089	18%	205 / 46.6%

MSA	MSA Description	State	Number of Medicare Beneficiaries in the 100% Data	Prevalence of HF in the 5% Sample Data	Sample Size of HF in the 5% Sample	Average HCC of HF Members	Area & Risk Adjusted PPM Cost of HF Members	Mortality Rates Among HF	PPPM Rank/ Percentile
16060	Carbondale-Marion	IL	20,746	8%	73	2.09	\$3,145	21%	233 / 53.0%
41180	St. Louis	IL	322,166	10%	1,548	2.27	\$3,153	22%	238 / 54.1%
37900	Peoria	IL	55,305	10%	265	2.09	\$3,239	22%	271 / 61.6%
29404	Lake County-Kenosha County	IL	98,490	8%	376	2.26	\$3,314	20%	297 / 67.5%
17999	Non-MSA Area	IL	284,995	10%	1,399	2.15	\$3,420	23%	327 / 74.3%
16974	Chicago-Naperville	IL	826,644	11%	4,220	2.28	\$3,496	18%	351 / 79.8%
19340	Davenport-Moline-Rock Island	IL	56,765	9%	251	2.16	\$3,516	25%	359 / 81.6%
34620	Muncie	IN	19,472	10%	92	2.17	\$2,842	22%	111 / 25.2%
29200	Lafayette-West Lafayette	IN	21,098	9%	92	2.40	\$2,889	22%	127 / 28.9%
26900	Indianapolis-Carmel-Anderson	IN	207,360	10%	993	2.30	\$2,992	23%	161 / 36.6%
21780	Evansville	IN	42,362	10%	198	2.33	\$3,000	25%	164 / 37.3%
43780	South Bend-Mishawaka	IN	38,002	11%	199	2.18	\$3,033	19%	181 / 41.1%
14020	Bloomington	IN	17,580	6%	54	1.78	\$3,074	17%	192 / 43.6%
23844	Gary	IN	106,087	14%	664	2.36	\$3,278	19%	285 / 64.8%
17140	Cincinnati	IN	203,569	10%	965	2.28	\$3,280	22%	287 / 65.2%
23060	Fort Wayne	IN	37,263	8%	152	2.31	\$3,286	29%	291 / 66.1%
45460	Terre Haute	IN	28,788	14%	184	2.09	\$3,314	20%	296 / 67.3%
31140	Louisville-Jefferson County	IN	164,023	9%	702	2.31	\$3,324	21%	302 / 68.6%
33140	Michigan City-La Porte	IN	17,894	9%	72	2.05	\$3,364	25%	314 / 71.4%
29020	Kokomo	IN	16,506	10%	83	2.37	\$3,416	18%	325 / 73.9%
18999	Non-MSA Area	IN	219,217	10%	1,049	2.21	\$3,474	23%	341 / 77.5%
18020	Columbus	IN	12,279	9%	53	2.41	\$3,684	21%	393 / 89.3%
21140	Elkhart-Goshen	IN	22,206	10%	96	1.84	\$4,277	24%	431 / 98.0%
41140	St. Joseph	KS	20,096	8%	82	2.49	\$2,822	15%	106 / 24.1%
48620	Wichita	KS	79,624	9%	349	2.02	\$2,936	23%	143 / 32.5%
20999	Non-MSA Area	KS	166,379	10%	818	1.95	\$3,236	22%	269 / 61.1%
28140	Kansas City	KS	210,628	8%	753	2.14	\$3,311	24%	295 / 67.0%
45820	Topeka	KS	40,008	7%	140	2.40	\$3,378	27%	316 / 71.8%
29940	Lawrence	KS	12,033	5%	28	2.08	\$3,696	29%	396 / 90.0%
36980	Owensboro	KY	20,319	13%	130	2.20	\$2,488	15%	35 / 8.0%
26580	Huntington-Ashland	KY	59,257	9%	277	2.50	\$2,796	20%	97 / 22.0%
21060	Elizabethtown-Fort Knox	KY	21,304	12%	119	2.19	\$2,873	10%	119 / 27.0%
17300	Clarksville	KY	27,107	9%	109	2.11	\$3,103	17%	210 / 47.7%
30460	Lexington-Fayette	KY	51,049	9%	222	2.22	\$3,224	19%	262 / 59.5%
14540	Bowling Green	KY	22,152	9%	102	2.11	\$3,243	17%	274 / 62.3%
21999	Non-MSA Area	KY	329,960	10%	1,540	2.20	\$3,317	20%	299 / 68.0%
26380	Houma-Thibodaux	LA	27,528	10%	124	2.11	\$2,655	17%	70 / 15.9%
35380	New Orleans-Metairie	LA	96,308	11%	478	2.35	\$2,965	19%	154 / 35.0%
29340	Lake Charles	LA	28,989	11%	152	2.08	\$3,467	22%	339 / 77.0%
29180	Lafayette	LA	63,689	10%	296	2.16	\$3,488	23%	348 / 79.1%
12940	Baton Rouge	LA	66,612	10%	299	2.08	\$3,509	18%	355 / 80.7%
33740	Monroe	LA	24,293	14%	139	2.37	\$3,601	20%	377 / 85.7%
43340	Shreveport-Bossier City	LA	61,826	10%	298	2.39	\$3,689	18%	395 / 89.8%
22999	Non-MSA Area	LA	121,566	13%	759	2.25	\$3,702	18%	400 / 90.9%
10780	Alexandria	LA	24,917	11%	138	2.25	\$3,827	20%	415 / 94.3%
25220	Hammond	LA	14,711	12%	84	2.63	\$4,082	20%	428 / 97.3%
25999	Non-MSA Area	MA	15,749	8%	55	2.17	\$2,530	16%	49 / 11.1%
38340	Pittsfield	MA	28,584	9%	120	2.44	\$2,661	24%	71 / 16.1%

