

Hypertrophic obstructive cardiomyopathy and the cost of treatment

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Abstract

Objective: To evaluate the demographics of patients admitted with Hypertrophic Obstructive Cardio-Myopathy (HOCM) and the financial burden of this disease on the health care system.

Methods: The Healthcare Cost and Utilization Project (HCUP), sponsored by The Agency for Healthcare Research and Quality's (AHRQ), includes the largest collection of longitudinal hospital care data in the United States of America. HCUP creates the National In-patient Sample data (NIS) to help conduct national and regional analyses of inpatient care. Using the NIS data (2013), we performed a retrospective cohort study that involved patients who were admitted and treated for HOCM.

Results: A total of 2605 patients were admitted for the principal diagnosis of HOCM in 2013. Mean hospitalization was 4.9 days. In our total population, 33% of the patients were above 64 years of age. Mean cost of admission was 25,433\$. Private insurance and Medicare or Medicaid paid for 43% and 47% admissions respectively. 76%, 3.5%, 4.6% and 13% patients were discharged to routinely home, another short term hospital, nursing home and for home health care, respectively.

Conclusions: HOCM admissions are relatively uncommon but effects all ages. Most of these patients were treated at a private hospital, and the hospital costs were very high. Large number of patients required rehabilitation services after discharge which increase financial burden on health care system.

Keywords: Healthcare research, hypertrophic obstructive cardiomyopathy, nursing and rehabilitation, healthcare cost

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Introduction

Hypertrophic cardiomyopathy (HCM) is a complex but relatively common form of genetic heart muscle disease and has been under investigation since more than last 50 years.¹⁻⁴ Prevalence of the disorder in the general population is estimated to be 0.2%⁵. It is often identified by clinicians later on in the disease course. A subset of patients with HCM has hypertrophic obstructive cardiomyopathy (HOCM), in which systolic septal bulging into the LVOT, malposition of the anterior papillary muscle, with enlarged posterior mitral leaflet and hyperdynamic LV contraction and drag forces, through a Venturi effect, provoke systolic anterior motion of the anterior leaflet of the mitral valve (SAM), contributing to the creation of the LVOT gradient.⁶ HOCM is the most common cause of heart-related sudden death in people under 30 years of age⁷, and it can also be responsible for exercise intolerance at almost any age. HOCM occurs in both genders with female dominance and has been reported in many races.⁸ Although HOCM is a chronic disease without a known cure, a number of treatments options are now available to alter its course.

In 2014, U.S. health care spending increased 5.3 percent to reach \$3.0 trillion, or \$9,523 per person. The share of the economy devoted to health care spending has been rising to 17.3 percent in 2013. Further spending for hospital care increased by 3.5 percent in 2013. Spending growth for freestanding home health care agencies accelerated in 2014, increasing to \$83.2 billion. Similarly total private health insurance expenditures increased 4.4 percent (33 percent of total health care spending) to \$991.0 billion in 2014, faster than the 1.6 percent growth in 2013 along with nursing home and rehabilitation expenses.

In this age of exponentially rising costs of health care, we wanted to assess the management cost of patients admitted to hospitals with the lethal diagnosis of Hypertrophic Obstructive cardiomyopathy (HOCM). We wanted to further look at their demographics and quantify the financial burden of this disease on the individual patient and health care system across USA.

Methods

The Healthcare Cost and Utilization Project (HCUP),

sponsored by The Agency for Healthcare Research and Quality's (AHRQ), includes the largest collection of longitudinal hospital care data in the United States of America. HCUP creates the National Inpatient Sample (NIS) to help conduct national and regional analyses of inpatient care. Using the NIS (2013), we performed a retrospective cohort study that involved patients who were admitted and treated for Hypertrophic Obstructive Cardiomyopathy. To identify these patients we used ICD-9-CM principal diagnosis code 425.11. ICD-9-CM stands for the "International Classification of Diseases - 9th revision - Clinical Modification." The "principal diagnosis" is that condition established after study to be chiefly responsible for occasioning the admission of the patient to the hospital for care. The principal diagnosis is always the reason for admission. The unit of analysis for HCUP data is the hospital discharge (i.e., the hospital stay), not a person or patient. This means that a person who is admitted to the hospital multiple times in one year will be counted each time as a separate "discharge" from the hospital.

