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Contact Information:
Healthcare Cost and Utilization Project (HCUP)
Agency for Healthcare Research and Quality
540 Gaither Road
Rockville, MD 20850
<http://www.hcup-us.ahrq.gov>

For Technical Assistance with HCUP Products:

Email: hcup@ahrq.gov

or

Phone: 1-866-290-HCUP

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The Cost of Ambulatory Surgery Visits, 2005

Bernard Friedman, PhD, and Pamela L. Owens, PhD

Agency for Healthcare Research and Quality
Center for Organization, Delivery and Markets

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Executive Summary

Background

The use of ambulatory surgery (AS) has been extended to an increasing variety of patient conditions, and is a major activity of hospitals, as well as freestanding facilities. The increased use is attributed to advances in technology and anesthesia, as well as payment incentives [Kozak, McCarthy and Pokras, 1999]. In 2005, 63.5% of surgeries in community hospitals were for ambulatory patients (American Hospital Association annual survey). To date, there has been no systematic data on the cost of AS visits for all-payer, multi-state hospital administrative databases. An accurate method for estimating the cost of producing AS visits in hospitals would be useful to analysts, health plans and policy makers concerned with public reporting, cost-effectiveness studies, or efficiency incentives.

The Healthcare cost and Utilization Project (HCUP) includes Statewide Partners in 25 states that collected data for each AS visit at each hospital in 2005. In some of these states, the advances in collection and reporting of administrative data include the detailed charges for specific services to each AS patient. Detailed charges can be matched up with departmental cost to charge ratios (CCRs) in standardized accounting data reported by hospitals to the Centers for Medicare and Medicaid Services (CMS). This study demonstrates practical methods for estimating the cost of AS visits in 8 states with data on detailed charges during each visit: Florida, Kentucky, Maryland, Minnesota, Nebraska, New Jersey, New York and Tennessee. There were about 5.2 million AS visits in these states in 2005, treated in 863 hospitals with complete accounting reports.

Once an estimate of cost is made for each AS visit, the average CCR for visits at each hospital can be calculated. The variation between hospitals and states is examined. The results allow an assessment of the possibilities for reasonable imputation of an AS CCR for hospitals with missing accounting data, or for extrapolating estimates to other states that were not part of this study.

Using all the hospitals combined, we can estimate the average cost of an AS visit in each primary procedure category, using the HCUP Clinical Classification Software (CCS). Physician services, separately billed, can be a large component of ambulatory surgery services. An estimate of the average cost of separately billed physician services is calculated from a different source. The Marketscan® database contains 3 million private insurance claims for instances of AS service in more than 40 states in 2005. These insurance claims provide the total amount paid to all physicians associated with an AS event. The physician amounts can also be broken down by CCS procedure category and tabulated with the corresponding hospital cost estimate. This is valuable information even though the payment to physicians is not exactly analogous to the resource cost of hospital services.

Finally, we analyze the effect of area wage level differences, diagnostic casemix, selected comorbidity rates, and other determinants of the variation across hospitals in the average cost per visit.

Results

1.) The average AS visit cost for the 8 states was estimated to be \$1,720 in 2005. The average charge was \$5,179, and the CCR was .332 overall, varying from .181 in FL to .618 in MD. Because of the variation between states it would be hazardous to extrapolate the average of .332 to other states without detailed charge reporting, unless there were a close association of the CCR with hospital characteristics, including the inpatient CCR. The correlation of the AS CCR with the inpatient CCR across hospitals was statistically significant but not very high at about .50. The simplest approach to extrapolating the results to other hospitals is to use the ratio of .332 to the average of the inpatient CCR in the sample (.379) and multiply this by the inpatient CCR for other hospitals. This is a convenient tool for extrapolation to hospitals outside the sample, but the validity of the method should be checked with subsequent tests as more detailed data for other states become available.

2.) A regression across hospitals of the CCR on the casemix index, payer mix proportions and other hospital characteristics found that the proportion of Medicaid-covered visits, and Medicare visits, have significant positive effects on the CCR. Investor owned hospitals have significantly lower CCR, while large size of hospital, urban location and teaching status did not have significant effects. Three of the states had significant differential effects from the other states. The size of these three state effects was as large as any other determinants except the Medicare and Medicaid payer proportions. Within the 8 states, to interpolate for missing CCR data within states the state specific constant term can be added to the list of predictor variables. It is hazardous to impute the AS CCR in states outside the 8 states due to the occasionally large state-specific effects that could occur.

3.) A listing is offered for the combined data in the 8 states of the average hospital cost per visit in various procedure categories. The average cost is shown side-by-side with the average of associated physician payments calculated from the Marketscan database. The listing is sorted by frequency of hospital AS visits. The top ten procedures in frequency are not the most expensive. In fact, half of them are less expensive than the overall average cost. It is interesting to note that in all but one of these categories, the payments to physicians are nearly equal to, or larger than, the cost of hospital services.

