Concentration of High-Cost Patients in Hospitals and Markets

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ABSTRACT

OBJECTIVES: Although we know that healthcare costs are concentrated among a small number of patients, we know much less about the concentration of these costs among providers or markets. This is important because it could help us to understand why some patients are higher-cost compared with others and enable us to develop interventions to reduce costs for these patients.

STUDY DESIGN: Observational study.

METHODS: We used a 20% sample of Medicare fee-for-service claims data from 2011 and 2012, and defined high-cost patients as those in the top 10% of standardized costs. We then characterized high-concentration hospitals as those with the highest proportion of high-cost patient claims, and high-concentration markets as the Hospital Referral Regions (HRRs) with the highest proportion of high-cost patients. We compared the characteristics and outcomes of each.

RESULTS: High-concentration hospitals had 69% of their inpatient Medicare claims from high-cost Medicare beneficiaries compared with 51% for the remaining 90% of hospitals. These hospitals were more likely to be for-profit and major teaching hospitals, located in urban settings, and have higher readmission rates. High-concentration HRRs had 13% high-cost patients compared with 9.5% for the remaining 90% of HRRs. These HRRs had a smaller supply of total physicians, a greater supply of cardiologists, higher rates of emergency department visits, and significantly higher expenditures on care in the last 6 months of life.

CONCLUSIONS: High-cost beneficiaries are only modestly concentrated in specific hospitals and healthcare markets.

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High and rising healthcare costs are the single biggest challenge facing federal and state governments, many businesses, and families. These healthcare costs are highly concentrated among a small number of patients; for example, just 10% of Medicare patients account for more than half of all Medicare spending.[1,2] There is broad consensus that we will need to improve care for this population of highly expensive patients in order to manage spending and improve outcomes.[3-6]

Although we know that healthcare costs are concentrated among a small number of patients, we know much less about the concentration of healthcare costs among providers or markets. This is important information as it could help us to understand why some patients are higher-cost compared with others and help us begin to develop interventions to reduce costs for these patients. For example, if differences in practice patterns between providers are a major driver of costs, we would expect to see high-cost patients clustered within a subset of providers. Such clustering would suggest that interventions might be more effective if they targeted physicians with a high proportion of high-cost patients. Similarly, it is possible that geographic variation in practice patterns is the dominant feature; if this were true, we would expect to see clustering of high-cost patients within communities and we would need to design interventions that address the practice patterns or underlying medical needs of these communities. However, we know very little about whether care for high-cost patients is concentrated and, if so, whether the characteristics of the providers and communities where these patients are disproportionately situated differ from those providers or communities with a lower concentration of high-cost beneficiaries.[7,8]

Hospitals are the setting where most expenditures for high-cost patients are incurred. Therefore, in this study, we set out to answer 2 sets of questions: 1) Are high-cost patients concentrated among certain hospitals? If so, how do hospitals that disproportionately care for high-cost patients differ from other hospitals? 2) Are high-cost patients concentrated within certain communities? If so, how do communities with a high proportion of high-cost

TAKEAWAY POINTS

- High-cost patients were only modestly concentrated in hospitals; those that disproportionately cared for high-cost beneficiaries were generally larger, academic teaching institutions with better outcomes on mortality but higher readmission rates.
- High-cost patients were only modestly concentrated in markets. We saw differences between the markets that were more concentrated versus not; concentrated markets had much higher proportions of racial and ethnic minorities and individuals in poverty.
- Efforts to lower spending among high-cost patients should remain broad. Policy efforts need to target the special needs of organizations and communities disproportionately serving high-cost beneficiaries.

patients differ from those communities with lower proportions of high-cost patients?

METHODS

Data

We used a 20% sample of Medicare fee-for-service (FFS) claims data from 2011 and 2012. Patients enrolled in Medicare Advantage and those not continuously enrolled in Parts A and B during the study period were excluded from our analysis because we do not have complete data on annual healthcare costs in these subpopulations. We excluded those younger than 65 years because they are a highly heterogeneous population, achieving eligibility for Medicare based on clinical conditions (eg, end-stage renal disease) that are highly correlated with spending.

