New York State Department of Health
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HIGHLIGHTS

For Medicaid managed care members, regional differences in myringotomy rates have been evident for several years.

In 2008, the myringotomy rate for children aged 0-19 years in the rest of state region was 5.5 times the rate in the New York City region.

Medicaid managed care children living outside of New York City were more likely to have a myringotomy than children living in New York City even after controlling for race/ethnicity, gender, age, and aid category.

Statistical Brief #7

Regional Variation in Children's Myringotomy Rates: New York State Medicaid Program, 2008

■ *Joanne Guo, Lindsay W. Cogan, Jacqueline Matson*

Introduction

Rates of frequently performed surgical procedures have shown wide regional variation which generates concern regarding potentially inappropriate utilization[1]. The examination of regional utilization rates may help eliminate unwarranted variation in the delivery of medical care. Myringotomy with the insertion of ear tubes is a frequently performed procedure on children aged 19 or younger. This procedure is an optional treatment for inflammation of the middle ear with fluid collection, lasting more than three months, that does not respond to drug treatment.

The New York State Department of Health (NYSDOH) collects and reports aggregate Medicaid managed care (MMC) utilization statistics for select frequently performed procedures, such as myringotomy, through the annual Quality Assurance Reporting Requirements (QARR). Among children enrolled in MMC, regional differences in myringotomy rates between New York City (NYC) and the rest of the state (ROS) have been evident for several years. A study in Australia also showed a similar finding where outer metropolitan areas had higher rates of myringotomy procedures than inner metropolitan areas in New South Wales, Australia.[2]

The purpose of this analysis is to identify possible demographic factors that are associated with New York State's regional variation in rates of myringotomy procedures among children aged 0-19 years enrolled in the New York State Medicaid Managed Care Program.

Findings

Demographic Distribution of the Study Population by Region

MMC encounter data obtained from the Office of Health Insurance Program (OHIP) Data Mart was used to identify the study cohort. There were 1,624,099 MMC enrollees aged 0-19 years in 2008. These enrollees accounted for 1,282,088 member years[*] and 8,569 myringotomy procedures in total.

Table 1 describes the gender, race/ethnicity, aid category, and age distribution of the study cohort by region (NYC and ROS). Among the 1,624,099 children in this study, 69.1% resided in NYC and 30.9% in ROS. In both regions, there were similar proportions of female and male enrollees. However, there were pronounced regional difference in the distribution of enrollees by race/ethnicity. Minorities were more represented in NYC with 41.6% Hispanic and only 12.9% White. The non-minority population was more represented in ROS with 44% White and 25.3% Hispanic. Blacks made up approximately 24% of the population in both NYC and ROS. Enrollees from Temporary Assistance to Needy Families (TANF) program accounted for approximately 94% of the study population in both NYC and ROS. Older children were more represented in NYC with 36.2% enrollees aged 12-19 (compared to 29.6 % in ROS), while younger enrollees were more represented in ROS with 38.0% enrollees aged 0-4 (compared to 31.8% in NYC).

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[1] HEDIS® 2009 is the Healthcare effectiveness Data and Information Set for the 2009 measurement year. HEDIS is one of the most widely used set of health care performance measures in the United States.

[2] Close GR, Rushworth RL, ROB MI, Rubin GL: Variation in selected childhood surgical procedures: The case of tonsillectomy and management of middle ear disease. Journal of Pediatrics and Child Health 1993, 29; 429-433.

[*] Member year is equivalent to the number of months within a year a member is enrolled in Medicaid divided by twelve.

Differences in Myringotomy Rates by Selected Demographic Characteristics

Table 2 describes the statewide and regional myringotomy rates by gender, race/ethnicity, aid category, and age. The statewide rate was 6.7 per 1,000 member year in 2008. This rate varied by region with a rate of 15.9 per 1,000 member years in ROS and 2.9 per 1,000 member years in NYC. Statewide and in both regions, myringotomy rates were higher for males, Whites, TANF, and younger children.

Table 2 also displays the unadjusted rate ratios comparing ROS to NYC by selected demographic characteristics. The overall myringotomy utilization in ROS was 5.5 times as high as in NYC. We further compared the rates of ROS and NYC by selected demographic characteristics and found that the rates were higher in ROS in every respect. The rate ratios comparing ROS to NYC ranged from three to nearly six times higher across demographic characteristics.