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44140	Springfield	MA	87,207	8%	336	2.16	\$2,892	22%	130 / 29.5%
15764	Cambridge-Newton-Framingham	MA	274,129	9%	1,184	2.45	\$3,116	22%	217 / 49.3%
14454	Boston	MA	232,913	9%	949	2.29	\$3,123	19%	220 / 50.0%
39300	Providence-Warwick	MA	195,933	8%	796	2.23	\$3,192	20%	254 / 57.7%
12700	Barnstable Town	MA	57,893	8%	227	2.20	\$3,221	19%	260 / 59.1%
25180	Hagerstown-Martinsburg	MD	36,284	9%	148	2.16	\$2,919	27%	135 / 30.7%
15680	California-Lexington Park	MD	12,159	10%	58	2.56	\$3,526	16%	361 / 82.0%
19060	Cumberland	MD	20,529	10%	98	2.05	\$3,910	17%	420 / 95.5%
43524	Silver Spring-Frederick	MD	129,314	7%	429	2.16	\$4,388	22%	434 / 98.6%
12580	Baltimore-Columbia-Towson	MD	349,353	9%	1,484	2.29	\$4,455	22%	436 / 99.1%
24999	Non-MSA Area	MD	32,466	8%	124	2.52	\$4,867	18%	440 / 100.0%
30340	Lewiston-Auburn	ME	17,705	8%	66	2.24	\$2,384	32%	20 / 4.5%
23999	Non-MSA Area	ME	105,451	8%	420	2.14	\$2,618	24%	63 / 14.3%
38860	Portland-South Portland	ME	79,320	8%	319	2.25	\$2,825	21%	107 / 24.3%
12620	Bangor	ME	26,204	7%	97	2.13	\$3,753	25%	409 / 93.0%
28020	Kalamazoo-Portage	MI	40,402	9%	189	2.26	\$2,504	25%	41 / 9.3%
33220	Midland	MI	12,215	12%	65	2.08	\$2,581	20%	58 / 13.2%
27100	Jackson	MI	23,514	8%	101	2.37	\$2,724	20%	81 / 18.4%
24340	Grand Rapids-Wyoming	MI	83,852	9%	355	2.23	\$2,865	23%	116 / 26.4%
12980	Battle Creek	MI	22,207	11%	110	2.35	\$2,947	25%	150 / 34.1%
26999	Non-MSA Area	MI	305,430	10%	1,402	2.11	\$2,973	21%	155 / 35.2%
11460	Ann Arbor	MI	34,072	9%	143	2.20	\$3,056	23%	190 / 43.2%
22420	Flint	MI	60,061	11%	312	2.47	\$3,089	18%	204 / 46.4%
29620	Lansing-East Lansing	MI	54,483	11%	285	2.29	\$3,105	24%	213 / 48.4%
40980	Saginaw	MI	31,934	10%	149	2.18	\$3,140	19%	228 / 51.8%
13020	Bay City	MI	18,187	11%	90	2.31	\$3,179	18%	248 / 56.4%
35660	Niles-Benton Harbor	MI	27,736	10%	145	2.38	\$3,181	27%	249 / 56.6%
34740	Muskegon	MI	22,525	10%	114	2.10	\$3,255	23%	278 / 63.2%
19804	Detroit-Dearborn-Livonia	MI	224,133	15%	1,553	2.55	\$3,261	18%	281 / 63.9%
47664	Warren-Troy-Farmington Hills	MI	308,952	12%	1,726	2.44	\$3,399	21%	320 / 72.7%
33780	Monroe	MI	19,443	12%	119	2.27	\$3,971	17%	422 / 95.9%
20260	Duluth	MN	34,703	8%	139	1.93	\$2,622	26%	64 / 14.5%
29100	La Crosse-Onalaska	MN	13,198	8%	56	1.77	\$2,776	23%	92 / 20.9%
41060	St. Cloud	MN	15,849	7%	49	1.95	\$2,870	27%	118 / 26.8%
27999	Non-MSA Area	MN	139,420	8%	535	2.00	\$2,945	21%	147 / 33.4%
22020	Fargo	MN	20,145	8%	72	2.01	\$3,141	32%	229 / 52.0%
33460	Minneapolis-St. Paul	MN	204,556	7%	652	2.13	\$3,201	22%	257 / 58.4%
24220	Grand Forks	MN	11,267	8%	47	1.88	\$3,284	13%	288 / 65.5%
40340	Rochester	MN	21,684	7%	65	1.70	\$3,848	34%	417 / 94.8%
44180	Springfield	MO	48,576	8%	188	2.16	\$2,486	18%	34 / 7.7%
27620	Jefferson City	MO	22,325	10%	113	2.22	\$2,887	23%	126 / 28.6%
17860	Columbia	MO	17,669	8%	75	1.98	\$2,927	19%	138 / 31.4%
27900	Joplin	MO	25,834	8%	99	2.37	\$3,001	25%	165 / 37.5%
29999	Non-MSA Area	MO	280,399	10%	1,364	2.13	\$3,126	19%	222 / 50.5%
25060	Gulfport-Biloxi-Pascagoula	MS	52,904	11%	259	2.27	\$3,403	23%	323 / 73.4%
27140	Jackson	MS	70,115	9%	268	2.19	\$3,480	23%	342 / 77.7%
28999	Non-MSA Area	MS	288,846	11%	1,469	2.06	\$3,517	21%	360 / 81.8%
25620	Hattiesburg	MS	20,393	10%	101	2.44	\$3,603	27%	378 / 85.9%