Patient race was categorized in the Medicare data based on self-report. We assigned comorbidities using CMS Hierarchical Condition Categories and based on diagnoses in inpatient, outpatient, and carrier claims. Cost information was aggregated from all Medicare claims files, including inpatient, outpatient, carrier, skilled nursing facility, home health, hospice, and durable medical equipment. *International Classification of Diseases, Ninth Revision, Clinical Modification* (*ICD-9-CM*) codes were used to identify comorbidities.

We focused on general acute care nonfederal hospitals and only included those with a minimum of 17 beneficiaries in 2012 (from our 20% sample), thus eliminating the very smallest of hospitals. Failure to exclude these hospitals would have led to the identification of very small hospitals as disproportionately caring for the highest-cost patients; for example, in a hospital with only 3 Medicare claims, 1 from a high-cost patient would be reported as having 33% of its patients being high-cost. We used the American Hospital Association Annual Survey to obtain data on hospital structural characteristics and the Hospital Compare database to obtain data on hospital quality and patient experience.[9] We calculated both mortality and readmissions using standard methods with adjustment via the Elixhauser comorbidity adjustment scheme, which is commonly used with administrative data,[10,11] and which we have used in prior work in this area.[12,13] We used Hospital Referral Regions (HRRs), as defined by the Dartmouth Atlas for Health Care,[14] to analyze healthcare markets. We obtained data on HRR Medicare spending from the Dartmouth Atlas. Regional demographic characteristics and data on physician and hospital bed supply were obtained from the Area Resource File. We used the Commonwealth Scorecard Health System Data Center to obtain data on population health measures.

High-Cost Beneficiaries

In order to identify high-cost beneficiaries, we first calculated total standardized costs of care for each Medicare beneficiary in our sample using CMS methodology.[15] By standardizing costs of care, we can identify patients who use a comparable amount of medical care across differing regions in which actual costs of care may vary. For example, although Medicare may pay more for a chest radiograph at a teaching hospital in New York City than at a community hospital in Phoenix, based on differences in wage index and other factors, standardized cost using the Medicare Wage Index assigns the same value to the service in both places. We then defined high-cost patients as those whose spending was in the top decile nationally in 2012.

High-Concentration Hospitals

To define high-concentration hospitals, we first calculated the percentage of the hospital's claims attributable to high-cost patients. We then calculated the distribution of this percentage among our sample of hospitals and categorized hospitals as high-concentration if their percentage of claims from high-cost patients was in the top decile nationally.

High-Concentration Markets

We next calculated the concentration of high-cost patients within markets and then compared high-concentration and non–high-concentration HRRs. We used HRRs as our geographical unit of observation for healthcare markets. For each market, we computed the percentage of beneficiaries in our sample residing in each HRR who were designated as high-cost patients. We then computed the distribution of this percentage and labeled HRRs as high-concentration markets if their percentage of beneficiaries who were high-cost was in the top decile nationally. We computed statistics on the distribution of annual patient costs, the percentage of beneficiaries in a region who were high-cost patients, and the percentage of a hospital's claims attributable to high-cost patients. Because costs of end-of-life care constitute a substantial portion of overall Medicare costs, decedents were overrepresented among the group of highest-cost patients; thus, we conducted our analyses with and without those patients who died during the period January 1, 2012, through June 30, 2013. The results were qualitatively similar and we present our primary results based on including decedents.

Analysis

After categorizing high-cost and non–high-cost patients, we first compared characteristics between these 2 groups of patients. We examined the following beneficiary-level predictors of high-cost status: age, race, gender, Medicaid eligibility, and comorbidities. We also investigated the relationship between a number of hospital characteristics and high-cost concentration status. We examined the relationship between high-cost concentration and the following market-level variables: percentages of blacks, Hispanics/Latinos, and the population in poverty; total physician supply; cardiologist supply; number of short- and long-term general hospital beds; and the rate of spending in the last 6 months of life. We also examined the relationship between high-concentration HRRs and health system performance on quality metrics, including potentially avoidable emergency department visits among Medicare beneficiaries, potentially preventable mortality, and percentage of adults 50 years or older receiving recommended screening and preventive care. For all bivariate analyses we used *t* tests and χ^2 tests to assess the statistical significance of differences based on high-cost and high-cost concentration.