Adjusted Regional Myringotomy Rates

Negative binomial modeling was used to assess the regional differences in myringotomy utilization controlling for demographic characteristics (Table 3). The adjusted regional rate ratio indicates that ROS Medicaid managed care children were 2.8 times more likely to have a myringotomy than NYC children controlling for race/ethnicity, gender, age, and aid category. Gender, age, and aid category were also statistically significantly associated with rates of myringotomy procedures. The myringotomy rate ratio of ROS to NYC decreased from 5.5 to 2.8 following adjustment. This reduction in the rate ratio indicates that these factors explain part of the regional rate difference between ROS and NYC but not all.

Discussion

The findings of this study indicate that there is a substantial regional difference in myringotomy utilization rates among New York State's Medicaid managed care children after controlling for demographic characteristics of the population. The observed regional differences may be explained in part by factors not addressed in this study, including regional differences in Medicaid enrollee case mix and risk, smoking, health plan characteristics, and provider practice differences. The biennial CAHPS survey of Medicaid members, for example, indicates that smoking is more prevalent in ROS. However, we were unable to incorporate these results into our analysis because of the much smaller sample available from the CAHPS respondents.

While we attempted to look at a history of prescribed antibiotics and diagnosis of otitis media as potentially explanatory factors in this analysis, there was very little variation in our outcome by these factors. Every myringotomy procedure had a history of antibiotics and almost every myrigotomy procedure had a

history of diagnosis of otitis media. In the future we may consider adjusting for patient case mix using Clinical Resource Groups (CRGs) to determine if clinical severity may somehow be impacting rates of myringotomy procedures. CRGs are a product from 3M Health Systems that use all claims and encounters to assign each enrollee to a unique mutually exclusive risk group.

Lastly, differences in the characteristics of providers in plan provider networks are likely factors influencing the use of myringotomies. A previous study found that male physicians and physicians trained in North America were more likely to refer for surgery; and higher rates occurred in counties with higher percentages of high school graduates[3]. However, these characteristics are not currently collected by the NYSDOH MMC program.

Data Source and Methods

Data Source

Member-level encounter data submitted by the Medicaid managed care plans to the New York State Office of Health Insurance Programs (OHIP) Data Mart were used to identify all Medicaid Managed Care (MMC) enrollees aged 0-19 enrolled in 2008. Using OHIP Data Mart encounter data, we then identified those individuals who had a myringotomy in 2008. Once the study population was identified, we then obtained selected demographic characteristics, such as age, race, gender, and aid category for each enrollee using enrollment and eligibility information also available in the Data Mart.

Dependent Variable

The primary outcome variable was defined as the count of myringotomy procedures performed for a child aged 19 or younger during the time the person was enrolled in Medicaid managed care in 2008. Myringotomy procedures were identified according to HEDIS® 2009 [4] specifications, using Current Procedural Terminology (CPT) and International Classification of Diseases, Ninth Revision procedure codes. Two procedures with different providers on the same day were treated as different procedures, and two procedures with different claim report numbers were also considered as different procedures.

[3] Coyte PC, Croxford R, Asche CV: Physician and population determinants of rates of middle-ear surgery in Ontario. The Journal of the American Medical Association 2001,286:2128-2135.
[4] HEDIS® 2009 is the Healthcare effectiveness Data and Information Set for the 2009 measurement year. HEDIS is one of the most widely used set of health care performance measures in the United States.

Independent Variables

The independent variables included in this analysis were region, gender, race, age, and aid category. In this study, an enrollee was defined as one of the mutually exclusive categories of race/ethnicity: White, Black, Hispanic, Asian/Pacific Island or Other. An enrollee was assigned to one of the two regions based on the address at the time of service received: NYC or ROS (which included all regions of the state outside of NYC). The enrollees were grouped into three age groups: aged 0 to 4, aged 5 and 11, and aged 12 and older. The enrollee's aid category at the time of service was also used in the study and coded as Family Health Plus, Supplemental Security Income (SSI) or Temporary Assistance to Needy Families (TANF).