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13740	Billings	MT	21,512	8%	82	2.16	\$2,529	29%	48 / 10.9%
33540	Missoula	MT	14,698	8%	57	2.07	\$2,607	25%	60 / 13.6%
30999	Non-MSA Area	MT	100,676	7%	339	1.95	\$2,995	25%	163 / 37.0%
24500	Great Falls	MT	11,976	8%	50	2.12	\$3,264	32%	282 / 64.1%
25860	Hickory-Lenoir-Morganton	NC	57,322	7%	203	2.21	\$2,728	21%	83 / 18.9%
15500	Burlington	NC	16,243	9%	65	2.52	\$2,800	20%	99 / 22.5%
20500	Durham-Chapel Hill	NC	54,260	7%	179	2.39	\$2,917	19%	133 / 30.2%
49180	Winston-Salem	NC	59,776	8%	231	2.21	\$3,014	21%	172 / 39.1%
22180	Fayetteville	NC	40,855	8%	140	2.49	\$3,135	26%	224 / 50.9%
39580	Raleigh	NC	112,799	7%	394	2.17	\$3,144	20%	231 / 52.5%
24660	Greensboro-High Point	NC	75,589	9%	325	2.23	\$3,148	22%	234 / 53.2%
16740	Charlotte-Concord-Gastonia	NC	258,947	8%	954	2.30	\$3,196	24%	255 / 58.0%
37999	Non-MSA Area	NC	397,151	9%	1,707	2.25	\$3,200	22%	256 / 58.2%
34820	Myrtle Beach-Conway	NC	79,911	7%	251	2.30	\$3,239	20%	272 / 61.8%
47260	Virginia Beach-Norfolk	NC	195,371	8%	753	2.15	\$3,241	19%	273 / 62.0%
24780	Greenville	NC	22,598	9%	87	2.36	\$3,333	11%	306 / 69.5%
11700	Asheville	NC	80,082	7%	271	2.08	\$3,344	23%	311 / 70.7%
48900	Wilmington	NC	43,052	9%	171	2.18	\$3,414	18%	324 / 73.6%
40580	Rocky Mount	NC	27,325	10%	119	2.32	\$3,470	18%	340 / 77.3%
27340	Jacksonville	NC	16,463	9%	67	1.75	\$3,500	24%	353 / 80.2%
24140	Goldsboro	NC	20,255	8%	70	1.94	\$3,642	20%	387 / 88.0%
35100	New Bern	NC	25,215	8%	95	2.14	\$3,846	21%	416 / 94.5%
13900	Bismarck	ND	16,119	9%	70	2.43	\$2,238	16%	15 / 3.4%
38999	Non-MSA Area	ND	57,158	10%	294	1.95	\$2,941	23%	145 / 33.0%
24260	Grand Island	NE	13,013	8%	54	1.96	\$2,875	11%	120 / 27.3%
31999	Non-MSA Area	NE	118,798	10%	568	2.02	\$3,165	21%	242 / 55.0%
30700	Lincoln	NE	37,033	7%	125	2.09	\$3,177	21%	247 / 56.1%
33999	Non-MSA Area	NH	92,388	7%	330	2.13	\$2,771	25%	89 / 20.2%
31700	Manchester-Nashua	NH	56,855	7%	189	2.21	\$2,945	20%	148 / 33.6%
40484	Rockingham-Strafford	NH	62,611	6%	194	2.54	\$3,509	27%	356 / 80.9%
35614	New York-Jersey City	NJ	1,375,280	11%	7,147	2.40	\$2,818	20%	105 / 23.9%
36140	Ocean City	NJ	21,416	10%	96	2.31	\$3,018	22%	173 / 39.3%
47220	Vineland-Bridgeton	NJ	22,002	11%	112	2.37	\$3,019	17%	176 / 40.0%
35084	Newark	NJ	287,207	11%	1,446	2.32	\$3,258	21%	279 / 63.4%
15804	Camden	NJ	156,217	9%	629	2.40	\$3,332	23%	305 / 69.3%
12100	Atlantic City-Hammonton	NJ	41,203	9%	188	2.34	\$3,433	20%	331 / 75.2%
10900	Allentown-Bethlehem-Easton	NJ	114,326	9%	499	2.61	\$3,559	27%	368 / 83.6%
45940	Trenton	NJ	49,612	8%	177	2.54	\$3,709	28%	401 / 91.1%
22140	Farmington	NM	15,627	11%	74	1.94	\$2,155	22%	9 / 2.0%
10740	Albuquerque	NM	65,824	6%	177	2.15	\$2,464	18%	30 / 6.8%
35999	Non-MSA Area	NM	102,002	8%	402	2.00	\$2,702	19%	77 / 17.5%
29740	Las Cruces	NM	23,429	7%	73	2.07	\$3,083	22%	194 / 44.1%
42140	Santa Fe	NM	19,812	5%	47	2.08	\$3,334	28%	307 / 69.8%
32999	Non-MSA Area	NV	40,197	7%	127	2.03	\$2,624	26%	66 / 15.0%
16180	Carson City	NV	11,419	6%	31	1.74	\$3,287	29%	292 / 66.4%
29820	Las Vegas-Henderson-Paradise	NV	150,768	7%	496	2.45	\$3,484	19%	345 / 78.4%
39900	Reno	NV	46,047	5%	112	2.16	\$3,653	28%	389 / 88.4%
24020	Glens Falls	NY	17,461	7%	61	2.50	\$2,214	18%	11 / 2.5%

