SPECIAL ARTICLE

Hospital Use and Survival among Veterans Affairs Beneficiaries

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ABSTRACT

BACKGROUND

Initiatives to reduce hospital care were part of the reorganization of the Department of Veterans Affairs (VA) medical care system undertaken in the mid-1990s. We examined changes in the use of VA health services and survival from 1994 through 1998 among VA beneficiaries with serious chronic diseases. We postulated that if access to hospital care was reduced too much, or if decreased hospital use was not offset by improvements in ambulatory care, urgent care visits would increase or survival rates would fall.

METHODS

We tracked changes in risk-adjusted VA bed-day rates, rates of medical visits, rates of visits for testing and consultation, and rates of urgent care visits per patient-year among VA beneficiaries in nine disease cohorts (a total of 342,300 beneficiaries). Trends in non-VA hospital use by VA beneficiaries 65 years of age or older who were enrolled in fee-for-service Medicare were also studied. VA and Medicare vital-status data were used to calculate one-year survival rates.

RESULTS

From 1994 through 1998, VA bed-day rates fell by 50 percent, rates of medical-clinic visits and visits for testing and consultation increased moderately, and rates of urgent care visits fell by 35 percent. The sharp decline in the use of VA hospitals was not compensated for by increases in the use of Medicare-reimbursed non-VA hospital care by veterans eligible for both VA care and Medicare, and the use of non-VA hospitals actually declined in four cohorts. The survival rates were essentially unchanged over the study period.

CONCLUSIONS

The marked decline in VA hospital use from 1994 through 1998 did not curtail access to needed services and was not associated with serious consequences for chronically ill VA beneficiaries.

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The Veterans Health Administration of the Department of Veterans Affairs (VA) manages the largest health care system in the United States. The VA operates 163 hospitals, 859 clinics, and 134 nursing homes (April 2002 data from the VA Central Office). Eligibility for VA services is determined by law; veterans are eligible, but not their dependents.

In 1995, the VA began to transform its medical care system from a hospital-based system to one providing comprehensive services to an enrolled population. Its four regions were reconfigured into 22 service-delivery networks, a primary care model was instituted, eligibility laws were changed (in 1996) to permit the VA to provide a full range of services, and beginning in April 1997, VA networks were financed by a capitation system.[1-5] Many of these initiatives were aimed at reducing the historically high levels of use of VA hospitals,[6,7] and from 1994 through 1998, the VA was able to reduce the number of its acute care hospital beds by 55 percent, from 52,315 to 23,612 (data from the VA Central Office).

We examined associations between changes in rates of use of VA health services from 1994 through 1998 in nine cohorts of chronically ill VA patients and the survival rates in those cohorts. We hypothesized that any adverse consequences of a decrease in hospital use would be apparent first in people with serious chronic diseases, and we postulated that if access to hospital care was reduced too much and not offset by improvements in ambulatory care, urgent care visits would increase or survival rates would fall.

METHODS

DATA SOURCES AND MEASURES OF UTILIZATION AND SURVIVAL

We analyzed data for the five federal fiscal years from 1994 through 1998, to examine utilization and survival rates immediately before and after the 1995 reorganization. To create patient-specific longitudinal utilization and vital-status records, we linked the inpatient treatment files, which contain records of all VA hospital stays; the outpatient clinic files, which contain records of all services provided to outpatients by VA staff; and the death files, which contain the dates of veterans' deaths, regardless of whether they occur in a VA facility or elsewhere, and are 90 to 95 percent complete.[8] For veterans 65 years of age or older, data on vital status, dates of death, and use of non-VA hospitals reimbursed under the fee-for-service Medicare program were obtained from Medicare Enrollment and Part A files. A total of 270,728 patients were 65 years of age or older at some point during their membership in the VA disease cohorts, and 243,443 (89.9 percent) were enrolled for a month or more in fee-for-service Medicare.

We ascertained vital status in the fall of 2001, three years after the end of the observation period, when death records should have been complete. Of the patients who died after entering a cohort, 94.6 percent were listed as deceased in VA files; Medicare files identified the other 5.4 percent of the decedents.

We calculated hospital bed-day rates (the number of days a patient spent in a hospital per 12 months of follow-up, regardless of the number of stays), discharge rates (the number of stays per 12 months, regardless of the number of bed-days), length of stay (the bed-day rate divided by the discharge rate), and the rates of clinic visits for general medical care or psychiatric care, urgent care, and testing and consultation. A medical clinic visit was defined as a day on which a patient received outpatient care at a general or subspecialty medical clinic capable of providing comprehensive, longitudinal care. A psychiatric clinic visit was defined as a day on which a patient received individual or group outpatient services from a clinic staffed by mental health professionals. An urgent care visit was defined as an unscheduled, self-initiated visit to the emergency department for a major or minor ailment. A visit for consultation or testing was defined as a scheduled day at a VA facility for services provided by a physician other than an internist (e.g., an ophthalmologist) or by a nonphysician consultant (e.g., a podiatrist), for an ambulatory procedure, or for laboratory or imaging tests. One-year survival rates served as our outcome measure.