Using statistical analysis we compared the demographics, geographical distribution and the cost of treating these patients. Unweighted, HCUP contains data from more than 7 million hospital stays each year. Weighted, it estimates more than 36 million hospitalizations nationally taken from more than 4,000 HCUP participating hospitals.

Results

A total of 2605 patients were admitted for the principal diagnosis of HOCM in 2013. Mean Length of hospital stay was 4.9 days. 55% of the patients were women. 33% of the patients were above 64 years of age, whereas 18% patients were aged below 45 (**Table 1**).

Hospital "charges" is the amount the hospital charged for the entire hospital stay. It does not include professional (MD) fees. "Costs" tend to reflect the actual costs of production, while charges represent what the hospital billed for the case. Total charges were converted to costs using cost-to-charge ratios based on hospital accounting reports from the Centers for Medicare and Medicaid Services (CMS). Mean cost of admission was 25,433\$ and Median cost of admission 19,422 \$. But the mean hospital charge for the admission was

Table 1-1: Outcomes for hypertrophic obstructive cardiomyopathy ICD-9-CM code 425.11

Variables		Total number of discharges		Charges \$ (mean)	Costs, \$ (mean)	Routine Discharge
All discharges		2,605	100.00%	88,646	25,433	76.39%
Age group	1-17	*	*	82,642	33,230	*
	18-44	470	18.04%	117,034	32,057	89.36%
	45-64	1,165	44.72%	86,340	24,942	78.97%
	65-84	790	30.33%	81,157	22,976	65.19%
	85+	80	3.07%	41,650	8,993	*
Sex	Male	1,170	44.91%	87,848	25,628	82.91%
	Female	1,435	55.09%	89,287	25,276	71.08%
Payer	Medicare	955	36.66%	73,647	19,681	64.40%
	Medicaid	260	9.98%	71,918	18,967	76.92%
	Private insurance	1,120	42.99%	103,823	31,370	82.59%
	Uninsured	125	4.80%	*	*	88.00%
	Other	*	*	61,735	21,848	*
	Missing	*	*	*	*	*
Median income for zipcode	Low	625	23.99%	97,783	27,506	81.60%
	Not low	1,915	73.51%	86,378	24,938	74.41%
	Missing	65	2.50%	64,491	19,387	*
Owner	Government	320	12.28%	68,846	20,961	82.81%
	Private, not-for-profit	2,140	82.15%	91,094	26,608	75.23%
	Private, for-profit	145	5.57%	97,738	18,687	79.31%
Location/teaching status	Rural	85	3.26%	24,175	9,567	*
	Urban nonteaching	405	15.55%	95,875	23,499	74.07%
	Urban teaching	2,115	81.19%	89,921	26,478	77.54%

Weighted national estimates from HCUP National Inpatient Sample (NIS), 2013. Statistics based on estimates with a relative standard error (standard error / weighted estimate) greater than 0.30 or with standard error = 0 are not reliable. These statistics are suppressed and are designated with an asterisk (*). Significant at $p < .05$

88,646 \$ and median Hospital charge 58,460\$. Highest charges were for the patients with the following factors below 44 years of age, private insurance being the payer, West region of USA and Pacific census division. 47% of admissions were paid by either Medicare or Medicaid and 43 % of admissions were paid by private. 5% patients were uninsured. 82% patients were taken care at private hospitals. 74% patients belonged to a high income area in the country (Table 1).

Bedsize categories are based on hospital beds and are specific to the hospital's location and teaching status. The definitions of small, medium, and large hos-

pitals vary by region . A hospital is considered to be a teaching hospital if the American Hospital Association (AHA) Annual Survey indicates it has an American Medical Association approved residency program, is a member of the Council of Teaching Hospitals (COTH), or has a ratio of full-time equivalent interns and residents to beds of 25 or higher. Teaching hospitals took care of 82% of these admissions (Figure 1).