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21300	Elmira	NY	13,227	9%	55	2.18	\$2,306	24%	17 / 3.9%
40380	Rochester	NY	72,813	10%	315	2.15	\$2,448	27%	27 / 6.1%
15380	Buffalo-Cheektowaga	NY	93,946	8%	358	2.28	\$2,472	20%	31 / 7.0%
36999	Non-MSA Area	NY	197,319	9%	896	2.22	\$2,551	22%	53 / 12.0%
10580	Albany-Schenectady-Troy	NY	90,348	9%	369	2.34	\$2,576	26%	57 / 13.0%
13780	Binghamton	NY	36,088	9%	155	2.18	\$2,624	18%	65 / 14.8%
46540	Utica-Rome	NY	42,275	10%	198	2.35	\$2,846	26%	112 / 25.5%
48060	Watertown-Fort Drum	NY	13,608	12%	73	2.33	\$2,849	23%	113 / 25.7%
45060	Syracuse	NY	82,562	8%	289	2.28	\$2,965	25%	153 / 34.8%
20524	Dutchess County-Putnum County	NY	53,938	8%	217	2.34	\$3,093	22%	207 / 47.0%
35004	Nassau County-Suffolk County	NY	360,727	10%	1,742	2.30	\$3,209	21%	259 / 58.9%
28740	Kingston	NY	26,529	9%	110	2.10	\$3,753	26%	410 / 93.2%
27060	Ithaca	NY	10,666	3%	17	1.87	\$4,587	41%	438 / 99.5%
49660	Youngstown-Warren-Boardman	OH	66,750	9%	290	2.46	\$2,885	21%	123 / 28.0%
31900	Mansfield	OH	19,970	7%	67	2.40	\$3,055	27%	189 / 43.0%
18140	Columbus	OH	147,444	9%	592	2.31	\$3,085	21%	196 / 44.5%
45780	Toledo	OH	64,245	11%	328	2.34	\$3,087	17%	197 / 44.8%
15940	Canton-Massillon	OH	41,590	10%	205	2.56	\$3,101	26%	209 / 47.5%
17460	Cleveland-Elyria	OH	229,598	11%	1,134	2.56	\$3,182	23%	250 / 56.8%
39999	Non-MSA Area	OH	323,526	10%	1,577	2.30	\$3,284	22%	289 / 65.7%
48540	Wheeling	OH	17,862	9%	75	2.37	\$3,461	20%	337 / 76.6%
10420	Akron	OH	64,621	11%	357	2.53	\$3,486	24%	346 / 78.6%
19380	Dayton	OH	81,213	11%	393	2.23	\$3,683	24%	392 / 89.1%
44220	Springfield	OH	14,803	8%	58	2.36	\$3,950	22%	421 / 95.7%
48260	Weirton-Steubenville	OH	19,524	9%	80	2.82	\$4,019	34%	426 / 96.8%
30620	Lima	OH	14,751	13%	90	2.29	\$4,431	21%	435 / 98.9%
30020	Lawton	OK	16,710	16%	133	1.98	\$2,891	19%	129 / 29.3%
36420	Oklahoma City	OK	143,748	10%	669	2.09	\$3,161	19%	239 / 54.3%
46140	Tulsa	OK	105,048	10%	512	2.16	\$3,419	22%	326 / 74.1%
40999	Non-MSA Area	OK	237,178	13%	1,441	2.01	\$3,587	19%	374 / 85.0%
24420	Grants Pass	OR	13,835	7%	51	2.29	\$1,267	20%	1 / 0.2%
32780	Medford	OR	31,032	7%	100	2.26	\$1,835	20%	4 / 0.9%
13460	Bend-Redmond	OR	22,156	5%	52	2.05	\$2,087	17%	6 / 1.4%
10540	Albany	OR	12,437	6%	38	2.22	\$2,480	16%	33 / 7.5%
38900	Portland-Vancouver-Hillsboro	OR	136,685	8%	519	2.16	\$2,505	21%	42 / 9.5%
41999	Non-MSA Area	OR	119,964	8%	453	1.91	\$2,611	16%	61 / 13.9%
41420	Salem	OR	27,165	7%	99	2.09	\$2,828	26%	109 / 24.8%
21660	Eugene	OR	34,308	7%	124	1.98	\$3,084	21%	195 / 44.3%
16540	Chambersburg-Waynesboro	PA	22,381	10%	110	2.19	\$2,378	19%	19 / 4.3%
23900	Gettysburg	PA	12,294	10%	61	2.45	\$2,450	33%	28 / 6.4%
48700	Williamsport	PA	16,705	7%	56	2.66	\$2,556	29%	54 / 12.3%
49620	York-Hanover	PA	50,831	9%	223	2.26	\$2,792	23%	95 / 21.6%
11020	Altoona	PA	14,502	12%	79	2.33	\$2,869	19%	117 / 26.6%
29540	Lancaster	PA	61,366	10%	283	2.36	\$2,884	25%	122 / 27.7%
21500	Erie	PA	28,399	11%	153	2.46	\$2,991	18%	160 / 36.4%
42999	Non-MSA Area	PA	213,069	10%	1,011	2.26	\$3,018	21%	174 / 39.5%
30140	Lebanon	PA	16,861	11%	85	1.90	\$3,045	20%	183 / 41.6%
33874	Montgomery-Bucks-Chester	PA	217,538	8%	799	2.40	\$3,048	24%	185 / 42.0%

