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GEOGRAPHIC VARIATIONS IN VA ACUTE LENGTHS OF STAY

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Abstract

Background: In 1997, the Veterans' Health Administration (VA) implemented the Veterans Equitable Resource Allocation budget system. Funding for the 22 Veterans Integrated Service Networks (VISNs) was based on a fixed amount per enrolled patient in each of two categories of care. With similar management structures and budget incentives, networks are expected to provide care efficiently. This study examined inpatient care to assess variations that might signal inefficiencies.

Methods: Discharge rates and use of acute wards (beds) were compared across VISNs using VA FY 1998 inpatient data. To capture the complexity of VA inpatient care, acute inpatient episodes were based on bed section information. Overall length of stay (LOS) for acute care and LOS for the 60 most frequent medical and surgical groups of patients were compared, adjusting for severity measured by APR-DRGs and patient characteristics.

Results: VA inpatients averaged 1.7 acute discharges in FY 1998. The number varied by a factor of 1.2 across networks. The national average acute LOS was 7.8 days, with a range from 6.2 days to 10.2 days (a factor of 1.6) across networks. Northeast VISNs had the longest acute LOS. Five western networks had the shortest. However, this geographic pattern was not uniform.

Conclusions: Variations in practice patterns across VA networks persist when inpatient severity and other characteristics are taken into account. Further studies are needed to understand the factors underlying differences in practice patterns.

Key words: Inpatient care, geographic difference, risk adjustment

Introduction

Variations in hospital lengths of stay (LOS) have been examined by many analysts as a measure of differences in efficiency [1-5] or to examine the impact of changes in payment systems. [6-7] These analyses have tried to control for variations in case-mix and patient severity using a variety of clinical and sociodemographic measures. The remaining differences are often ascribed to technical inefficiencies in production.

Several studies have found variations in LOS across Veteran's Health Administration (VA) hospitals. Thomas et al. [8] examined variations across VA hospitals for the 11 most frequently occurring medical and surgical DRGs using 1991-1993 data and found differences in LOS. In their examination of variations in the use of VA hospital and outpatient services nationwide in fiscal year (FY) 1991 to FY 1995, Ashton et al. found significant geographic variations in discharge rates, number of hospital days per patient, and rates of outpatient visits for eight cohorts of patients. [9] Fortney et al. compared LOS for VA patients with depression and concluded that variations reflect differences in practice styles and that opportunities for reducing costs of care exist.[10]

In 1995, the VA reorganized its hospital-based health care system into 22 management systems or Veterans Integrated Service Networks (VISNs) (Table 1). Each network is comprised of 5 to 11 hospitals and varying numbers of clinics, nursing homes, and other types of programs [11]. The basic budgetary, planning and operating decisions for VA patients living within each geographic area are coordinated at the VISN level. The purpose of this organizational transformation is for VA to provide continuous high quality care and improve access to care through better integration of resources [12].

INSERT TABLE 1 HERE

In FY 1997, the VA also implemented a new budgeting method: the Veterans Equitable Resource Allocation (VERA) budget system. Under the VERA methodology, the VA allocated its FY 1998 appropriation of $17 billion to the 22 VISNs using a formula based on each network's number of patients in two categories [13]. By budgeting a fixed amount per enrolled patient ($2,604 in FY 1998 for those in the Basic category and $36,960 for Complex Care patients), the VERA methodology encourages all VA networks to deliver high quality care efficiently. With similar structures of management and budget constraints, networks are expected to provide care efficiently.

This paper revisits the question of variation in care in VA using FY 1998 data. The analysis focused on inpatient care only and highlighted 60 medical and surgical groups of inpatients. More specifically, analysts examined patterns of inpatient care and variations in LOS across networks as a whole and for 60 specific cohorts. In addition, the study explored the extent to which variation was due to differences in patients' characteristics, such as severity. Networks are central in managing the provision of VA health care. Understanding where and why variations in LOS exist is important to evaluate networks' performance and to improve resource allocation.

