E C O N O M I C S B U L L E T I N

A brief look at hospital profits by outpatient services offered

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Abstract

Data from 94 Alabama hospitals are examined to determine the relative profitability of sixteen outpatient Diagnosis Related Groups. Analysis of variance and Bonferroni multiple comparisons are made. Supplemental outpatient services are shown to be the most profitable outpatient service studied.

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A Brief Look at Hospital Profits by Outpatient Services Offered

1. Introduction

The profitability of hospitals has been a subject of interest to academic economists for at least two decades. Recently, it has also been a topic of interest in the popular press. The literature has addressed this topic from several perspectives.

The vast majority of the research on hospital profitability has examined the relative performance of for-profit and not-for-profit hospitals or compared the similarities and differences of these methods of control. Rosenau (2003) and Shen et. al (2005) each document approximately 75 scholarly articles addressing this topic. Recent additions to this literature include Potter (2001), McClellan and Staiger (2000), Silverman and Skinner (2001) and Chakravarty et. al. (2006).

Examinations as to the factors leading to hospital profitability have been less numerable. These studies, exemplified by Morey and Dittman (1984), Dafney (2003), and Friedman et al. al. (2004), have concentrated on the link between hospital payment source and profitability, neglecting the supply side of the market. On the supply side, the profitability of particular hospital departments has been a subject of study. Browne and Kuo (2004) and Henneman, Tomaszewski, and Mayforth (2006) both examine the relative profits generated from patients admitted to hospitals through emergency departments with non emergency patients. A hospital's ability to generate profits though its pharmacy and pediatric burn centers is discussed, respectively, by Grauer (1983) and Corpron, Martin, Roberts, and Besner (2004).

As far as we are aware, little literature exists studying the relative profitability of the various services provided by hospitals. This is interesting considering that historically when estimating cost functions researchers have treated hospitals as multi-product firms, providing a host of services [Lave and Lave (1970), Evans (1971), (Coverdale, Gibbs, and Nurse (1980), Cowing and Holtman (1983), and Adam, Evans, and Murray (2003)].

The purpose of the present study is to provide a brief analysis of the profitability of the various outpatient patient services offered by a sample of hospitals. Preliminary analysis of the profitability of inpatient services has been undertaken by Hegji (2007). A natural extension of this analysis is to examine the profitability of outpatient care. Although primarily descriptive, the present analysis does suggest some tentative conclusions concerning the relative profitability of these services.

Section 2 of the paper discusses our data set and statistical techniques. Our results are presented in Section 3. Concluding comments appear in Section 4.

2. Data and Methodology

Data on profits were obtained from the *American Hospital Directory* for a sample of 94 Alabama hospitals. The data is self-reported, and applies to fiscal year ending 2005.

Profits were calculated for sixteen different hospital Diagnostic Related Groups (DRGs), listed in the Appendix. These services are self-explanatory with the exception of possibly neoplasms and external injury and supplemental classification. Neoplasms refers to tumors, which could be malignant or benign. While external injury is self-explanatory, the supplemental classification refers to a patient reporting to a hospital outpatient facility for tests, MRIs, and similar procedures.

Profits for each hospital were calculated as the difference between per patient charges and per patient costs and as the difference between per patient costs for each four

digit diagnosis. These profits were then averaged for the three digit diagnoses as appear in the Appendix. Finally, the markup of per DRG profit over DRG cost was calculated.

A one-way analysis of variance was conducted on the charge and payment markup for each DRG. The initial analysis was performed on all sixteen DRGs. This analysis appears in Tables 1 and 2.

3. Results

Table 1 shows the mean average markup of charges and payments over costs and other summary statistics for the DRGs studied. The table reveals that the average hospital charge markup was at least 100% for all DRGs. Infectious disease was least profitable when measured by charges, with an average markup of 114%. The most profitable markup was for the supplemental classification, with an average markup of 435%.

The markups of payment over cost were, as to be expected, much smaller. Undefined conditions generated the smallest average relative payment over cost, 1.69%. A reasonable explanation of this is that many of such undefined initial diagnoses were on emergency room patients, who are often indigent and non-paying. Another small markup of payment over cost was for circulatory system problems, 3.65%. A reason for the low markup is the high cost of providing such care. The most profitable markup, on the other hand, was for the low cost DRG, mental disorders. This diagnoses generated an average markup of payment over cost of 37.78%.