4.) A regression across 727 hospitals of average cost of AS visits found strong importance of the area wage index and the casemix index of procedures, which had a disproportionately large effect. A number of other variables had surprisingly small effects: the age mix of patients, the payer mix, hospital size, teaching status, and urban location. Among the comorbidity variables, chronic heart failure had a significantly

negative effect. These patients may only be candidates for outpatient procedures of a relatively minor diagnostic or therapeutic nature. Complications and comorbidities may have added to cost for those patients initially treated as ambulatory surgery but later admitted to inpatient units.

Conclusion

The methods of this study demonstrate that the hospital resource cost of an AS visit can be estimated, based on detailed charges and detailed accounting data, for a large number of visits and hospitals in available statewide databases. The variation of the CCR is high across states, and the effects of payer mix are important across hospitals within a state. Two methods of extrapolation to other states were considered, based on the evidence of CCR variation, but both have drawbacks and should be tested when other states collected detailed charges for each visit.

Payments for separately billable physician services should be kept in mind as a sizeable component of the total cost of an ambulatory surgery event. Cost variation across hospitals was surprisingly unrelated to many patient and hospital characteristics. The disproportionate effect of the index of procedure mix suggests a spillover effect. A hospital expecting a relatively costly set of procedures to be performed could have an investment in facilities and equipment, together with a skilled worker payroll, that makes all procedures more costly than they would have been at other hospitals.

Introduction

The use of ambulatory surgery (AS) is a major activity of hospitals, as well as freestanding facilities. In 2005, 63.5% of surgeries in community hospitals were for ambulatory patients (American Hospital Association annual survey). The increased use over time is attributed to advances in technology and anesthesia, as well as payment incentives (Kozak, McCarthy, and Pokras, 1999). A thorough examination of the leading types of procedures given on an outpatient basis in 17 states is available for 2003 in Russo, Owens, Steiner and Josephsen, 2007. Only major therapeutic or diagnostic procedures were included. Those authors also provide a comparison to inpatient use of the procedures and the types of patients obtaining the procedures. To date, there has been no systematic data on the cost of AS visits for an all-payer, multi-state hospital administrative database. An accurate method for estimating the cost of producing AS visits in hospitals would be useful to analysts, health plans and policy makers concerned with public reporting, cost-effectiveness studies, or efficiency incentives.

The Healthcare cost and Utilization Project (HCUP) includes Statewide Partners in 25 states that collected data for each AS visit from each hospital in 2005. In some of these states, the advances in collection and reporting of administrative data include the detailed charges for specific services to each AS patient. Detailed charges can be matched up with departmental cost to charge ratios (CCRs) in standardized accounting data reported by hospitals to the Centers for Medicare and Medicaid Services (CMS).

Purpose

This paper aims to demonstrate practical methods for estimating the cost of AS visits in a set of states currently supplying AS visit data with detailed charges linkable to standardized accounting reports from CMS. Each department in the CMS database has its own all-payer CCR so that the cost for a case can be built up from the department level. Once an estimate of cost is made for each ED visit in the selected set of states, the average CCR for visits at each hospital can be calculated. Three initial questions are addressed in the study: First, can the variation of AS CCR across hospitals in the sample be used for reasonable imputations within a state to hospitals with missing accounting data or detailed charges, so long as the total AS charge is available for each visit? Second, how well does the AS CCR correlate with the inpatient CCR? Can the latter be used for reasonable extrapolations of AS CCR results in this study to other states outside the study, so long as the inpatient CCR is available and the total charge for AS visits is available? Third, can other statistical methods be use for extrapolation? Admittedly only a tentative answer can be given here to the question of generalizability to other states. A test for validation of any method will await future improvements in information available from other states.

The study had two additional objectives. Since separately billed physician services are a large part of the total ambulatory service package, the report aims to combine and display information on hospital resource cost, by procedure category, with information

from another source on the average payment for physician services in the same category of procedure. Finally, the report offers an econometric analysis of the effect of area wage level differences, procedure casemix, comorbidity rates and other patient characteristics on the variation across hospitals in the average cost per visit. These are factors that analysts may want to consider in comparing costs of AS procedures between hospitals for public reporting and for discussions among health plans, hospitals and physicians on comparative efficiency of services.