Methods

Data

VA inpatient data came from the Patient Treatment Files (PTF) for FY 1998 (Oct 1997 – Sept. 1998). These files provide patient-level demographics, ICD-9-CM diagnosis codes and procedure codes for all discharges in a fiscal year from VA medical centers (VAMCs').

Bed Sections and Definition of Acute Inpatient Episodes

VA provides many types of inpatient services to veterans. During an inpatient stay, a patient may be treated under several different settings of hospitalization, some of which are for acute care while others are non-acute. For example, a patient could be admitted to a surgical intensive care section in a VAMC, transferred to a non-acute section such as the rehabilitation section, then returned to the surgical intensive care section, and finally moved to a general surgery bed section from which discharge occurred. In VA, all the transfers are recorded as bed section records within one inpatient episode. In the private sector, this care would be considered as three inpatient episodes: acute care (the first section stay), non-acute care (rehabilitation) and acute care (the last two section stays). To examine the acute setting, separating acute from non-acute section stays was an important first step.

Only one other study [8] has tried to capture the complicated nature of VA hospital stays. The analysis divided a hospital stay into multiple episodes defined by changes in bed service, or a transfer to/from Intermediate Medicine. The present study, also used the bed service data to identify acute hospital stays in multiple episode discharges. In particular, acute inpatient episodes were based on bed section movement information. For each discharge, all sequences of consecutive acute bed-section stays were defined as one acute inpatient episode. The LOS was calculated for each of these episodes. To distinguish acute inpatient episodes from episodes defined in VA databases, this paper will refer to the latter as “inpatient discharges.”

Risk Adjustment and APR-DRG Severity Measurement

Observed variations in VA networks’ patterns of delivering care such as LOS may be due to systematic differences in diagnoses or severity of illness rather than to differences in providers. Hence severity measures and risk adjustment are essential for evaluating the variation

in resource utilization across networks. Previous studies have adjusted inpatient LOS in VA using various severity measures such as the Severity of Illness Index (SOI) rating system developed at Johns Hopkins University [14], Patient Management Categories (PMC) from Pittsburgh Research Institute, Inc. [8], and severity measured with diagnosis-specific algorithms [9].

This study used 3M's All Patient Refined Diagnosis Related Groups (APR-DRGs) to measure patient severity. The 3M APR-DRGs are an enhancement of the DRG structure to describe all inpatients seen in the acute setting (version 15.0) [15]. Non-VA studies have found APR-DRGs had the best performance in terms of R-squares in predicting LOS for hip fracture [16] and pneumonia patients [17] compared to other risk adjustors. This analysis is the first to apply APR-DRGs to all VA inpatient care.

In the APR-DRG system, a patient is assigned to one of 355 base APR-DRGs using the principal diagnosis. All APR-DRGs are divided into four severity-of-illness subclasses (1 minor, 2 moderate, 3 major or 4 extreme severity) according to a clinical logic that simultaneously evaluates multiple co-morbidities, age, procedures, principal diagnosis and discharge. Details about how to adapt APR-DRG to VA setting can be found in Shen. [18]

Data Analysis

After comparing the characteristics of all inpatient discharges and variations in LOS across VISNs, variations in LOS across networks were examined within each of the 60 largest medical and surgical APR-DRGs. Together, these 60 major acute APR-DRGs (see Table 2) accounted for 55.5% of acute inpatient episodes and 48.7% of total acute bed days.

INSERT TABLE 2 HERE

Variations in LOS may be due to patient factors rather than processes of care. A multivariate linear regression model predicted LOS, adjusting for age, sex, and the interaction of patient severity score with APR-DRG. The LOS of acute inpatient episodes may be shortened by using non-acute bed sections during the hospital stay. Therefore the number of days in other bed sections during a stay was also included as an adjuster.