For our multivariate analyses, we estimated logistic regression models of the likelihood of being a high-cost concentration hospital or high-cost concentration HRR as a function of hospital and market characteristics. In the hospital-level regression, we clustered our standard errors within market.

All analyses were performed using SAS version 9.4 (SAS Institute, Cary, North Carolina).

TABLE 1. Characteristics of High-Cost versus Non–High-Cost Medicare Beneficiaries[a]

	Overall (N = 4,967,645)	
	High-Cost Beneficiaries	Non–High-Cost Beneficiaries
Number of beneficiaries in sample	496,764	4,470,881
Average standardized cost per beneficiary	$64,096	$5848
Median standardized cost per beneficiary	$52,152	$3017
Mean age, years	79.7	76.7
Female	57.9%	58.1%
Race		
White	85.5%	87.4%
Black	9.8%	7.2%
Hispanic	1.8%	1.5%
Other/unknown	2.9%	4.0%
Medicaid/dual-eligible	22.5%	12.7%
Rheumatoid arthritis and inflammatory connective tissue disease	11.2%	5.7%
Vascular disease	39.5%	15.6%
Vascular disease with complications	12.8%	1.9%
Diabetes with renal or peripheral circulatory manifestation	14.6%	4.0%
Diabetes with neurologic or other specified manifestation	8.6%	3.7%
Diabetes with acute complications	0.6%	0.2%
Diabetes with ophthalmologic or unspecified manifestation	2.0%	1.9%
Diabetes without complication	21.8%	19.9%
Chronic obstructive pulmonary disease	43.0%	14.7%
Renal failure	40.5%	11.6%
Breast, prostate, colorectal, and other cancers and tumors	12.4%	10.2%
Congestive heart failure	52.0%	12.8%
Acute myocardial infarction	8.7%	0.9%
Major depressive, bipolar, and paranoid disorders	10.8%	3.4%

[a]All *P* values for comparison between high-cost and non–high-cost patients are <.0001.

RESULTS

Characteristics of High-Cost and Non–High-Cost Beneficiaries

There were 4,937,361 Medicare beneficiaries in our 20% sample file, 493,736 of which were categorized as high-cost. As expected, a large percentage of Medicare costs (55%) were concentrated in a small percentage of beneficiaries (10%). The average cost for the high-cost cohort was more than 10-fold higher than that of the non–high-cost cohort. Compared with non–high-cost patients, high-cost patients were more likely to be black (9.84% vs 7.2%; *P* <.0001) and nearly twice as likely to be eligible for Medicaid (22.5% vs 12.7%; *P* <.0001) (Table 1). As expected, high-cost patients also had higher rates of chronic disease, including mental health conditions, congestive heart failure, renal failure, chronic obstructive pulmonary disease, and vascular disease (Table 1).

Concentration of High-Cost Beneficiaries by Hospitals

High-cost beneficiaries accounted for a disproportionate share of the Medicare claims at every hospital. The highest decile of hospitals had 69% of their inpatient Medicare claims from high-cost Medicare beneficiaries compared with 51% for the remaining

TABLE 2. Analysis of Hospital-Level Concentration of High-Cost Medicare Beneficiaries

Concentration by Hospitals	High-Concentration Hospitals[a]	Non–High-Concentration Hospitals
Number of hospitals	424	3818
Percentage of total sample inpatient claims	9.2%	90.8%
Percentage of total claims attributed to high-cost Medicare beneficiaries	12.5%	87.5%
Percentage of total standardized costs	14.0%	86.0%
Average percentage of claims from high-cost Medicare beneficiaries	69.0%	51.0%
Mean standardized cost per claim	$30,959	$22,722

[a]High Concentration Hospitals are defined as those in the top decile with respect to percentage of high-cost Medicare beneficiaries.

TABLE 3. Analysis of Market Concentration of High-Cost Medicare Beneficiaries

Concentration by Markets[a]	Concentrated Markets[b]	Nonconcentrated Markets
Number of HRRs	30	276
Percentage of total beneficiaries	7.8%	92.2%
Average percentage of beneficiaries who are high-cost	13.0%	9.0%
Median standardized cost/beneficiary	$14,193	$11,078

HRR indicates Hospital Referral Region.
[a]Markets are defined by HRRs.
[b]High-concentration markets (HRRs) are defined as those in the top decile with respect to percentage of high-cost Medicare beneficiaries.