Methods

The HCUP partnership includes statewide Partners in 25 states that collected data for each AS visit at each hospital in 2005. Seventeen of these Partners attempted to collect and report detailed charges for the visit. Detailed charges are desirable because they can be matched up with department (sometimes called “cost center”) CCRs in standardized accounting data reported by hospitals to the Centers for Medicare and Medicaid Services (CMS). The CMS data provide all-payer cost and charges for each department. The department CCRs are known to vary substantially within any hospital. In some of the states the detailed charge categories were too broad for practical use in this study, while for others the reporting was incomplete for all or many hospitals in the state. Ultimately, hospital AS visit summaries for 2005 were drawn from 8 states: Florida, Kentucky, Maryland, Minnesota, Nebraska, New Jersey, New York and Tennessee. There were about 5.2 million AS visits in these states, treated in 863 hospitals with complete accounting reports for 2005. Since the final 2005 HCUP file of matched cost reports was not available when this study was done, we used the 2004 CCR rates by department. The 2005 CCRs would likely be just a bit lower on average.

Because states differ in how they group together different types of charges, the detailed charges for an AS visit here are clustered into 5 categories that serve as a “lowest common denominator” for the 8 states. The categories and the associated percentages of total cost per visit in the entire set of visits are as follows: Operating room (32.4%), supplies and pharmacy (18.8%), radiology (5.8%), laboratories (3.5%) and a large category capturing anesthesia, recovery rooms, observation and other (39.4%). Unfortunately, it was not possible to subdivide the last category in more detail for some of the states.

After cost is calculated for each visit and aggregated to the hospital level, we examine variation of the average AS CCR across hospitals in relation to the following hospital-level variables, controlling for state: investor-ownership, payer proportions (Medicare, Medicaid, private insurance, self-pay), rural location, large size, teaching status. A generalized linear least-squares model is used. The independent variables have been previously tested and found to affect variation of the inpatient CCR and the CCR for ED visits within states.

Using all the hospitals combined, we can estimate the average cost of an AS visit in each primary procedure category within the HCUP Clinical Classification Software

(CCS). While these procedures are usually reported with CPT codes, partners and HCUP contractors use a conversion program to create the best corresponding ICD-9 codes which are aggregated into CCS service and procedure categories. See HCUP (2008) for definitions, construction and citations for the procedure categories. Physician services, separately billed, are a large component of ambulatory surgery services. An estimate of the average cost of separately billed physician services is calculated from a different source (The Medstat Group, 2002). The Marketscan® database contains 3 million private insurance claims for instances of AS service in more than 40 states in 2005. These insurance claims provide the total amount paid to all physicians associated with an AS visit. The physician amounts can also be broken down by CCS category and tabulated with the corresponding the hospital cost estimate. This is valuable information even though the payment to physicians is not exactly analogous to the resource cost of hospital services. Since physicians have alternative uses of their time, payments represent the opportunity cost of their services. For hospitals, many of which are run as not-for-profit and charitable organizations, the resource cost of care is likely to be somewhat of an underestimate of the opportunity cost of alternative uses of the resources.

A logarithmic least-squares regression analysis is used to analyze variation of hospital average visit cost with the area wage index (from CMS), a casemix index, several comorbidity proportions, bed capacity of the hospital and teaching status. A standard type of casemix costliness index is used here. The casemix costliness of the AS visits in a particular hospital is measured as $\sum_i(C_i * W_{ih})$ where C_i is the average cost in category i of primary procedure, over the entire set of all patients in all hospitals, and W_{ih} is the proportion of visits for hospital h that are in category i . When this is divided by the overall average cost of visits in the pooled data for all hospitals, the index has an average value across hospitals of approximately 1.0. The average value across hospitals can't exactly be 1.0 because hospitals differ in the total number of visits.

Comorbid illness can affect the cost of services in the hospital. While candidates for AS procedures might be selected on the basis of generally few comorbid conditions, this could vary between hospitals and help to explain differences in average cost. We started with a list of 30 comorbidities unrelated to the principal diagnosis, as defined in the work of Elixhauser et al. (1998). Many of these are rarely seen in AS patients and some were grouped together to arrive at a list of 13 comorbidity groups. Three of these were later dropped due to extremely low prevalence in the sample of AS visits.

Findings

The average AS visit cost for the 8 states was estimated to be \$1,720 in 2005, with a standard deviation of 2,077. There was substantial variation between states in average visit cost, as shown in Table 1. The average charge was \$5,179 and the CCR was .332 overall, varying from .181 in FL to .618 in MD. This variation can reflect many factors including the mix of procedures performed, regulations and state programs to compensate for care to Medicaid and uninsured patients. Because of the variation between states it would be hazardous to extrapolate the average of .332 to other states without detailed charge reporting, unless there were a close association of the CCR with hospital characteristics, including the inpatient CCR. The average inpatient CCR for the hospitals included was .379. The correlation of the AS CCR with the inpatient CCR across hospitals was statistically significant but not very high at about .50. The simplest approach to extrapolating the results to other hospitals is to use the ratio of .332 to the average of the inpatient CCR in the sample (.379) and multiply this by the inpatient CCR for other hospitals. This is a convenient tool for extrapolation to hospitals outside the sample, but the validity of the method should be checked with subsequent tests as more detailed data for other states become available. An alternative method might be to use a regression of AS CCR across other hospital characteristics in the sample, controlling for state effects.