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44300	State College	PA	10,491	10%	53	2.51	\$3,089	19%	202 / 45.9%
42540	Scranton-Wilkes-Barre-Hazleton	PA	89,061	10%	418	2.30	\$3,337	24%	309 / 70.2%
20700	East Stroudsburg	PA	22,532	10%	102	2.46	\$3,429	18%	330 / 75.0%
37964	Philadelphia	PA	190,104	9%	818	2.40	\$3,486	22%	347 / 78.9%
38300	Pittsburgh	PA	168,186	10%	798	2.46	\$3,550	27%	366 / 83.2%
25420	Harrisburg-Carlisle	PA	56,008	9%	240	2.37	\$3,557	26%	367 / 83.4%
39740	Reading	PA	46,234	9%	205	2.57	\$3,617	23%	382 / 86.8%
27780	Johnstown	PA	12,891	11%	67	2.52	\$3,761	21%	411 / 93.4%
41980	San Juan-Carolina-Caguas	PR	72,860	7%	238	1.79	\$1,427	15%	2 / 0.5%
44940	Sumter	SC	16,471	9%	70	1.92	\$2,592	11%	59 / 13.4%
24860	Greenville-Anderson-Mauldin	SC	110,753	9%	484	2.12	\$2,931	20%	140 / 31.8%
16700	Charleston-North Charleston	SC	85,046	8%	331	2.21	\$3,116	19%	218 / 49.5%
17900	Columbia	SC	93,058	9%	370	1.99	\$3,234	14%	268 / 60.9%
45999	Non-MSA Area	SC	131,535	9%	555	2.10	\$3,249	23%	276 / 62.7%
43900	Spartanburg	SC	44,524	9%	174	2.29	\$3,437	22%	332 / 75.5%
25940	Hilton Head Island-Bluffton	SC	34,838	6%	91	1.96	\$3,701	20%	399 / 90.7%
22500	Florence	SC	36,292	9%	149	2.10	\$3,809	23%	414 / 94.1%
43620	Sioux Falls	SD	28,550	7%	97	2.26	\$2,292	25%	16 / 3.6%
46999	Non-MSA Area	SD	71,307	9%	295	1.93	\$3,044	25%	182 / 41.4%
39660	Rapid City	SD	20,345	6%	52	2.05	\$3,509	23%	357 / 81.1%
28700	Kingsport-Bristol-Bristol	TN	40,966	8%	165	2.59	\$2,688	25%	74 / 16.8%
34980	Nashville-Davidson-Murfreesboro	TN	154,064	10%	711	2.23	\$2,917	19%	134 / 30.5%
28940	Knoxville	TN	103,461	9%	434	2.29	\$3,165	25%	241 / 54.8%
27740	Johnson City	TN	26,484	10%	118	2.40	\$3,175	21%	246 / 55.9%
47999	Non-MSA Area	TN	271,460	11%	1,488	2.10	\$3,190	19%	253 / 57.5%
27180	Jackson	TN	20,659	13%	125	2.25	\$3,358	25%	313 / 71.1%
34100	Morristown	TN	17,191	8%	63	2.28	\$3,697	25%	397 / 90.2%
17420	Cleveland	TN	16,940	9%	79	2.13	\$3,796	23%	413 / 93.9%
41660	San Angelo	TX	17,369	11%	84	1.97	\$2,398	12%	21 / 4.8%
21340	El Paso	TX	64,763	9%	250	2.10	\$2,628	18%	68 / 15.5%
47020	Victoria	TX	14,922	14%	98	2.05	\$2,690	21%	75 / 17.0%
43300	Sherman-Denison	TX	21,670	15%	157	2.37	\$2,790	16%	94 / 21.4%
28660	Killeen-Temple	TX	34,711	10%	165	2.24	\$3,011	19%	169 / 38.4%
36220	Odessa	TX	15,255	12%	79	2.15	\$3,022	24%	178 / 40.5%
32580	McAllen-Edinburg-Mission	TX	68,304	13%	383	2.50	\$3,031	14%	180 / 40.9%
13140	Beaumont-Port Arthur	TX	50,537	14%	326	2.12	\$3,089	18%	201 / 45.7%
47380	Waco	TX	30,472	10%	144	2.11	\$3,104	19%	211 / 48.0%
15180	Brownsville-Harlingen	TX	38,216	11%	189	2.44	\$3,120	20%	219 / 49.8%
41700	San Antonio-New Braunfels	TX	200,588	8%	747	2.29	\$3,299	20%	293 / 66.6%
48660	Wichita Falls	TX	23,953	14%	161	1.89	\$3,325	19%	303 / 68.9%
19124	Dallas-Plano-Irving	TX	357,212	10%	1,632	2.25	\$3,425	20%	328 / 74.5%
23104	Fort Worth-Arlington	TX	179,715	11%	880	2.39	\$3,454	18%	336 / 76.4%
46340	Tyler	TX	32,985	9%	141	2.04	\$3,532	17%	363 / 82.5%
29700	Laredo	TX	23,185	7%	72	2.61	\$3,538	25%	364 / 82.7%
18580	Corpus Christi	TX	40,069	11%	201	2.26	\$3,575	24%	371 / 84.3%
17780	College Station-Bryan	TX	20,814	13%	117	1.98	\$3,593	19%	375 / 85.2%
48999	Non-MSA Area	TX	481,498	12%	2,796	2.08	\$3,605	19%	379 / 86.1%
12420	Austin-Round Rock	TX	144,472	9%	605	2.21	\$3,640	21%	386 / 87.7%