90% of hospitals. The hospitals in the lowest decile of concentration, by contrast, still had 32.6% of their inpatient claims come from high-cost beneficiaries.

If high-cost beneficiary hospital claims and inpatient costs were evenly distributed nationally, we would expect high-cost hospitals to account for 10% of all inpatient claims and costs. We found that high-cost patients and their inpatient expenditures were only slightly more concentrated: just 12.54% of hospital claims attributable to high-cost beneficiaries and 14% of inpatient costs were for care delivered at hospitals in the highest decile of concentration of high-cost patients (**Table 2**). The median cost per claim in high-concentration hospitals was 15% greater than the median cost per claim in other hospitals (**eAppendix Figure 1** [eAppendices available at **www.ajmc.com**]).

Concentration of High-Cost Beneficiaries in the Markets

Similar to the hospital analysis, we found only a modest concentration of high-cost patients in the markets. The percentage of Medicare beneficiaries in each HRR considered high-cost varied modestly across communities (**eAppendix Figure 2**). In the 10% of markets with the highest proportion of high-cost patients, on average, 13% of beneficiaries were high-cost compared with 7% of beneficiaries in the lowest decile of concentration. The 30 HRRs with the highest concentration of high-cost patients—representing 10% of all HRRs in the United States—accounted for 9.7% of Medicare costs. The median annual per-beneficiary total standardized cost in these HRRs was $14,193 per year in high-concentration markets compared with $11,077 in all other markets (**Table 3**).

Comparing High-Concentration Hospitals Versus Other Hospitals

We found substantial differences in the characteristics of hospitals that disproportionately care for high-cost patients (ie, the high-concentration hospitals) versus other institutions in bivariate (eAppendix Table 1) and multivariate (**Table 4**) analyses. The hospitals with the greatest proportion of claims from high-cost patients were more likely to be for-profit hospitals and teaching hospitals. Possibly reflecting resource constraints, high-concentration hospitals were more likely to receive disproportionate share payments and to have lower nurse-to-patient staffing ratios (although the latter was found only in bivariate analyses). High-concentration and lower-concentration hospitals scored similarly on many quality metrics; however, high-concentration hospitals were more likely to have higher 30-day readmission rates and slightly lower 30-day mortality rates (Table 4 and **eAppendix Table 1**).

Differences Between Markets With More Versus Fewer High-Cost Patients

We found significant differences between the 30 HRRs with the highest concentration of high-cost patients and the 276 other HRRS with lower concentrations of high-cost patients. In bivariate analyses, high-concentration HRRs were more likely to have a higher percentage of beneficiaries who were black (18.5% vs 10.1%; $P = .0009$), living in poverty (19.1% vs 15.5%), and living in urban areas (82.2% vs 71.3%) (**eAppendix Table 2**). High-concentration HRRs also had a greater supply of specialists—but an equal supply of total physicians—and a lower supply of long-term hospital beds despite a higher population density.

High-concentration HRRs have both high costs of care and high rates of care utilization. In high-concentration HRRs, the Dartmouth Hospital Care Intensity Index (1.39 for high-concentration hospitals and 0.94 for non–high-concentration hospitals)

TABLE 4. Multivariate Hospital Analysis[a]

Hospital Characteristics	Odds Ratio (SE)
Medical/surgical beds	1.000 (0.0004)
Ownership	
For-profit	2.098[b] (0.359)
Public	0.835 (0.191)
Nonprofit	Ref
DSH percentage (quartile)	
1st (bottom)	0.230[b] (0.0063)
2nd	0.350[b] (0.095)
3rd	0.482[c] (0.102)
4th	Ref
Major teaching hospital	2.089[c] (0.482)
Urban area	2.404[b] (0.592)
Region	
Midwest	1.230 (0.514)
South	1.354 (0.497)
West	1.062 (0.585)
Northeast	Ref
Nurse ratio	0.951 (0.026)
30-day readmission composite (quartile)	
1st (smallest)	Ref
2nd	1.443 (0.475)
3rd	2.512[c] (0.686)
4th	4.947[b] (1.351)
30-day mortality composite (quartile)	
1st (smallest)	Ref
2nd	0.628[d] (0.117)
3rd	0.581[d] (0.117)
4th	0.712 (0.185)
HCAHPS overall rating of 8 or higher	1.100 (0.371)
Number of hospitals	2986
Pseudo R^2	0.1726

DSH indicates Disproportionate Share Hospital; HCAHPS, Hospital Consumer Assessment of Healthcare Providers and System; HRR, Hospital Referral Region; ref, reference; SE, standard error.
[a]Robust standard errors clustered by HRR.
[b]P <.001.
[c]P <.005.
[d]P <.05.