A regression across hospitals of the CCR on the casemix index, payer mix proportions and other hospital characteristics gave rise to the results in Table 2. State differences were simultaneously allowed. Clearly the proportion of Medicaid-covered visits, and Medicare visits, have significant effects on the CCR, relative to Medicare insured visits. Investor owned hospitals have significantly lower CCR, while large size of hospital, urban location and teaching status did not have significant effects. Three of the states had significant differential effects from the other states. The size of these three state “effects”, is statistically significant and as large as any other determinants except the Medicare and Medicaid payer proportions. Within the 8 states, to interpolate for missing CCR data within states the state specific constant term can be added to the list of predictor variables. It is a little more hazardous to impute the AS CCR in states outside the sample due to the occasionally large state-specific effects that could occur.

Table 3 provides a listing for the combined data in the 8 states of the average hospital cost per visit in various procedure categories. The average cost is shown side-by-side with the average of associated physician payments calculated from the Marketscan database. The number of cases for each data source in each procedure category is shown. The Table is sorted by frequency of hospital AS visits. The top ten procedures in frequency are not the most expensive, in fact half of them are less expensive than the overall average cost. However, it is interesting to note that in all but one of these categories, the payments to physicians are nearly equal to, or larger than, the cost of hospital services.

Table 4 provides results for the regression across hospitals of average cost of AS visits in relation to the area wage index, the casemix index of procedures performed, other

patient characteristics and hospital characteristics. Differences between states are again controlled. Quite plausibly, there is a high association of cost with the area wage index. A 10% increase in the area wage index is associated with an 8.6% increase in AS visit costs. The procedure mix is highly important with a more than proportional effect, a provocative result discussed later. Remarkably, the age mix of patients, the payer mix, hospital size, teaching status, and urban location do not have a significant effect on AS visit cost at the hospital level. Among the comorbidity variables, only one is significant -- where there is a relatively high proportion of patients with chronic heart failure, cost is lower. These patients may only be candidates for outpatient procedures of a relatively minor diagnostic or therapeutic nature.

Discussion

The methods and results in this study demonstrate that the cost of an AS visit can be estimated, based on detailed charges and detailed accounting data, for a large number of visits and hospitals in available statewide databases. The variation of cost with respect to area wages and procedure mix is plausible. The disproportionate effect of procedure mix suggests a spillover effect -- a hospital expecting a costly set of procedures could have an investment in facilities and equipment, together with a skilled worker payroll that makes all procedures more costly than they would have been at other hospitals.

To impute the AS CCR within states, one may use the type of regression model presented here in Table 2, where the payer mix and ownership had significant effects. Extrapolating to other states without detailed charges is more hazardous at the present time. State effects are large in 3 of 8 states relative to the effects of other hospital variables. The correlation of AS CCR with inpatient CCR is not very high (.5). As more states provide detailed charges it would be possible to test the extrapolation method.

Useful information is presented for particular procedure categories comparing hospital cost with physician payments associated with AS procedures. These data indicate that payments to physicians are often as large or greater than the hospital cost, particularly for the frequent procedures that do not have the highest hospital cost.

A limitation of the study is that the database does not include those patients receiving ambulatory surgery who were later admitted to the hospital. These omitted patients were likely to have had more comorbidities and complications than the patients for whom costs are calculated in this paper.

Cost variation across hospitals was surprisingly unrelated to many patient and hospital characteristics. The disproportionate effect of the index of procedure mix suggests a spillover effect. A hospital expecting a relatively costly set of procedures to be performed could have an investment in facilities and equipment, together with a skilled worker payroll, that makes all procedures more costly than they would have been at other hospitals.

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Table 1: Ambulatory Surgery visit cost and charge averages in 8 states, 2005

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State	Hospital cost (\$)	Stand. Deviation of Cost	Total charges (\$)	CCR	N of Visits	N of hospitals
FL	1362	1319	7536	0.181	1,226,750	173
KY	2564	3358	4346	0.590	529,730	91
MD	1393	1725	2254	0.618	394,404	46
MN	1041	1180	3478	0.299	588,520	108
NE	1241	1268	4097	0.303	148,661	82
NJ	2046	1662	7582	0.270	378,561	74
NY	1912	1870	4459	0.429	1,231,332	189
TN	2054	2848	4960	0.414	702,815	100
					5,200,773	863
Over all visits:	1720	2077	5179	0.332		

Table 2: Regression Results for Cost/Charge Ratio (CCR) for Ambulatory Surgery Visits, 2005