The observed average LOS in each VISN was compared with the expected LOS with/without case-mix adjustment for all acute inpatient episodes and for each of the 60 largest APR-DRGs. All the comparisons were based on Z-scores, where Z = (observed value – expected value)/(standard error). The observed severity level or LOS was the average severity level or LOS over all patients in one VISN. The expected severity level was the average severity level over all VA patients. When the LOS was not adjusted, the expected value equaled the average LOS of all VA patients. When the LOS was adjusted, the expected LOS was the average predicted LOS of all patients in one network. Networks with Z-score greater than 1.96 or less than -1.96 were identified as having significantly higher or lower values than expected values ($p<=0.05$). Otherwise, a network was considered not to be significantly different from the expected value.

Results

Comparisons Based on All Inpatient Care

Treating a sequence of consecutive acute bed-sections in an inpatient discharge as one acute inpatient stay generated 564,034 acute inpatient episodes from 604,869 inpatient discharges in FY 1998.

VA inpatients averaged 1.7 discharges in FY 1998, but the number varied by a factor of 1.2 across networks. VISN 1 had the highest number (1.92) and VISN 13 the lowest (1.58). The

variations in acute episode rates per person across networks were similar to those of discharge rates (Figure 1).

INSERT FIGURE 1 HERE

Figures 2 and 3 compare LOS across networks relative to VA national means for all inpatient discharges and acute inpatient episodes. On average, VA inpatients stayed 11.7 days per discharge in FY 1998 with a range from 7.0 days to 17.5 days (a factor of 2.5) across networks. Analysts combined consecutive acute inpatient bed sections in an inpatient discharge into one acute inpatient episode, analysts found a smaller but still marked variation. The national average of acute LOS was 7.8 days, with a range from 6.2 days to 10.2 days (a factor of 1.6) across networks.

INSERT FIGURE 2 AND 3 HERE

Networks in the northeast had the longest LOS for inpatient discharges, five networks in the west had the shortest. Some networks in the west kept patients in acute bed sections longer than average, however, while some in the northeast kept patients in acute bed sections shorter than average. For example, VISNs 21 and 22 (San Francisco and Long Beach, Calif.) had relatively longer than average LOS for acute inpatient episodes. VISNs 1, 5, and 11 (New England, Maryland, and Michigan), which had longer than average LOS for inpatient discharges, had shorter LOS for acute inpatient episodes. VISN 3 (New York/New Jersey) had the longest LOS for both inpatient discharges and acute inpatient episodes.

After adjusting for patient severity level and other characteristics, the geographic differences in LOS for acute inpatient episodes remained (Table 1). In general, case-mix adjustment changed the magnitude of the difference between the average LOS in each network and the expected LOS, but not change the sign and significance of the difference. Networks with

longer than average LOS still had longer LOS after case-mix adjustment. For example, VISN 3 still had longest LOS after taking severity and other issues into account while VISN 9 (Tennessee) still had the shortest LOS. The only exception was VISN 8 (Florida) whose overall LOS was shorter than the VA average but which had a longer than expected LOS after case-mix adjustment.

The R-square achieved by the linear risk adjustment model was 14% (i.e. the risk adjustors explain 14% of the variation in LOS across inpatient acute episodes). The parameter estimations showed that age and the number of days in other bed sections were positively correlated with LOS. Severity level was also highly (positively) correlated with LOS: more severely ill inpatients stayed in the hospital longer (results not presented here). Therefore, severity and other risk adjustors explain part of the variations in LOS at the level of individual inpatients, but did little to explain differences in LOS across networks.

Comparisons Based on 60 Cohorts of Patients

Table 2 presents the 60 acute medical/surgical cohorts that accounted for the majority of inpatients. The VA national average LOS for these cohorts ranged from 2.8 days (Chest Pain) to 49.5 days (Tracheostomy Except For Face, Mouth & Neck Diagnoses). Table 2 also presents the number of networks whose LOS was significantly different from the expected value after adjusting for severity and other factors for each APR-DRG. Examining 60 cohorts independently, identifies types of procedures with more (or less) variation in LOS across 22 networks. For example, networks treated simple pneumonia patients (APR-DRG 139) differently: its LOS was significantly different from the expected value in all but five networks. Major thoracic vascular procedures (APR-DRG 168) and major stomach, esophageal and

duodenal procedures (APR-DRG 220) were treated homogeneously (with respect to LOS) across VISNs: LOS did not differ from the expected value in 21 VISNs.