TABLE 5. Multivariate HRR Analysis

HRR Characteristics	Odds Ratio (SE)
Percent black population, 2010	1.002 (0.030)
Percent Hispanic/Latino population, 2010	0.954 (0.025)
Percent individuals in poverty, 2011	1.123 (0.082)
Total physicians per population	0.975[a] (0.008)
Cardiologists per population	1.662[b] (0.285)
Short-term general hospital beds per 1000 individuals	0.978 (0.405)
Long-term hospital beds per 1000 individuals	0.019 (0.042)
Potentially avoidable ED visits among Medicare beneficiaries per 1000 beneficiaries	1.036[b] (0.014)
Potentially preventable mortality, deaths per 100,000 population	1.018 (0.023)
Percent of adults ≥50 years received recommended screening and preventive care	1.054 (0.068)
Annual Medicare EOL spending ($1000)	1.20[c] (0.046)
Number of HRRs	304
Pseudo R^2	0.4547

ED indicates emergency department; EOL, end of life; HRR, Hospital Referral Region; SE, standard error.
[a]P <.005.
[b]P <.05.
[c]P <.001.

and the Medicare end-of-life spending measure ($79,446 for concentrated HRRs and $65,538 for nonconcentrated HRRs) were both significantly higher in high-concentration HRRs than in lower-concentration HRRs. Although the general pattern of these findings held in multivariate analyses (Table 5), supply-side factors and end-of-life spending of the market were more influential in the likelihood of being high-concentration than sociodemographic characteristics of the market.

DISCUSSION

We examined the concentration of high-cost patients in hospitals and markets and found only a modest degree of concentration. However, the hospitals and markets that disproportionately care for high-cost beneficiaries were markedly different than those that cared for fewer such patients: in general, these hospitals were either academic teaching or for-profit institutions operating in urban settings and serving a greater proportion of low-income patients. Similarly, we saw differences between the markets that were more concentrated versus not, with concentrated markets having a greater supply of specialists and a lower supply of long-term care beds. Spending in the last 6 months of life was also significantly higher in high-cost concentration HRRs. Taken together, these findings suggest that although high-cost patients are widely distributed, particular provider and delivery system characteristics are associated with a higher degree of concentration.

These findings have important implications for our approach to caring for high-cost beneficiaries. Although there must be a broad approach to identifying and caring for these patients, our findings suggest that we must pay special attention to the providers where these patients receive their care. The high-concentration hospitals were more likely to be teaching hospitals, which may reflect the more specialized and costly types of care provided in these institutions. However, high-concentration hospitals were also more

likely to be for-profit; whether this reflects differences in practice patterns or patient mix is unclear and warrants further examination. Additionally, given that the high-concentration hospitals tended to care for a poorer population, it is possible that the higher costs were reflective of a greater degree of medical and social need. Initiatives like the Disproportionate Share Hospital (DSH) program were designed for this reason and provide additional payments to help safety net providers care for the poor. Whether DSH payment cuts under the Affordable Care Act, in conjunction with insurance expansion, will ultimately hamper or help these facilities that care for high-cost beneficiaries is unclear.

Limitations

There are important limitations to our study. First, our analyses are based on data for the traditional FFS Medicare population; the patterns of high-cost concentration may differ in other populations. Second, our measure of patient costs did not include prescription drug expenditures. However, given that drug costs constitute approximately 10% of total healthcare spending, small differences for this kind of expenditure are unlikely to explain our findings. Third, we used the most recent Medicare data available at the time of our analysis (calendar year 2012), but patterns may have changed in more recent years. Fourth, we used the 10th percentile as our cutoff for being considered high-cost and high-concentration. This cutoff has been used by our group and others in previous research[1,5] and was chosen to allow a population large enough to be nationally representative, but small enough to represent potential targets for intervention to reduce costs; nevertheless, cost is a continuous variable. The use of alternative cutoffs (eg, the top 1% or 5% of spenders, as has also been examined previously)[1,6] might yield different patterns in cost concentration. Finally, our multivariate analyses reflect cross-sectional associations and the relationships identified cannot be interpreted as causal. Furthermore, we could not address the endogeneity of hospitals' location and strategy decisions.