**Table 2: Regression Results for Cost/Charge Ratio (CCR)
for Ambulatory Surgery visits, 2005 [1]**

	Variable mean	Coefficient	standard error	t	
Casemix index for procedures [2,3]	0.93	0.054	0.054	0.93	
Proportion of cases for Primary Insurance group					
Medicaid	0.121	0.285	0.098	2.90	**
Medicare	0.298	0.203	0.085	2.39	*
Self-pay	0.046	0.219	0.125	1.75	
Hospital Characteristics					
Investor-owned hospital	0.172	-0.127	0.030	-4.23	**
Teaching hospital (COTH member)	0.240	0.012	0.029	0.40	
Hospital has 300+ acute care beds (1/0)	0.278	-0.007	0.027	-0.27	
Urban location (1/0)	0.678	-0.040	0.026	-1.52	
STATE (default=TN)					
FL		-0.136	0.039	-3.48	**
KY		0.193	0.040	4.89	**
MD (no hospitals remained in sample for this regression)					
MN		0.031	0.042	0.72	
NE		0.085	0.072	1.17	
NJ		-0.043	0.048	-0.89	
NY		0.169	0.037	4.59	**
Intercept		0.263			
Mean of dependent variable		0.405			
Adj. R-squared		0.269			
F=18.7, degrees of freedom=710, P<.0001					

NOTES:

[1] In 8 states with detailed charges for AS visits: FL, KY, MD, MN, NE, NJ, NY, TN. In these states 863 hospitals had usable discharge data and cost reports, but due to missing variables and a screen for low number of visits, the sample for analysis was 727 hospitals.

[2] The primary procedure is taken to be the first listed. The index uses the entire pooled sample for an average cost for each primary procedure.

[3] The Clinical Classification Software categories are defined at "<http://www.hcup-us.ahrq.gov/toolssoftware/css/css.jsp>" accessed March, 2008.

** $p < .01$ * $p < .05$

Table 3: Average Hospital Cost and Payments to Physicians, by primary procedure, 2005

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(hospital visits are all-payer in 8 states, physician payments are national for privately insured patients)

CCS category <i>[1]</i>	Primary Procedure Category, in descending order by frequency in hospital database	Number of Visits	Number of Cases	Mean hospital cost	mean physician payments
	Source:	HCUP	Marketscan		
76	Colonoscopy and biopsy	395034	382104	792	1002
70	Upper gastrointestinal endoscopy, biopsy	273511	116436	902	878
95	Other non-OR lower GI therapeutic procedures	198769	679	923	1993
15	Lens and cataract procedures	186155	40830	1874	1942
5	Ins. of catheter or spinal stimulator and injection into spinal canal	161789	112459	842	822
171	Suture of skin and subcutaneous tissue	145487	128349	393	304
47	Diagnostic cardiac catheterization, coronary arteriography	140905	462	3146	1582
160	Other therapeutic procedures on muscles and tendons	103269	41770	2286	2243
166	Lumpectomy, quadrantectomy of breast	91745	22578	2107	1829
85	Inguinal and femoral hernia repair	90150	19514	2397	2291
170	Excision of skin lesion	89150	36039	1429	990
151	Excision of semilunar cartilage of knee	83764	37788	2306	2648
174	Other non-OR therapeutic procedures on skin and breast	82559	8981	1530	435
84	Cholecystectomy and common duct exploration	81445	34088	3396	2694
30	Tonsillectomy and/or adenoidectomy	72458	25041	1788	1798
125	Other excision of cervix and uterus	69638	18542	2053	1862
169	Debridement of wound, infection or burn	65693	25858	530	364
128	Diagnostic dilatation and curettage (D&C)	62258	4070	1789	1602
139	Fetal monitoring	58588	66	214	80
23	Myringotomy	53278	16328	1271	1614
175	Other OR therapeutic procedures on skin and breast	53233	20115	3287	2595
6	Decompression peripheral nerve	49535	20073	1594	1721
101	Transurethral excision, drainage, or removal urinary obstruction	49448	8967	2516	1650
86	Other hernia repair	44724	15362	2582	2284
19	Other therapeutic procedures on eyelids, conjunctiva, cornea	44620	11156	1468	1813
165	Breast biopsy and other diagnostic procedures on breast	43230	25604	1214	817
37	Diagnostic bronchoscopy and biopsy of bronchus	40730	6780	1287	909
127	Dilatation and curettage (D&C), aspiration after delivery or abortion	37846	46	1565	1049