MSA	MSA Description	State	Number of Medicare Beneficiaries in the 100% Data	Prevalence of HF in the 5% Sample Data	Sample Size of HF in the 5% Sample	Average HCC of HF Members	Area & Risk Adjusted PPPM Cost of HF Members	Mortality Rates Among HF	PPPM Rank/ Percentile
11100	Amarillo	TX	30,858	10%	145	2.06	\$3,659	21%	390 / 88.6%
26420	Houston-The Woodlands-Sugar Land	TX	435,345	11%	2,205	2.25	\$3,686	19%	394 / 89.5%
30980	Longview	TX	32,809	11%	168	2.13	\$3,700	20%	398 / 90.5%
31180	Lubbock	TX	32,414	13%	194	2.16	\$3,883	21%	419 / 95.2%
10180	Abilene	TX	24,442	10%	110	2.10	\$3,989	15%	423 / 96.1%
33260	Midland	TX	15,225	8%	61	2.22	\$4,611	28%	439 / 99.8%
41100	St. George	UT	17,767	9%	76	1.92	\$2,740	18%	85 / 19.3%
41620	Salt Lake City	UT	63,924	7%	212	2.12	\$2,928	20%	139 / 31.6%
39340	Provo-Orem	UT	23,825	10%	117	1.93	\$2,936	25%	142 / 32.3%
49999	Non-MSA Area	UT	30,764	8%	120	1.92	\$3,171	18%	244 / 55.5%
36260	Ogden-Clearfield	UT	41,780	7%	155	1.79	\$3,260	21%	280 / 63.6%
44420	Staunton-Waynesboro	VA	21,469	11%	111	2.18	\$2,527	19%	47 / 10.7%
31340	Lynchburg	VA	44,144	8%	165	2.26	\$2,887	22%	125 / 28.4%
13980	Blacksburg-Christiansburg	VA	24,457	10%	117	2.13	\$2,944	26%	146 / 33.2%
16820	Charlottesville	VA	31,567	7%	113	2.15	\$3,021	25%	177 / 40.2%
51999	Non-MSA Area	VA	204,732	9%	848	2.20	\$3,165	20%	243 / 55.2%
40220	Roanoke	VA	49,360	8%	201	2.08	\$3,232	25%	267 / 60.7%
25500	Harrisonburg	VA	13,789	9%	57	2.60	\$3,273	26%	283 / 64.3%
49020	Winchester	VA	19,247	7%	69	2.08	\$3,392	17%	318 / 72.3%
40060	Richmond	VA	147,724	9%	588	2.28	\$3,530	25%	362 / 82.3%
78999	Non-MSA Area	VI	16,297	4%	35	1.50	\$3,082	11%	193 / 43.9%
15540	Burlington-South Burlington	VT	25,980	7%	88	1.90	\$3,141	22%	230 / 52.3%
50999	Non-MSA Area	VT	82,066	7%	279	2.28	\$3,151	26%	236 / 53.6%
47460	Walla Walla	WA	10,370	9%	51	2.72	\$2,210	33%	10 / 2.3%
28420	Kennewick-Richland	WA	28,511	6%	83	1.98	\$2,222	22%	13 / 3.0%
36500	Olympia-Tumwater	WA	28,334	7%	101	2.06	\$2,328	21%	18 / 4.1%
14740	Bremerton-Silverdale	WA	32,306	8%	126	2.22	\$2,424	21%	25 / 5.7%
48300	Wenatchee	WA	16,948	5%	43	2.02	\$2,459	35%	29 / 6.6%
13380	Bellingham	WA	21,689	7%	71	1.95	\$2,613	15%	62 / 14.1%
42644	Seattle-Bellevue-Everett	WA	218,201	7%	711	2.19	\$2,748	22%	87 / 19.8%
44060	Spokane-Spokane Valley	WA	64,767	7%	209	2.23	\$2,800	28%	98 / 22.3%
45104	Tacoma-Lakewood	WA	82,483	9%	359	2.30	\$2,814	23%	102 / 23.2%
53999	Non-MSA Area	WA	126,254	7%	434	1.98	\$2,900	20%	131 / 29.8%
31020	Longview	WA	11,446	11%	60	2.85	\$3,019	32%	175 / 39.8%
49420	Yakima	WA	28,247	8%	113	2.09	\$3,052	25%	186 / 42.3%
34580	Mount Vernon-Anacortes	WA	15,742	6%	44	2.13	\$3,206	20%	258 / 58.6%
36780	Oshkosh-Neenah	WI	13,441	8%	45	2.27	\$1,694	20%	3 / 0.7%
48140	Wausau	WI	13,047	11%	65	2.09	\$2,008	17%	5 / 1.1%
11540	Appleton	WI	14,823	6%	47	1.97	\$2,444	26%	26 / 5.9%
43100	Sheboygan	WI	13,130	8%	52	1.87	\$2,494	21%	37 / 8.4%
24580	Green Bay	WI	27,438	10%	136	2.05	\$2,771	30%	90 / 20.5%
31540	Madison	WI	65,029	6%	195	1.96	\$2,978	21%	157 / 35.7%
20740	Eau Claire	WI	21,338	8%	80	1.93	\$3,004	21%	167 / 38.0%
22540	Fond du Lac	WI	11,170	10%	50	1.90	\$3,031	22%	179 / 40.7%
55999	Non-MSA Area	WI	201,642	9%	890	2.05	\$3,089	23%	200 / 45.5%
39540	Racine	WI	24,702	8%	94	2.20	\$3,112	20%	215 / 48.9%
33340	Milwaukee-Waukesha-West Allis	WI	166,502	8%	655	2.29	\$3,373	25%	315 / 71.6%
27500	Janesville-Beloit	WI	22,004	7%	73	2.14	\$4,191	16%	429 / 97.5%