Percentage and Rate Calculation

Percentages of selected demographic and clinical characteristics of the enrollees were calculated at the member level. However, myringotomy procedure rates were calculated at event level, by counts of procedures per 1,000 member years. Each enrollee may contribute more than one myringotomy procedure.

Regression Modeling

Negative Binomial regression analysis was performed to examine the association between region and the frequency of the outcome of interest controlling for the study variables. Although Poisson regression is often used for count outcomes, the observed counts often exhibit more variability than what is predicted by the Poisson, a condition called over-dispersion. This leads to underestimation of the standard errors of the regression estimates, confidence intervals that are too narrow, and p-values that are too small.[2] Thus in this study, a Negative Binomial model was selected as the final model to account for over-dispersion, according to the likelihood ratio test and Akaike Information Criterion (AIC). The Negative Binomial model was fitted first for each region (NYC and ROS) respectively to ensure all covariates, such as race, gender, showed similar patterns in each region. Thus, combining data from two regions and fitting a single model using region as a covariate would not obscure different information specific to any of the specified regions. The results from this analysis were displayed as incidence rate ratios, which may be interpreted as the relative increase in the rate of myringotomy procedures for those who resided in ROS in comparison to those who resided in NYC.

Table 1. Selected Demographic Characteristics of the Study Population by Region				
Characteristic		New York City (N=1,122,633)	Rest of State (N=501,466)	New York State (N=1,624,099)
		Percent	Percent	Percent
Gender	Female	49.4	49.9	49.5
	Male	50.6	50.1	50.5
Race/Ethnicity	White	13.0	44.1	22.6
	Black	24.0	23.9	23.9
	Hispanic	41.5	25.3	36.5
	Asian	10.5	2.2	8.0
	Other	11.0	4.6	9.0
Aid Category	TANF	94.5	94.5	94.5
	SSI	4.5	4.2	4.4
	Family Health Plus	1.1	1.2	1.1
Age	0-4	31.8	38.0	33.7
	5-11	32.1	32.4	32.2
	12-19	36.2	29.6	34.1
Region				
	New York City	100.0	0.0	69.1
	Rest of State	0.0	100.0	30.9
Total		100.0	100.0	100.0

Table 2. Regional Myringotomy Rates and Rate Ratios by Gender, Race/Ethnicity, Aid Category and Age

Characteristic		New York City Rate per 1,000 Member Years	Rest of State Rate per 1,000 Member Years	New York State Rate per 1,000 Member Years	Rate Ratio* Rest of State vs NYC
Gender					
	Female	2.1	12.4	5.1	5.9
	Male	3.6	19.5	8.2	5.4
Race/Ethnicity					
	White	6.9	25.4	17.5	3.7
	Black	1.5	6.5	3	4.3
	Hispanic	2.7	9.5	4.1	3.5
	Asian	1.8	6.5	2.1	3.6
	Other	2.6	15.1	4.5	5.8
Aid Category					
	TANF	2.7	15.8	6.5	5.9
	SSI	6.5	22.6	11	3.5
Age					
	0-4	5.2	30.1	13.5	5.8
	5-11	3.2	11.3	5.5	3.5
	12-19	0.4	1.2	0.6	3.0
Total		2.9	15.9	6.7	5.5

* Rate ratio calculated as the Rest of State rate divided by the New York City rate

Table 3. Adjusted Rate Ratios and 95% Confidence Intervals for Factors Associated with Myringotomy Procedure Using Negative Binomial Modeling

		Rate Ratio	95% CI
Region	ROS vs NYC	2.8	(2.3-3.4)
Gender	Male vs Female	1.3	(1.1-1.6)
Race/Ethnicity	White vs Asian	2.4	(1.6-3.5)
	Black vs Asian	0.6	(0.4-0.9)
	Hispanic vs Asian	1.1	(0.8-1.6)
	Other vs Asian	1.2	(0.8-1.8)
Aid Category	SSI vs TANF	3.0	(2.4-3.8)
Age	0-4 vs 12-19	20.8	(15.7-27.4)
	5-11 vs 12-19	7.9	(6.0-10.4)