33	Other OR therapeutic procedures on nose, mouth and pharynx	36253	17583	2527	2876
154	Arthroplasty other than hip or knee	34796	11918	3389	3267
143	Bunionectomy or repair of toe deformities	33980	15645	2349	2439
162	Other OR therapeutic procedures on joints	33813	29773	2821	2663
148	Other fracture and dislocation procedure	33089	19517	2171	1042
100	Endoscopy and endoscopic biopsy of the urinary tract	32877	9929	1619	963
168	Incision and drainage, skin and subcutaneous tissue	31525	19837	559	309
121	Ligation of fallopian tubes	31083	6587	2288	2079
28	Plastic procedures on nose	29761	9167	2372	2926
20	Other intraocular therapeutic procedures	29364	4156	2526	3158
145	Treatment, fracture or dislocation of radius and ulna	29329	17239	2323	1184
61	Other OR procedures on vessels other than head and neck	28773	27767	4616	1485
29	Oral and Dental Services	27693	1779	1944	2429
147	Treatment, fract. or disloc. of lower extremity (oth. than hip or femur)	27179	13718	2551	1371
152	Arthroplasty knee	27152	8807	3945	3682
226	Other diagnostic radiology and related techniques	25044	18739	1006	649
32	Other non-OR therapeutic procedures on nose, mouth and pharynx	24368	1036	1293	1045
107	Extracorporeal lithotripsy, urinary	24317	16659	3341	2718
231	Other therapeutic procedures	24108	660501	1685	35
8	Other non-OR or closed therapeutic nervous system procedures	23922	11631	688	469
118	Other OR therapeutic procedures, male genital	23783	8910	2725	2393
83	Biopsy of liver	22437	7859	1033	556
69	Esophageal dilatation	21808	9085	949	984
9	Other OR therapeutic nervous system procedures	21534	12020	3191	1789
54	Other vascular catheterization, not heart	21023	21142	1414	707
67	Other therapeutic procedures, hemic and lymphatic system	20698	4933	2096	1946
96	Other OR lower GI therapeutic procedures	19378	5937	1675	1736
3	Laminectomy, excision intervertebral disc	19212	9576	4290	4039
163	Other non-OR therapeutic procedures on musculoskeletal system	19151	595	553	229
57	Creat'n, revis., & remov. of arterioven. fistula or vessel-to-vessel cann	19127	2732	3083	2299
132	Other OR therapeutic procedures, female organs	18991	14295	1836	2148
142	Partial excision bone	18387	9743	2259	2398
102	Ureteral catheterization	17772	6829	2514	1618
26	Other therapeutic ear procedures	17302	6166	1816	1194
115	Circumcision	16973	14128	1608	464
48	Ins., revis., repl., rem., of cardiac pacemaker or cardioverter/d	16883	3201	7926	1817

109	Procedures on the urethra	16553	3535	1914	1351
81	Hemorrhoid procedures	15960	5906	1872	1735
93	Other non-OR upper GI therapeutic procedures	15924	1477	934	698
130	Other diagnostic procedures, female organs	15067	28714	1660	1209
106	Genitourinary incontinence procedures	14739	6822	3010	2440
120	Other operations on ovary	14284	1348	2894	1750
88	Abdominal paracentesis	14169	4449	732	362
77	Proctoscopy and anorectal biopsy	13575	8218	899	540
4	Diagnostic spinal tap	13524	12817	1049	287
111	Other non-OR therapeutic procedures of urinary tract	13356	1028	1290	619
62	Other diagnostic cardiovascular procedures	13201	5166	3503	204
181	Myelogram	12546	7906	1769	478
21	Other extraocular muscle and orbit therapeutic procedures	11430	3548	2189	2833
35	Tracheoscopy and laryngoscopy with biopsy	11221	5389	1296	619
11	Diagnostic endocrine procedures	11040	2241	533	373
16	Repair of retinal tear, detachment	10781	3521	3477	3490
108	Indwelling catheter	10735	4254	689	179
53	Varicose vein stripping, lower limb	10582	2365	2452	2481
126	Abortion (termination of pregnancy)	10505	18	1517	1503
119	Oophorectomy, unilateral and bilateral	9963	4842	3516	2508
98	Other non-OR gastrointestinal therapeutic procedures	9841	561	2109	667
39	Incision of pleura, thoracentesis, chest drainage	9713	3167	775	403
124	Hysterectomy, abdominal and vaginal	9606	7283	4873	2571
189	Contrast aortogram	9503	24	3176	1168
161	Other OR therapeutic procedures on bone	9463	10893	3633	2174
172	Skin graft	9140	10228	2020	2046
10	Thyroidectomy, partial or complete	9048	3912	4064	2797
227	Other diagnostic procedures (interview, evaluation, consultation)	9005	76448	1003	114
42	Other OR therapeutic procedures on respiratory system	9004	3056	2021	1644
113	Transurethral resection of prostate (TURP)	8924	708	3004	2220
87	Laparoscopy	8844	5317	2435	2750
65	Bone marrow biopsy	8584	3686	996	495
159	Other diagnostic procedures on musculoskeletal system	8425	2834	1626	1094
191	Arterio- or venogram (not heart and head)	8420	68	2891	1443
99	Other OR gastrointestinal therapeutic procedures	8275	3102	2389	1612
63	Other non-OR therapeutic cardiovascular procedures	8235	6680	4499	1386
116	Diagnostic procedures, male genital	8178	2867	1402	752