Table 3 lists each VA network and the number of major acute APR-DRGs for which LOS was lower, not different, or higher than the VA national average with and without case-mix adjustment. On average, LOS in networks was not significantly different from the means for 63% of the 60 major acute APR-DRGs. Networks tended to have disproportionately more APR-DRGs with either lower or higher LOS. LOS in VISN 20 was below average in as many as 40 cohorts. The other two networks with LOS predominantly below average were VISNs 9 and 18. VISN 3 had longer LOS in as many as 33 cohorts.

LOS was case-mix adjusted using multivariate regression for patient severity, age, sex and number of days in other bed sections during a stay for each APR-DRG. For all 60 APR-DRGs, severity was highly correlated with LOS. Moving from moderate to major severity was associated with varied increases in LOS, from a maximum of 25.8 days (transient ischemia) to a minimum of 2.7 days (respiratory malignancy), with mean 7.6 days and median 7 days. R-squares for the 60 case-mix adjustment models had a mean of 0.12 and a median of 0.11. Severity level and the other examined factors could predict as much as 27% of the variation in LOS for the cohort of major stomach, esophageal and duodenal procedures (APR-DRG 220), but with an R-square of only 0.01, the variations in LOS for the cohort of degenerative nervous system disorders (APR-DRG 42) could not be explained by the case-mix adjustors (Table 2).

To examine whether the variations of LOS across networks are also explained in part by severity and other patients characteristics, the average LOS in each VISN was compared to the expected LOS with case-mix adjustment. For 90% of all pairs of the 22 networks and 60 major acute APR-DRGs, comparisons based on expected LOS with adjustment were identical to those

without adjustment (Table 4). If a network was identified as having significantly longer than average LOS for a given APR-DRG, its LOS was still longer than the expected LOS after taking into consideration patients' severity level and other characteristics. These results indicate that severity and other case-mix adjustors explained little of the variations in LOS across networks.

Conclusions

Analysis of total inpatient acute care and 60 diagnosis-based cohorts of inpatients found significant geographic variations in VA in FY 1998. As with past analysis of specific patient cohorts, the current study found that northeast networks had longer average LOS per inpatient discharge compared to the Midwest and West.[9] New England, which had longer LOS per overall inpatient discharge, kept patients a shorter time in acute sections, however. California networks kept patients longer in acute sections even though they had shorter than average overall LOS per inpatient discharge. Networks with above average discharge rates were not only from the northeast moreover, and those with below average discharge rates were not only from the west.

Networks differed in their average LOS in acute bed sections. The case-mix adjustment models showed that APR-DRG severity levels could explain the variation of LOS within networks, i.e. within a network, more severely-ill patients stayed longer in hospital. However, using APR-DRG severity levels and other patients' characteristics to adjust for LOS in acute bed sections did little to explain the difference in LOS across networks.

These results suggest that variations of practice patterns across VA 22 networks persist even though VA networks share similar structures of management and budget incentives. Severity levels within APR-DRG and patient characteristics narrowed the gap marginally. Further, patterns were not uniform. Networks were not above or below the average LOS for all

patient groups. The differences in use of non-acute beds suggests that further studies are needed to understand the existence of difference in practice patterns.