CONCLUSIONS

High-cost beneficiaries are only modestly concentrated in specific hospitals and healthcare markets; as such, efforts to efficiently manage costs and care among the high-cost cohort should remain broad. However, the providers and communities where these patients disproportionately receive their care are meaningfully different, suggesting that additional research on the mechanisms underlying these differences might benefit policy efforts to improve care for these high-cost beneficiaries. ■

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eAppendix

eAppendix Table 1. Comparison of Structural Characteristics and Quality Metrics at Hospitals

Hospital Characteristics		**High Concentration Hospitals[a]**	**Non-High Concentration Hospitals**	***P***
Number of hospitals		424	3818	
Medical/surgical beds, median		158	113	.002
Ownership	For-profit	31.0%	15.7%	<.0001
	Nonprofit	49.2%	63.5%	
	Public	19.7%	20.8%	
DSH		40.8%	27.4%	<.0001
Teaching	Major	14.6%	5.3%	<.0001
	Minor	15.1%	21.7%	
	Non-teaching	70.3%	72.9%	
Rural/Urban Commuting Area	Urban	60.9%	46.7%	<.0001
	Suburban	4.6%	4.9%	
	Large rural town	7.7%	19.4%	
	Small town/isolated rural	26.7%	29.1%	
Region	Northeast	12.3%	13.7%	<.0001
	Midwest	21.8%	30.1%	
	South	50.3%	37.8%	
	West	15.6%	18.4%	
Nurse ratio, median		7.1	8.3	<.0001
30-day readmission	AMI	22.9%	18.4%	<.0001
	CHF	27.5%	23.3%	<.0001
	Pneumonia	21.3%	17.8%	<.0001
30-day mortality	AMI	16.7%	17.0%	.71
	CHF	10.7%	12.1%	.0004
	Pneumonia	11.4%	11.9%	.11
HCAHPS overall rating of 8 or higher		65.9%	69.8%	<.0001

With the Highest Concentration of High-Cost Medicare Beneficiaries Versus Non-Concentrated Hospitals

AMI indicates acute myocardial infarction; CHF, congestive heart failure; DSH, disproportionate share hospital; HCAHPS, Hospital Consumer Assessment of Healthcare Providers Survey.

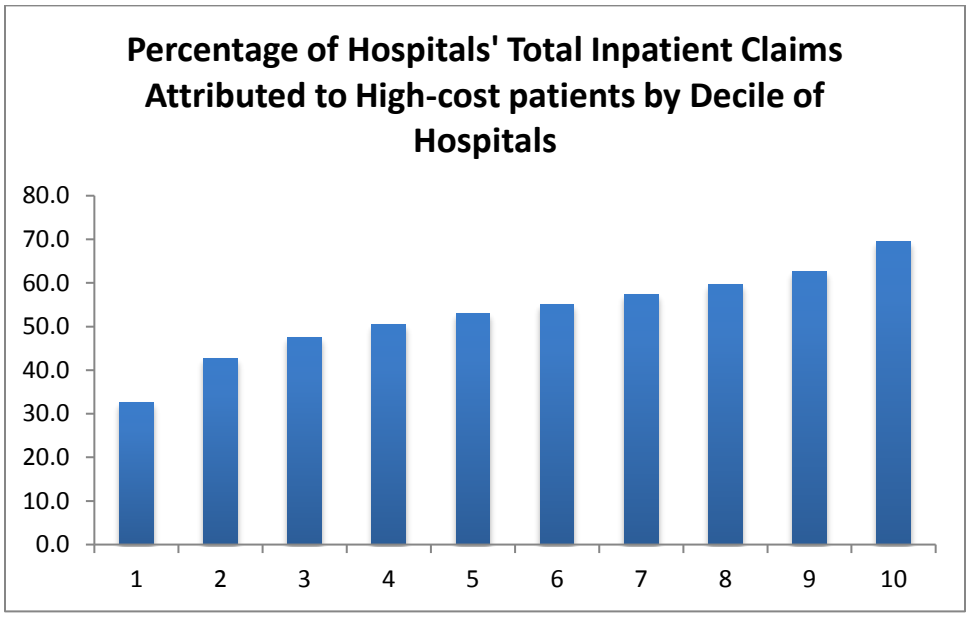
[a]Hospitals were considered high concentration if they were in the highest decile of hospitals with respect to percentage of high-cost Medicare beneficiaries. The remaining hospitals were considered non–high-concentration hospitals.