22	Tympanoplasty	7839	3774	2739	2587
80	Appendectomy	7713	5678	4657	1979
27	Control of epistaxis	7253	4190	489	322
211	Therapeutic radiology	7189	201	6541	464
14	Glaucoma procedures	7015	3101	2137	1413
45	Percutaneous transluminal coronary angioplasty (PTCA)	6862	58	12319	2719
117	Other non-OR therapeutic procedures, male genital	6800	3820	1426	948
90	Excision, lysis peritoneal adhesions	5706	1377	2922	2394
149	Arthroscopy	5478	1845	2614	3085
12	Other therapeutic endocrine procedures	5396	1615	2679	2698
31	Diagnostic procedures on nose, mouth and pharynx	5326	3076	1376	650
94	Other OR upper GI therapeutic procedures	5102	2137	4538	2861
110	Other diagnostic procedures of urinary tract	5062	1747	1473	559
17	Destruction of lesion of retina and choroid	4943	1513	1287	1268
82	Endoscopic retrograde cannulation of pancreas (ERCP)	4852	4236	1626	1655
164	Other OR therapeutic procedures on musculoskeletal system	4738	3645	2954	2232
146	Treatment, fracture or dislocation of hip and femur	4691	1430	2270	1792
150	Division of joint capsule, ligament or cartilage	4673	2493	2704	2882
214	Traction, splints, and other wound care	4558	53732	724	162
167	Mastectomy	4556	1657	4005	2613
158	Spinal fusion	4479	1248	10832	4963
131	Other non-OR therapeutic procedures, female organs	4469	1472	1593	543
71	Gastrostomy, temporary and permanent	4385	2184	1148	596
97	Other gastrointestinal diagnostic procedures	4322	1857	1730	385
156	Inject., and aspir. of muscles, tendons, bursa, joints and soft tissue	4313	5272	402	283
40	Other diagnostic procedures of respiratory tract and mediastinum	4168	579	2545	2211
144	Treatment, facial fracture or dislocation	3740	3233	3538	1886
141	Other therapeutic obstetrical procedures	3716	43	1435	888
213	Physical therapy exercises, manipulation, and other procedures	3699	9200	1287	87
155	Arthrocentesis	3603	9907	559	270
13	Corneal transplant	3483	630	4955	3167
123	Other operations on fallopian tubes	3476	941	2902	2700
129	Repair of cystocele and rectocele, obliteration of vaginal vault	3172	1100	3729	2340
112	Other OR therapeutic procedures of urinary tract	3012	3172	2524	1701
229	Nonoperative removal of foreign body	2800	6398	1215	247
224	Cancer chemotherapy	2676	202	3789	324
157	Amputation of lower extremity	2642	849	1896	1395

24	Mastoidectomy	2535	1091	4804	3768
173	Other diagnostic procedures on skin and subcutaneous tissue	2469	11397	776	290
92	Other bowel diagnostic procedures	2297	17	851	1685
197	Other diagnostic ultrasound	2095	17760	678	52
41	Other non-OR therapeutic procedures on respiratory system	1925	201	1797	483
222	Blood transfusion	1909	5501	1207	651
49	Other OR heart procedures	1906	664	10057	2171
193	Diagnostic ultrasound of heart (echocardiogram)	1602	710	1758	222
198	Magnetic resonance imaging	1524	609	1430	658
228	Prophylactic vaccinations and inoculations	1516	80	698	64
225	Conversion of cardiac rhythm	1433	26	1125	3932
58	Hemodialysis	1349	126	1972	163
220	Ophthalmologic and otologic diagnosis and treatment	1217	246	1312	1730
103	Nephrotomy and nephrostomy	1156	343	3563	2392
114	Open prostatectomy	1079	371	6070	3099
216	Respiratory intubation and mechanical ventilation	947	2455	2235	263
18	Diagnostic procedures on eye	880	264	1653	1623
7	Other diagnostic nervous system procedures	783	815	1779	1429
177	Computerized axial tomography (CT) scan head	545	131	988	243
206	Microscopic examination (bacterial smear, culture, toxicology)	519	178	812	138
52	Aortic resection, replacement or anastomosis	482	56	5311	3354
196	Diagnostic ultrasound of abdomen or retroperitoneum	399	708	578	135
59	Other OR procedures on vessels of head and neck	370	541	6715	2352
25	Diagnostic procedures on ear	341	66	1362	676
180	Other CT scan	315	103	1101	585
55	Peripheral vascular bypass	299	174	3869	2739
179	CT scan abdomen	283	278	1315	579
178	CT scan chest	203	79	1157	291
192	Diagnostic ultrasound of head and neck	193	6446	564	55
2	Insertion, replacement, or removal of extracranial ventricular shunt	186	267	5293	1886
51	Endarterectomy, vessel of head and neck	154	213	4989	2419
73	Ileostomy and other enterostomy	154	112	1542	2383
89	Exploratory laparotomy	152	453	3315	1638
1	Incision and excision of CNS	127	482	\$4,133	\$2,378
202	Electrocardiogram	112	2885	1426	24
56	Other vascular bypass and shunt, not heart	107	89	6426	1528
78	Colorectal resection	107	870	3785	2266