Acknowledgement

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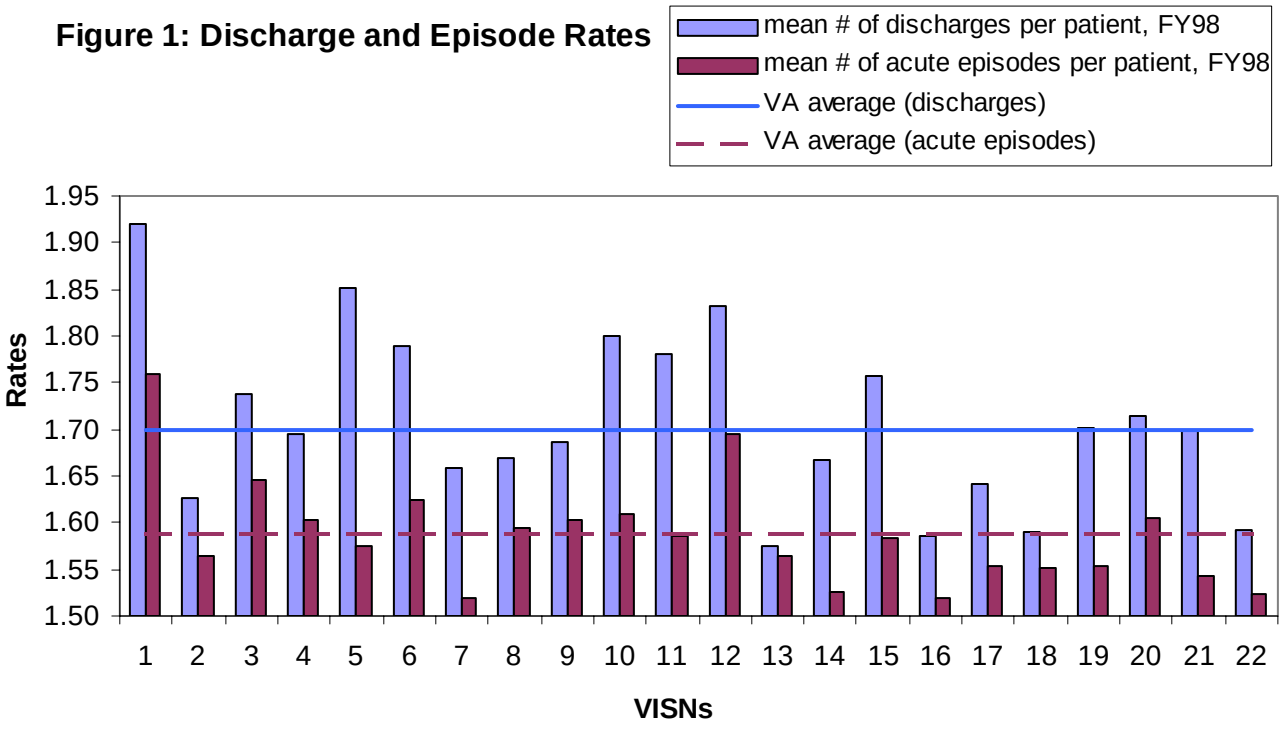


Figure 1: Discharge and Episode Rates
mean # of discharges per patient, FY98
mean # of acute episodes per patient, FY98
VA average (discharges)
VA average (acute episodes)
Rates
1.95
1.90
1.85
1.80
1.75
1.70
1.65
1.60
1.55
1.50
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22
VISNs

Figure 2: LOS for Inpatient Discharges

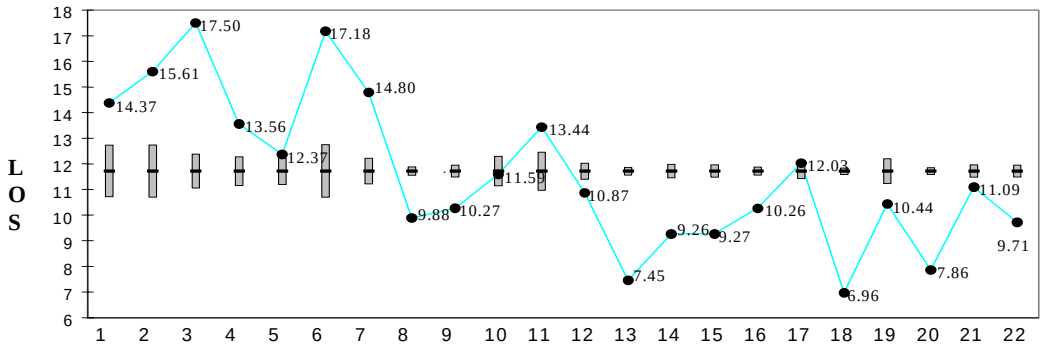
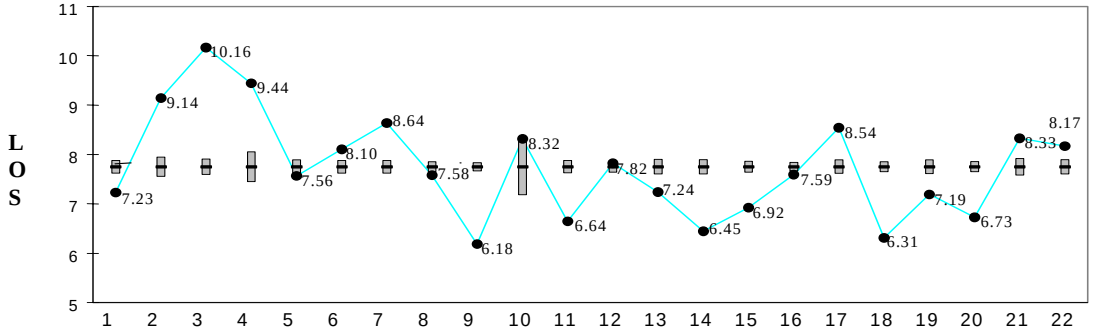