Table 2 displays the analysis of variance for the markup of charge over cost and payments over cost for the sixteen DRGs used in the study. The table shows that there are significant differences in both profit margins among the DRGs, where significance is at a greater than 1% level.

To simplify the search for pair wise differences between the profit margins for the various DRGs, analysis of variance was run for the four highest average charge markups and four highest payment markups. These Diagnosis Related Groups were neoplasms, muscle and skeletal problems, ill-defined conditions, and supplemental classification for the markup of charges over cost. The four highest markups of payment over cost were blood disease, mental disorders, nervous disorders, and supplemental classification. The results appear in Tables 3 and 4.

Since there were no statistically significant differences among the average markup for the top four markups of charge over cost and payment over cost, this analysis is not displayed in the Tables. However, there were statistically significance differences among the average markup of payment over cost among the four DRGs that ranked highest in terms of charge markup. Conversely, there were statistically significance differences among the average markup of charge over cost among the four DRGs that ranked highest in terms of payment markup. These differences were in both cases significant at the 2% or greater level.

Tables 3 and 4 also show that there were pair wise differences between the profitability of DRGs measured in terms of charge relative to cost and payments relative cost. These differences were tested using the Bonferroni procedure. For the markup of payments over cost, supplemental conditions generated a statistically greater markup than ill defined conditions at a greater than 1% level. For the markup of payments over costs, supplemental conditions generated a statistically greater markup than mental disorders at approximately the 1% level.

4. Conclusions

This study has been a first step in studying the relative profitability of various outpatient services, as classified by Diagnostic Related Groups. Two conclusions can be drawn from the study.

First, there are significant differences among the profitability of outpatient services hospitals offer, both in terms of charges over costs and payments over cost. Second, hospitals make particularly high profits on patients coming to outpatient facilities for supplemental procedures such as lab work.

The authors hope this preliminary work encourages others to further delve into the study of the profitability of hospital services.

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Appendix: ICD-9 Codes with At Least One Outpatient Event in Alabama 2006

Codes 001-139: Infectious and parasitic diseases

Codes 140-239: Neoplasms

Codes 240-279: Endocrine, nutritional and metabolic diseases, and immunity disorders

Codes 280-289: Diseases of the blood and blood-forming organs

Codes 290-319: Mental disorders

Codes 320-359: Diseases of the nervous system

Codes 360-389: Diseases of the sense organs

Codes 390-459: Diseases of the circulatory system

Codes 460-519: Diseases of the respiratory system

Codes 520-579: Diseases of the digestive system

Codes 580-629: Diseases of the genitourinary system

Codes 680-709: Diseases of the skin and subcutaneous tissue

Codes 710-739: Diseases of the musculoskeletal system and connective tissue

Codes 780-799: Symptoms, signs, and ill-defined conditions

Codes 800-999: Injury and poisoning

Codes E and V: External causes of injury and supplemental classification

Table 1: Summary Statistics for Markup over Cost

Infectious diseases

	Number of Obs	Mean	Std. Dev.	Min	Max
Markup of Charges	2	113.67%	165.82%	3.59%	230.92%
Markup of Payments	2	23.90%	49.60%	58.97%	11.18%

Neoplasms

	Number of Obs	Mean	Std. Dev.	Min	Max
Markup of Charges	162	422.89%	247.34%	2.20%	1461.05%
Markup of Payments	162	9.53%	46.33%	68.94%	162.40%

Endocrine disorders

	Number of Obs	Mean	Std. Dev.	Min	Max
Markup of Charges	33	356.13%	275.07%	21.14%	1356.29%
Markup of Payments	33	25.26%	63.89%	43.21%	270.99%

Blood disease

	Number of Obs	Mean	Std. Dev.	Min	Max
Markup of Charges	61	332.24%	202.59%	7.00%	966.95%
Markup of Payments	61	8.91%	40.86%	60.27%	184.42%