Discharge status indicates the disposition of the patient at discharge from the hospital, e.g., routine (home), to another short term hospital, to a nursing home, to home health care, or against medical advice

Table 1-2: Outcomes for hypertrophic obstructive cardiomyopathy ICD-9-CM code 425.11

Variables		Total number of discharges		Charges \$ (mean)	Costs, \$ (mean)	Routine Discharge
Bedsize	Small	245	9.40%	72,282	22,155	73.47%
	Medium	445	17.08%	86,702	24,507	67.42%
	Large	1,915	73.51%	91,305	26,094	78.85%
Region	Northeast	570	21.88%	90,831	22,463	62.28%
	Midwest	*	*	83,300	29,230	*
	South	805	30.90%	74,287	21,079	82.61%
	West	405	15.5%	134,577	31,947	72.84%
Census division	New England	*	*	59,281	21,945	*
	Middle Atlantic	420	16.12%	102,099	22,648	64.29%
	East North Central	*	*	85,936	24,199	*
	West North Central	*	*	80,727	34,139	*
	South Atlantic	430	16.51%	56,105	16,775	83.72%
	East South Central	*	*	*	33,259	*
	West South Central	225	8.64%	74,986	21,184	84.44%
	Pacific	120	4.61%	105,473	27,079	83.33%
		285	10.94%	152,040	34,867	68.42%

Weighted national estimates from HCUP National Inpatient Sample (NIS), 2013. Statistics based on estimates with a relative standard error (standard error / weighted estimate) greater than 0.30 or with standard error = 0 are not reliable. These statistics are suppressed and are designated with an asterisk (*). Significant at $p < .05$

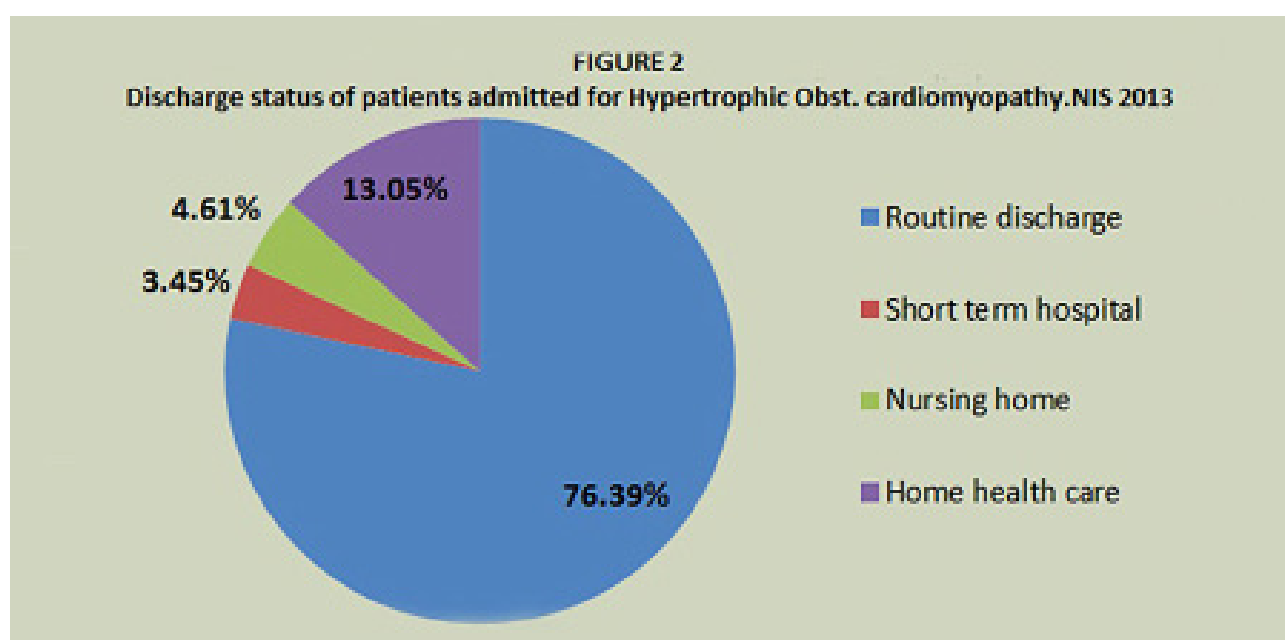
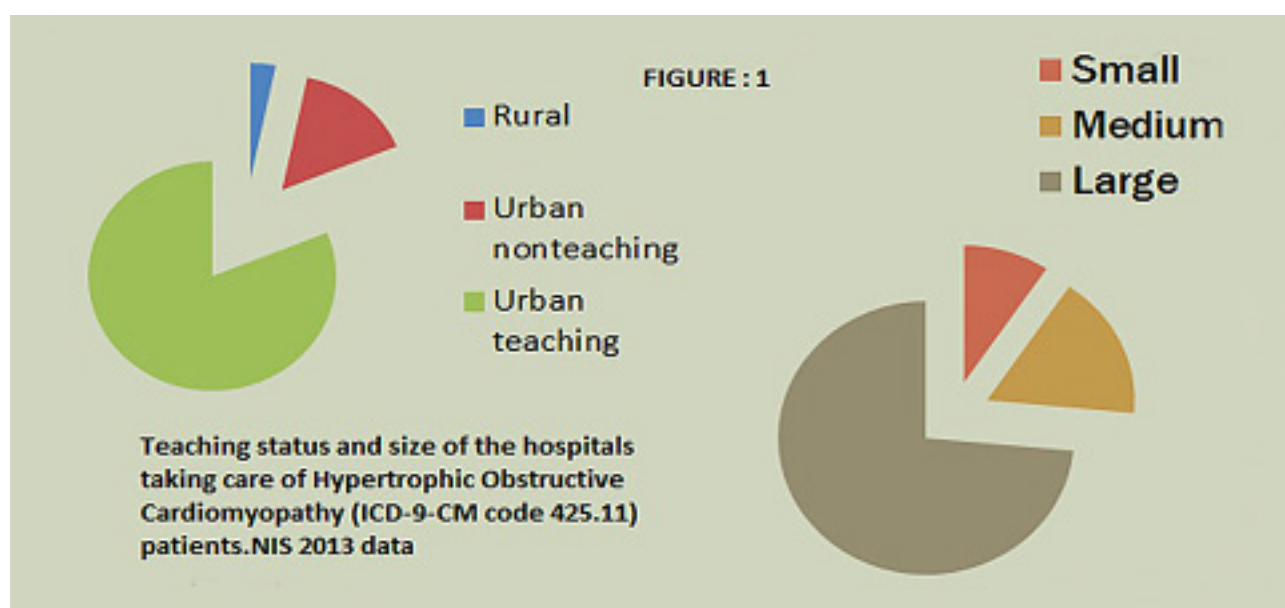
(AMA). Increase in age has an inverse relation with routine discharge i.e. from 90% to 65% decline as age goes from 18 to 85 years. (Table 1) 20% of the patients require further institutional care after discharge (Figure 2).