COHORTS

We analyzed six cohorts of medical patients and three cohorts of psychiatric patients (Table 1). Patients were enrolled in a cohort if and when they had a VA hospital stay (called the enrollment stay) for one of the study conditions between 1990 and 1998, had not had a stay for that condition or any of the other eight conditions in the previous two years, and did not die before October 1993. Depending on the cohort and the diagnosis, 10 to 30 percent of the patients had multiple hospitalizations during the

Table 1. Number of Patients and Number of Patient-Years of Follow-up in Each Disease Cohort from 1994 through 1998.*

Cohort†	1994		1995		1996		1997		1998	
	Patients	Patient-Years	Patients	Patient-Years	Patients	Patient-Years	Patients	Patient-Years	Patients	Patient-Years
Chronic obstructive pulmonary disease (DRG 88)	30,389	24,391	32,315	26,638	33,487	28,077	33,577	28,476	33,569	28,437
Pneumonia (DRG 89–91)	31,731	24,793	34,777	27,850	37,323	30,455	39,662	32,730	41,745	34,508
Congestive heart failure (DRG 127)	28,612	21,793	29,890	23,255	30,925	24,410	31,010	24,803	31,152	24,858
Angina (DRG 140, 143)	63,999	55,733	71,810	63,417	78,633	70,529	83,961	75,993	88,651	80,498
Diabetes (DRG 294, 295)	28,345	24,424	31,163	27,341	32,874	29,438	33,481	30,270	33,535	30,453
Chronic renal failure (ICD-9-CM code 585)	10,396	7,685	10,820	8,099	10,876	8,364	10,862	8,412	10,841	8,407
Bipolar disorder (ICD-9-CM codes 296.0, 296.1, 296.4, 296.5–296.8, 296.81, 296.82, 296.89)	15,011	13,338	17,033	15,305	19,071	17,284	21,064	19,162	22,847	20,926
Major depressive disorder (ICD-9-CM codes 296.2, 296.3, 298.0)	22,695	20,014	26,209	23,262	29,210	26,390	32,217	29,217	35,233	32,034
Schizophrenia (ICD-9-CM codes 295.0–295.9)	33,114	29,837	36,790	33,517	40,084	37,052	42,629	39,521	44,727	41,647
All cohorts	264,292	222,008	290,807	248,684	312,483	271,999	328,463	288,584	342,300	301,768

* To account for an incomplete year of follow-up for a patient who entered the cohort after the year began or left it before the year ended, we calculated a patient-year by adding up the number of months of follow-up and dividing by 12. For example, a patient followed for six months contributed 0.5 of a patient-year.
† DRG denotes diagnosis-related group, and ICD-9-CM *International Classification of Diseases, 9th Revision, Clinical Modification*.

year they became eligible for enrollment. If a patient had multiple hospital stays for more than one of the study conditions during the year, we used a random process of selection to identify the enrollment stay. A patient could be included in only one cohort.

After enrollment, all hospital stays and clinic visits were tabulated for each enrollee, regardless of the reasons for the hospitalization or visit. Once enrolled, a cohort member stayed in the cohort until death, until the end of the observation period (September 30, 1998), or until two consecutive years had elapsed without any contact with the VA medical care system. Presumably, the patients in the last group switched to non-VA care. The cohort sizes increased each year because the number of enrollees who died each year was smaller than the number of new enrollees.

The 342,300 patients in the 1998 cohorts constituted about 11 percent of the beneficiaries who used VA health services that year. Because cohort enrollment depended on being hospitalized, VA beneficiaries who had conditions of interest but did not have any VA hospital stays between 1990 and 1998 were not included in the study.

RISK ADJUSTMENT AND STATISTICAL ANALYSIS

Utilization rates and survival rates were calculated for each of the five years from 1994 through 1998. The covariates used for risk adjustment of the rates were obtained from cohort members' enrollment stays and were updated after every two years they spent in the cohort with the use of data from the most recent hospitalization. Data on age were updated yearly. Our disease-specific risk-adjustment approach[9,10] adjusted within each cohort for differences in physiological reserve and social support (age, race, and marital status) and the complexity of the disease burden (principal diagnosis within diagnosis-related group, number of coexisting conditions, and the body systems affected by coexisting conditions[11]). In separate analyses of models of utilization and survival (data not shown), we found that including the principal diagnosis, the number of coexisting conditions, and affected body systems improved the explanatory ability of models contain-

Table 2. Risk-Adjusted Rates of Veterans Affairs (VA) Hospital and Clinic Use per Patient-Year and Relative Percent Change from 1994 through 1998.*