Mental disorders

	Number of Obs	Mean	Std. Dev.	Min	Max
Markup of Charges	10	146.40%	56.81%	2.61%	186.41%
Markup of Payments	10	37.78%	47.41%	54.25%	136.89%

Nervous disorders

	Number of Obs	Mean	Std. Dev.	Min	Max
Markup of Charges	17	374.16%	210.55%	141.88%	750.04%
Markup of Payments	17	27.52%	81.33%	51.92%	246.32%

Eyes and ears

	Number of Obs	Mean	Std. Dev.	Min	Max
Markup of Charges	77	364.26%	202.03%	24.68%	1005.47%
Markup of Payments	77	13.24%	34.39%	53.07%	106.12%

Circulatory system

	Number of Obs	Mean	Std. Dev.	Min	Max
Markup of Charges	223	357.87%	187.57%	1.89%	1098.94%
Markup of Payments	223	3.65%	36.44%	64.33%	213.86%

Respiratory system

	Number of Obs	Mean	Std. Dev.	Min	Max
Markup of Charges	67	297.32%	184.21%	72.92%	881.33%
Markup of Payments	67	11.42%	48.76%	59.33%	226.56%

Table 1: Continued

Digestive system

	Number of Obs	Mean	Std. Dev.	Min	Max
Markup of Charges	191	352.61%	223.91%	33.51%	1136.72%
Markup of Payments	191	7.63%	29.85%	72.99%	88.08%

Urinary tract problems

	Number of Obs	Mean	Std. Dev.	Min	Max
Markup of Charges	88	405.10%	214.05%	72.92%	1055.92%
Markup of Payments	88	3.90%	27.13%	61.22%	107.89%

Skin disease

	Number of Obs	Mean	Std. Dev.	Min	Max
Markup of Charges	10	261.19%	249.52%	37.96%	841.35%
Markup of Payments	10	14.81%	67.71%	81.53%	165.38%

Muscle and skeletal problems

	Number of Obs	Mean	Std. Dev.	Min	Max
Markup of Charges	256	427.23%	275.99%	14.88%	1976.06%
Markup of Payments	256	9.29%	53.68%	79.34%	320.00%

Undefined conditions

	Number of Obs	Mean	Std. Dev.	Min	Max
Markup of Charges	503	429.98%	260.81%	69.03%	1878.76%
Markup of Payments	503	1.69%	27.34%	60.34%	226.56%

Injury and poisoning

	Number of Obs	Mean	Std. Dev.	Min	Max
Markup of Charges	70	407.29%	250.74%	32.61%	1243.68%
Markup of Payments	70	13.94%	73.80%	57.10%	533.01%

Supplemental classification

	Number of Obs	Mean	Std. Dev.	Min	Max
Markup of Charges	86	435.47%	311.51%	-18.99%	1599.34%
Markup of Payments	86	22.30%	72.59%	-73.70%	514.67%

Table 2: ANOVA for Sixteen Outpatient DRGs

Markup of Charge over Costs

Source	SS	df	MS	F	Prob > F
Between groups	378.329491	15	25.2219661	4.26	0
Within groups	10887.828	1840	5.91729782		
Total	11266.1575	1855	6.07340026		

Markup of Payment over Costs

Source	SS	df	MS	F	Prob > F
Between groups	12.1367726	15	0.809118174	4.24	0
Within groups	351.413296	1840	0.190985487		
Total	363.550068	1855	0.195983864		

Table 3: ANOVA for Top 4 DRGs Markup of Charge over Costs

Markup of Payment over Costs

Source	SS	df	MS	F	Prob > F
Between groups	3.6578793	3	1.2192931	6.23	0.0003
Within groups	196.290493	1003	0.195703382		
Total	199.948372	1006	0.198755837		

Individual Difference	Difference	Prob Value
Supplemental - Ill defined	20.61%	0

Table 4: ANOVA of Top 4 DRGs by Payment Markup

Markup of Charge over Costs

Source	SS	df	MS	F	Prob > F
Between groups	81.3285457	3	27.1095152	3.37	0.0202
Within groups	1140.79158	142	8.0337435		
Total	1222.12012	145	8.42841464		

Individual Difference	Difference	Prob Value
Supp- Mental Disorder	289.07%	0.016