Figure 3: LOS for Acute Inpatient Episodes



Notes:

Bars indicate the 95% confidence interval; dots represent VISN average.

Dashed lines represent VA average; treadline among dots shows the variation of LOS across VISNs.

Table 1: VISNs and Geographic Variation in VA Acute Inpatient Episodes, FY 1998

VISNs	Networks	Region Covered	# of Episodes per patient	LOS per episode	Diff_1	Diff_2
1	Boston, MA	CT, ME, MA, NH, RI, VT	1.76	7.23	-0.52	-0.76
2	Albany, NY	NY, PA	1.56	9.14	1.39	1.28
3	Bronx, NY	NJ, NY	1.65	10.16	2.41	2.19
4	Pittsburgh, PA	DE, NJ, NY, OH, PA, WV	1.60	9.44	1.69	1.50
5	Baltimore, MD	MD, PA, VA, WV, DC	1.58	7.56	-0.19	-0.03*
6	Durham, NC	NC, SC, VA, WV	1.62	8.10	0.35	0.53
7	Atlanta, GA	AL, GA, SC	1.52	8.64	0.89	0.63
8	Bay Pines, FL	FL, GA, PR	1.59	7.58	-0.17	0.19
9	Nashville, TN	AR, GA, IN, KY, MS, OH, TN, VA, WV	1.60	6.18	-1.57	-1.42
10	Cincinnati, OH	IN, KY, OH	1.61	8.32	0.57	0.35*
11	Ann Arbor, MI	IL, IN, MI, OH	1.58	6.64	-1.11	-1.04
12	Chicago, IL	IL, IN, MI, MN, WI	1.70	7.82	0.07 *	0.13
13	St. Paul, MN	IA, MN, NE, ND, SD, WI, WY	1.56	7.24	-0.51	-0.47
14	Omaha, NE	IL, IA, KS, MO, NE	1.53	6.45	-1.30	-1.05
15	Kansas City, MO	AR, IL, IN, KS, KY, MO	1.58	6.92	-0.83	-1.23
16	Jackson, MS	AL, AR FL, LA, MS, MO, OK, TX	1.52	7.59	-0.16	-0.03*
17	Dallas, TX	OK, TX	1.55	8.54	0.79	0.72
18	Phoenix, AZ	AZ, CO, NM, OK, TX	1.55	6.31	-1.44	-0.96
19	Denver, CO	CO, ID, KS, MT, NE, NV, ND, UT, WY	1.55	7.19	-0.56	-0.72
20	Portland, OR	AK, CA, ID, MT, OR, WA	1.60	6.73	-1.02	-1.20
21	San Francisco, CA	CA, HI, NV	1.54	8.33	0.58	0.46
22	Long Beach, CA	CA, NV	1.52	8.17	0.42	0.36
VA			1.59	7.75		R^2=0.14

Notes: 1. Diff_1= Mean of LOS – expected LOS without case-mix adjustment (national average of LOS).
2. Diff_2=Mean of LOS – expected LOS with case-mix adjustment.
3. All differences were significance at level <=0.05 except ones with* which were not statistically significant.