MSA	MSA Description	State	Number of Medicare Beneficiaries in the 100% Data	Prevalence of HF in the 5% Sample Data	Sample Size of HF in the 5% Sample	Average HCC of HF Members	Area & Risk Adjusted PPM Cost of HF Members	Mortality Rates Among HF	PPPM Rank/Percentile
37620	Parkersburg-Vienna	WV	18,480	9%	82	2.56	\$2,994	22%	162 / 36.8%
16620	Charleston	WV	36,660	8%	151	2.37	\$3,111	23%	214 / 48.6%
34060	Morgantown	WV	13,610	10%	69	2.01	\$3,128	19%	223 / 50.7%
13220	Beckley	WV	22,307	9%	90	2.20	\$3,335	22%	308 / 70.0%
54999	Non-MSA Area	WV	129,883	10%	598	2.21	\$3,622	25%	383 / 87.0%
16940	Cheyenne	WY	13,553	6%	41	2.04	\$2,134	12%	7 / 1.6%
56999	Non-MSA Area	WY	54,636	7%	198	1.79	\$2,725	20%	82 / 18.6%
16220	Casper	WY	10,930	5%	29	2.11	\$3,448	24%	333 / 75.7%

APPENDIX C: KEY DATA SOURCES

Medicare 5% Sample: This Limited Data Set contains all Medicare FFS paid claims generated by a statistically balanced sample of Medicare FFS beneficiaries. Information includes diagnosis codes, procedure codes, and diagnosis-related group (DRG) codes, along with site of service information as well as beneficiary age, eligibility status and an indicator for HMO enrollment. We used Medicare 5% beneficiary sample data in 2011-2012.

Milliman's 2014 65+ Health Cost Guidelines (HCGs): The HCGs provide a flexible but consistent basis for the determination of health claim costs and premium rates for a wide variety of health plans. The HCGs are developed as a result of Milliman's continuing research on health care costs. First developed in 1954, the HCGs have been updated and expanded annually since that time. The HCGs are continually monitored as they are used in measuring the experience or evaluating the rates of health plans, and as they are compared to other data sources. The HCGs were developed to be representative of the age and sex distribution for the Medicare FFS population. The standard demographics were developed using data from the Medicare 5% sample and publicly available Medicare demographic population data.