Conclusion

Our study presents valuable real-world information regarding HOCM from the largest available

inpatient care database. HOCM admissions are relatively uncommon but affect all ages. Its admissions are relatively more common in the South of USA and in high income population.

Most of these patients were treated at a private hospital, and the hospital charges were very high. Large number of patients required care after discharge adding to the cost of already very expensive treatment.



References

1. Teare D. Asymmetrical hypertrophy of the heart in young adults. *Br Heart J*. 1958;20:1-8
2. Braunwald E, Lambrew CT, Rockoff SD, Ross J, Jr., Morrow AG. Idiopathic hypertrophic subaortic stenosis. I. A description of the disease based upon an analysis of 64 patients. *Circulation*. 1964;30:SUPPL 4:3-119
3. Maron BJ, Bonow RO, Cannon Iii RO, Leon MB, Epstein SE. Hypertrophic cardiomyopathy: Interrelations of clinical manifestations, pathophysiology, and therapy. *N. Engl. J. Med*. 1987;316:780-789
4. Klues HG, Schiffers A, Maron BJ. Phenotypic spectrum and patterns of left ventricular hypertrophy in hypertrophic cardiomyopathy: Morphologic observations and significance as assessed by two-dimensional echocardiography in 600 patients. *J. Am. Coll. Cardiol*. 1995;26:1699-1708
5. Spirito P, Seidman CE, McKenna WJ, Maron BJ. The management of hypertrophic cardiomyopathy. *N. Engl. J. Med*. 1997;336:775-785
6. Vatasescu R, Evertz R, Mont L, Sitges M, Brugada J, Berruezo A. Biventricular / left ventricular pacing in hypertrophic obstructive cardiomyopathy: An overview. *Indian pacing and electrophysiology journal*. 2012;12:114-123
7. Colan SD. Hypertrophic cardiomyopathy in childhood. *Heart failure clinics*. 2010;6:433-444, vii-iii
8. Terauchi Y, Kubo T, Baba Y, Hirota T, Tanioka K, Yamasaki N, Furuno T, Kitaoka H. Gender differences in the clinical features of hypertrophic cardiomyopathy caused by cardiac myosin-binding protein c gene mutations. *J. Cardiol*. 2015;65:423-428

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