Table 2: Geographic Variation in LOS for 60 Acute APR-DRGs, FY 1998

APR DRG*	Description	# of Episodes	VA Mean LOS	Number of VISNs Adjusted LOS Compared to VA Mean**			
				Lower	Same	Higher	R^2
194	Heart Failure	18,194	6.5	10	6	6	0.1
140	Chronic Obstructive Pulmonary Disease	17,351	5.9	6	11	5	0.09
139	Simple Pneumonia	15,516	7.3	10	5	7	0.07
250	Other Digestive System Diagnoses	12,897	5.5	6	12	4	0.16
201	Cardiac Arrhythmia & Conduction Disorders	12,809	4.6	8	8	6	0.13
203	Chest Pain	11,493	2.8	7	11	4	0.07
202	Angina Pectoris	9,992	3.6	11	5	6	0.09
190	Circulatory Disorders W Ami	8,863	6.6	7	10	5	0.12
198	Atherosclerosis	8,476	4.2	4	12	6	0.11
192	Cardiac Catheterization For Ischemic Heart Disease	8,458	4.8	8	10	4	0.07
383	Cellulitis	8,284	6	5	13	4	0.1
463	Kidney & Urinary Tract Infections	7,766	7.2	12	6	4	0.08
197	Peripheral & Other Vascular Disorders	7,369	6.4	5	13	4	0.07
422	Hypovolemia & Electrolyte Disorders	7,007	6	7	10	5	0.12
420	Diabetes	6,353	5.9	7	11	4	0.1
136	Respiratory Malignancy	6,291	8.3	6	12	4	0.07
137	Respiratory Infections & Inflammations	6,075	10.6	5	12	5	0.05
175	Percutaneous Cardiovascular Procedures W/o Ami	6,016	4.8	6	10	6	0.15
302	Major Joint & Limb Reattach Proc Of Lower Extrem Exc For Trauma	5,749	7.2	5	13	4	0.06
144	Respiratory System Signs, Symptoms & Other Diagnoses	5,370	5.1	5	15	2	0.13
693	Chemotherapy	5,086	4.6	4	15	3	0.13
204	Syncope & Collapse	4,928	4.2	9	9	4	0.07
46	Nonspecific Cva & Precerebral Occlusion W/o Infarct	4,646	7.5	4	16	2	0.18
221	Major Small & Large Bowel Procedures	4,595	13.6	2	19	1	0.21
249	Nonbacterial Gastroenteritis & Abdominal Pain	4,440	4	5	16	1	0.13
460	Renal Failure	4,422	7.8	5	15	2	0.13
282	Disorders Of Pancreas Except Malignancy	4,169	6.6	1	18	3	0.19
862	Other Factors Influencing Health Status	4,158	3.2	2	17	3	0.08
241	Peptic Ulcer & Gastritis	4,048	5.1	6	13	3	0.13
173	Other Vascular Procedures	4,011	10.2	5	15	2	0.19
45	Cva W Infarct	3,890	9.5	7	11	4	0.18
53	Seizure	3,748	5.7	7	13	2	0.03
280	Cirrhosis & Alcoholic Hepatitis	3,677	7.4	3	17	2	0.09