eAppendix Table 2. Characteristics of Hospital Referral Regions

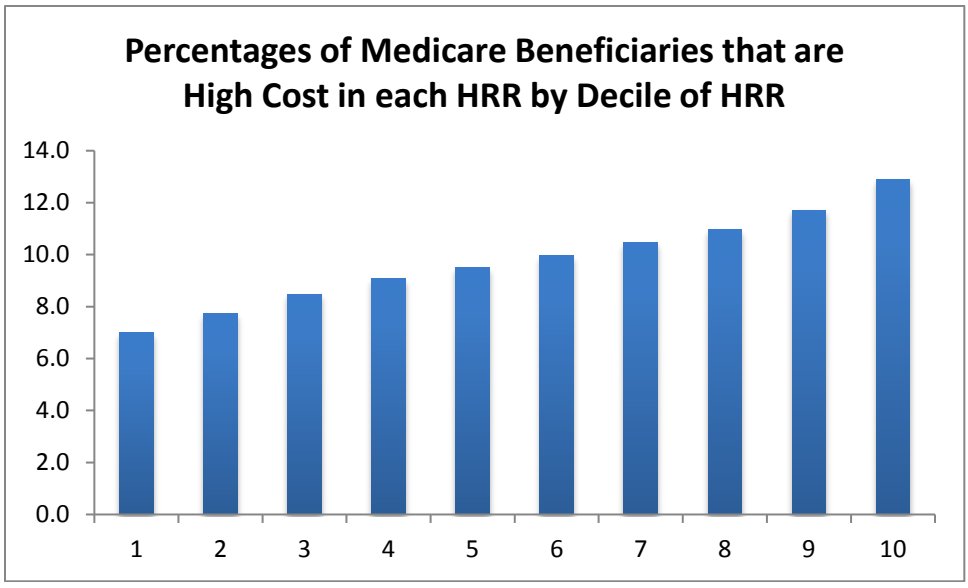
Hospital Referral Region (HRR) Characteristics	**Concentrated HRRs***	**Non-Concentrated HRRs**	***P***
Number of HRRs	**n = 30**	**n = 276**	
Median income, 2010	$36,584	$38,345	.21
Percent black/African American population, 2010	18.5%	10.1%	.0009
Percent Hispanic/Latino population, 2010	18.5%	12.0%	.10
Percent individuals in poverty, 2011	19.1%	15.5%	.002
Total physicians per 100,000, nonfederal, 2011	208	207	.94
Cardiologists per 100,000	7.2	6.0	.09
Short-term general hospital beds, 2010	2686	2546	.79
Long-term hospital beds, 2010	114.8	237.5	.005
Potentially avoidable ED visits among Medicare beneficiaries, per 1000 beneficiaries	218.3	196.5	.0002
Potentially preventable mortality, deaths per 100,000 population	112.5	94.2	.0002
Percent of adults 50 or older who received recommended screening and preventive care	42.1%	44.4%	.03
Annual Medicare spending per enrollee (age, sex, and race-adjusted)	$11,082	$9111	<.0001
Annual Medicare EOL spending	$79,447	$65,538	<.0001

ED indicates Emergency Department; EOL, End of Life; HRR, Hospital Referral Region
*Concentrated HRRs are defined as those in the top decile with respect to percentage of high-cost Medicare beneficiaries.

eAppendix Figure 1. Percentage of Hospitals' Total Inpatient Claims Attributed to High-Cost Patients by Decile of Hospitals



eAppendix Figure 2. Percentage of Medicare Beneficiaries That Are High Cost in Each HRR by Decile of HRR



HRR indicates Hospital Referral Region