221	Nasogastric tube	80	89	1555	161
176	Other organ transplantation	76	152	4410	2730
183	Routine chest X-ray	75	478	989	72
34	Tracheostomy, temporary and permanent	74	231	2425	1013
44	Coronary artery bypass graft (CABG)	70	368	2189	4557
66	Procedures on spleen	66	96	5791	2041
38	Other diagnostic procedures on lung and bronchus	62	1786	2744	436
60	Embolectomy and endarterectomy of lower limbs	59	1284	6004	2061
209	Radioisotope scan and function studies	57	369	1426	562
79	Local excision of large intestine lesion (not endoscopic)	54	10	1816	2302
153	Hip replacement, total and partial	54	486	4054	2413
104	Nephrectomy, partial or complete	48	200	8218	2310
36	Lobectomy or pneumonectomy	44	165	3528	2905
210	Other radioisotope scan	43	19	2405	262
43	Heart valve procedures	42	103	6823	4313
201	Cardiac stress tests	27	469	2927	135
64	Bone marrow transplant	21	27	3144	2333
203	Electrographic cardiac monitoring	19	243	959	75
207	Radioisotope bone scan	18	41	1065	261
75	Small bowel resection	14	184	2837	2224
72	Colostomy, temporary and permanent	13	53	2463	1567
185	Upper gastrointestinal X-ray	12	79	783	117
50	Extracorporeal circulation auxiliary to open heart procedures	11	18	5381	1856
199	Electroencephalogram (EEG)	10	272	1610	143

NOTES:

[1] The Clinical Classification Software for Procedures is described at website: "<http://www.hcup-us.ahrq.gov/toolssoftware/ccs/ccs.jsp>" accessed March, 2008.

Table 4: Regression Results, Log of Average Cost for Ambulatory Surgery Visits, 2005

**Table 4: Regression Results, Log of Average Cost
for Ambulatory Surgery visits, 2005 [1,2]**

	Variable mean	Coefficient	standard error	t	
Log (Area wage index)	-0.027	0.858	0.187	4.58	**
Log (casemix index), based on primary procedure category [3,4]	-0.104	1.235	0.092	13.48	**
Proportion of patients by age group					
0-17	0.083	0.074	0.463	0.16	
18-44	0.278	-0.393	0.423	-0.93	
45-64	0.354	0.400	0.461	0.87	
Proportion of cases for Primary Insurance group					
Medicaid	0.120	-0.023	0.198	-0.12	
Medicare	0.298	0.042	0.357	0.12	
Self-pay	0.046	0.202	0.236	0.86	
Proportion of cases with selected comorbidities [4]					
chronic heart failure	0.004	-12.105	4.830	-2.51	*
substance use or psychiatric disorder	0.037	0.843	0.509	1.66	
paralysis	0.001	7.231	4.165	1.74	
chronic lung disorder	0.012	0.569	1.798	0.32	
diabetes	0.038	0.792	0.850	0.93	
liver failure	0.004	-3.250	3.440	-0.95	
cancer	0.076	0.733	0.458	1.60	
Hospital Characteristics					
Investor-owned hospital	0.172	-0.029	0.055	-0.53	
Teaching hospital (COTH member)	0.242	0.021	0.053	0.36	
Log (acute medical and surgical beds)	5.074	0.049	0.029	1.71	
Log (number of AS visits)	8.144	-0.040	0.022	-1.86	
intercept		7.591			
Mean of dependent variable	7.239				
Adj. R-squared	0.401				
F=17.8, degrees of freedom=691, P<.0001					

NOTES:

[1] In 8 states with detailed charges for AS visits: FL, KY, MD, MN, NE, NJ, NY, TN. In these states 863 hospitals had usable discharge data and cost reports, but due to missing variables and other screens, the sample for analysis was 717 hospitals.

[2] The individual state effects are not shown. TN has a relatively low value compared to the other states who differ little among themselves.

[3] The primary procedure is taken to be the first listed. The index uses the entire pooled sample for an average for each primary procedure.

[4] The Clinical Classification Software categories are defined at http://www.hcup-us.ahrq.gov/tools_software.jsp.

** $p < .01$ * $p < .05$