663	Red Blood Cell Disorders Except Sickle Cell Anemia Crisis	3,537	4.7	6	14	2	0.08
166	Coronary Bypass W/o Malfunctioning Coronary Bypass W/o Cardiac Cath	3,352	10.2	4	17		0.19
310	Back & Neck Procedures Except Dorsal & Lumbar Fusion	3,341	5	5	14	3	0.21
283	Disorders Of Liver Except Malig, Cirrhosis Or Alcoholic Hepatitis	3,200	6.3	3	17	2	0.11
24	Extracranial Vascular Procedures	3,113	4.6	3	19		0.16
240	Digestive Malignancy	3,021	8.6	2	19	1	0.09
812	Poisoning & Toxic Effects Of Drugs	3,012	6.1	5	14	3	0.06
47	Transient Ischemia	2,894	5	8	13	1	0.12
247	G.i. Obstruction	2,794	6.3	5	17		0.1
207	Other Circulatory System Diagnoses	2,776	5.3	4	16	2	0.12
58	Other Disorders Of Nervous System	2,717	6.7	4	18		0.12
42	Degenerative Nervous System Disorders	2,684	11.2	8	11	3	0.01
347	Medical Back Problems	2,616	5.7	7	14	1	0.07
482	Transurethral Prostatectomy	2,474	3.4	2	18	2	0.14
191	Cardiac Catheterization W Circ Disord Exc Ischemic Heart Disease	2,397	8.1	2	19	1	0.13
121	Non-major Respiratory Procedures	2,373	11.2	3	19		0.22
143	Pneumothorax & Pleural Effusion	2,286	6.8	3	19		0.09
950	Extensive Procedure Unrelated To Principal Diagnosis	2,271	17	3	17	2	0.17
165	Coronary Bypass W/o Malfunctioning Coronary Bypass W Cardiac Cath	2,108	14.3	4	16	1	0.16
691	Lymphoma & Non-acute Leukemia	2,107	8.9	1	20	1	0.1
720	Septicemia	2,037	10.3	6	13	3	0.02
133	Pulmonary Edema & Respiratory Failure	1,976	9.5	3	19		0.06
172	Amputation For Circ System Disorder Except Upper Limb & Toe	1,802	19.2	3	16	3	0.11
4	Tracheostomy Except For Face, Mouth & Neck Diagnoses	1,607	49.5	3	16	3	0.13
168	Major Thoracic Vascular Procedures	1,493	11.8	1	21		0.16
130	Respiratory System Diagnosis W Ventilator Support 96+ Hours	1,463	19.9	3	19		0.04
220	Major Stomach, Esophageal & Duodenal Procedures	1,298	14.7	1	21		0.27

Notes:
*. APR-DRGs presented in the descending order of number of episodes.
** Number of VISNs which had significantly lower, higher values than the expected or no significant difference (the significant level P <= 0.05).

Table 3: Comparisons of LOS across VISNs (60 major acute APR-DRGs), FY 1998

VISNs	LOS without case-mix adjustment			LOS with case-mix adjustment		
	Lower	No Diff.	Higher	Lower	No Diff.	Higher
1	14	43	3	17	41	2
2	1	34	25	1	33	26
3	1	26	33	1	30	29
4	6	42	12	3	47	10
5	2	49	9	1	55	4
6	3	43	14	1	41	18
7		39	21		39	21
8	4	40	16	3	41	16
9	39	21		36	24	
10	16	43	1	18	42	
11	31	28	1	31	28	1
12	5	52	3	7	50	3
13	17	43		22	38	
14	29	27	2	23	34	1
15	18	42		22	38	
16	6	53	1	4	50	6
17	2	42	16	1	44	15
18	38	22		34	26	
19	16	42	2	13	47	
20	40	19	1	41	18	1
21	14	42	4	12	43	5
22	18	39	3	11	46	3
Average	15 (24%)	38 (63%)	8 (13%)	14 (23%)	39 (65%)	7 (12%)

Notes: Number of the major acute APR-DRGs which had significantly lower, higher values than the expected or no significant difference (the significance level P<=0.05).

Table 4: Comparisons of LOS With/Without Case-Mix Adjustment (22 VISNs * 60 Acute APR-DRGs)

LOS (No adjustment)	LOS (with adjustment)			
	Shorter than the expected	No difference	Longer than the expected	Total
Shorter than the expected	271	49	0	320
No difference	31	778	22	831
Longer than the expected	0	28	139	167
Total	302	855	161	1,318

Note: 90% of 1,318 cases (22 networks *60 APR-DRGs), comparisons based on expected LOS with adjustment were identical to those without adjustment.