APPENDIX D: METHODOLOGY

1. Identification of study population

We used the Medicare 5% sample 2012 data as an index year to identify HF beneficiaries. The following beneficiaries were excluded from the denominator population:

- Beneficiaries without eligibility in all months of 2011 and at least one month in 2012
- Beneficiaries without Part A and Part B eligibility during the study period
- Beneficiaries enrolled in an HMO for any portion of the study period

For the benchmarking portion of our analysis, we also excluded the following beneficiaries:

- Beneficiaries with end-stage renal disease (ESRD)
- Beneficiaries whose MSA was unidentified
- Beneficiaries whose MSA contained less than 10,000 Medicare FFS beneficiaries (based on our analysis of the Medicare 100% enrollment file)

HF patients were identified as individuals with at least one outpatient, non-acute inpatient, acute inpatient or emergency department claim coded with a HF ICD-9 code in any position of the claim. The claim types queried for HF identification were required to have one of the codes below:

Claim Type	CPT Code	Revenue Codes
Outpatient	99201-99205, 99211-99215, 99217-99220, 99241-99245, 99341-99345, 99347-99350, 99384-99387, 99394-99397, 99401-99404, 99411, 99412, 99420, 99429, 99455, 99456	051x, 0520-0523, 0526-0529, 057x-059x, 082x-085x, 088x, 0982, 0983
Non-acute inpatient	99034-99310, 99315, 99316, 99318, 99324-99328, 99334-99337	0118, 0128, 0138, 0148, 0158, 019x, 0524, 0525, 055x, 066x
Acute inpatient	99221-99223, 99231-99233, 99238, 99239, 99251, 99255, 99291	010x, 0110-0114, 0119, 0120-0124, 0129, 0130-0134, 0139, 0140-0144, 0149, 0150-0154, 0159, 016x, 020x, 021x, 072x, 080x, 0987
Emergency department	99281-99285	045x, 0981

List of HF ICD-9 diagnosis codes for HF patient identification:

ICD-9 Dx Code	Code Description
398.91	Rheumatic heart failure (congestive)
402.01	Malignant hypertension, with heart failure
402.11	Benign hypertension, with heart failure
402.91	Unspecified hypertension, with heart failure
404.01	Hypertensive heart and chronic kidney disease, malignant, with heart failure and with chronic kidney disease stage I through stage IV, or unspecified
404.03	Hypertensive heart and chronic kidney disease, malignant, with heart failure and with chronic kidney disease stage V
404.11	Hypertensive heart and chronic kidney disease, benign, with heart failure and with chronic kidney disease stage I through stage IV, or unspecified
404.13	Hypertensive heart and chronic kidney disease, benign, with heart failure and with chronic kidney disease stage V
404.91	Hypertensive heart and chronic kidney disease, unspecified, with heart failure and with chronic kidney disease stage I through stage IV or unspecified
404.93	Hypertensive heart and chronic kidney disease, unspecified, with heart failure and with chronic kidney disease stage V
428.0	Congestive heart failure, unspecified
428.1	Left heart failure
428.20	Systolic heart failure, unspecified
428.21	Systolic heart failure, acute
428.22	Systolic heart failure, chronic
428.23	Systolic heart failure, acute on chronic
428.30	Diastolic heart failure, unspecified
428.31	Diastolic heart failure, acute
428.32	Diastolic heart failure, chronic
428.33	Diastolic heart failure, acute on chronic
428.40	Combined systolic and diastolic heart failure, unspecified
428.41	Combined systolic and diastolic heart failure, acute
428.42	Combined systolic and diastolic heart failure, chronic
428.43	Combined systolic and diastolic heart failure, acute on chronic
428.9	Heart failure, unspecified

2. Classify the best performing MSAs for HF population

We assigned each HF beneficiary to a MSA based on county of residence. After excluding 21 MSAs with Medicare FFS populations under 10,000, 440 MSAs remained. Our analysis captured all Medicare allowed services and claim costs for the HF population in each MSA.

Using the Medicare reimbursement relativities developed by Milliman, we adjusted each claim using each MSA's relative Medicare reimbursement levels to the nationwide average. For facility claims, Medicare varies the payment based on the wage index and other provider-specific adjustments. For physician claims, Medicare adjusts payment levels by carrier and locality using GPCI factors. We summarized each MSA's area-adjusted allowed costs PPPM and average Medicare HCC risk score. The costs were then adjusted using the average HCC risk score found in the MSA. The MSAs were then listed in ascending order by the risk & area adjusted PPPM for HF patients.

Fluctuations associated with small sample sizes could produce different results for particular MSAs and alter the ranking in the methodology.

3. Create Cost Models for HF patients found in select MSAs

After ranking these hospitals in order of best managed, we created the following cost models

- National Average
- 10th Percentile of HF Cost Management (Estimated using the average of the MSAs whose risk and area adjusted PPPM were between the 0th and 20th percentile).
- 90th Percentile of HF Cost Management (Estimated using the average of the MSAs whose risk and area adjusted PPPM were between the 80th and 100th percentile).

The cost models shown in this report represent utilization and average charge levels of the HF patient population for roughly 60 benefit categories. This standard categorization and utilization counting allows straightforward comparisons to Milliman benchmark cost models and internal comparisons for various sub-populations. The Milliman *Health Cost Guidelines* have been the standard for health cost categorization for more than 50 years.

We note that rather than summarizing the experience of the MSAs at the 10th and 90th percentiles, we chose to use a range of MSAs to increase the credibility of our cost models. For these cost models, we assumed the varying levels of HF cost management across the MSAs will only vary the utilization of services from HF patients and the non-risk adjusted average cost of service is the same as the national average. To adjust for differences in the risk score levels found in each population subgroup, we used the Milliman risk score adjustment factors which are applied to the utilization and average cost of service for each health service category.

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