Cohort and Variable	Rate per Patient-Year					Change, 1994–1998
	1994	1995	1996	1997	1998	
						percent
Chronic obstructive pulmonary disease						
Bed-days	17.0	15.3	12.9	10.2	8.4	–50.6
Discharges	1.5	1.4	1.2	1.1	1.0	–33.3
Average length of stay	11.2	10.9	10.3	9.5	8.3	–25.9
Medical clinic visits	6.0	6.1	6.1	6.4	6.4	+6.7
Urgent care visits	2.8	2.4	2.0	1.7	1.7	–37.3
Testing and consultation visits	13.5	14.0	13.9	14.1	14.6	+8.1
Pneumonia						
Bed-days	16.9	14.7	12.8	10.2	8.6	–49.1
Discharges	1.4	1.3	1.2	1.0	1.0	–28.6
Average length of stay	11.7	11.3	10.7	10.0	8.9	–23.9
Medical clinic visits	5.0	5.2	5.3	5.6	5.7	+14.0
Urgent care visits	2.3	2.0	1.7	1.4	1.4	–39.1
Testing and consultation visits	13.4	14.0	14.6	14.9	15.5	+15.7
Congestive heart failure						
Bed-days	18.7	17.0	14.6	12.1	10.6	–43.3
Discharges	1.7	1.6	1.5	1.3	1.3	–23.5
Average length of stay	11.0	10.6	10.0	9.3	8.4	–23.6
Medical clinic visits	6.7	6.8	6.9	7.3	7.4	+10.4
Urgent care visits	2.5	2.3	1.9	1.6	1.6	–36.0
Testing and consultation visits	15.0	15.6	15.7	16.3	17.1	+14.0
Angina						
Bed-days	8.7	8.0	6.8	5.2	4.4	–49.4
Discharges	1.0	1.0	0.9	0.7	0.7	–30.0
Average length of stay	8.3	8.2	7.7	7.1	6.3	–24.1
Medical clinic visits	5.5	5.7	5.7	6.0	6.1	+10.9
Urgent care visits	2.3	2.0	1.7	1.4	1.5	–34.8
Testing and consultation visits	13.9	14.5	14.6	14.9	15.3	+10.1
Diabetes						
Bed-days	12.8	11.7	10.4	7.9	6.5	–49.2
Discharges	1.1	1.0	0.9	0.8	0.7	–36.4
Average length of stay	11.9	11.8	11.6	10.5	9.1	–23.5
Medical clinic visits	5.6	5.7	5.7	6.1	6.2	+10.7
Urgent care visits	2.1	1.9	1.5	1.3	1.3	–38.1
Testing and consultation visits	14.9	15.8	15.9	16.3	16.9	+13.4

ing demographic variables and specific coexisting conditions. Adjustment models also included a variable approximating the number of years the patient had a serious chronic disease (year of cohort entry), a marker of socioeconomic status (VA means-test category), and a variable indicating whether the patient had switched to non-VA care for more than 24 months while in a cohort. Analyses of new cohort enrollees showed that the disease burden, as indicated by the number of body systems affected by

Table 2. (Continued.)

Cohort and Variable	Rate per Patient-Year					Change, 1994–1998
	1994	1995	1996	1997	1998	
						percent
Chronic renal failure						
Bed-days	26.1	23.4	19.8	15.9	14.1	–46.0
Discharges	1.9	1.8	1.7	1.4	1.4	–26.3
Average length of stay	13.5	12.9	11.9	11.1	10.2	–24.4
Medical clinic visits	6.4	6.1	6.5	6.7	7.1	+10.9
Urgent care visits	2.3	2.1	1.8	1.5	1.5	–34.8
Testing and consultation visits	19.7	20.7	21.2	21.4	22.2	+12.7
Bipolar disorder						
Bed-days	23.2	20.4	16.8	13.3	11.2	–51.7
Discharges	1.2	1.1	1.0	0.9	0.8	–33.3
Average length of stay	19.9	18.7	17.4	15.2	13.2	–33.7
Psychiatric clinic visits	12.0	12.0	12.4	12.6	12.4	+3.3
Urgent care visits	2.6	2.4	1.9	1.6	1.6	–38.5
Testing and consultation visits	11.4	11.8	12.7	12.6	13.8	+21.2
Major depressive disorder						
Bed-days	23.2	20.7	17.7	12.4	9.4	–59.5
Discharges	1.2	1.2	1.1	0.9	0.8	–33.3
Average length of stay	18.6	17.3	15.8	13.6	11.3	–39.2
Psychiatric clinic visits	13.0	13.3	13.3	13.3	13.0	0.0
Urgent care visits	2.5	2.3	1.9	1.6	1.6	–36.0
Testing and consultation visits	12.1	12.3	12.4	13.1	14.2	+17.4
Schizophrenia						
Bed-days	25.5	23.0	20.2	14.5	12.7	–50.2
Discharges	1.1	1.0	0.9	0.8	0.8	–27.3
Average length of stay	23.4	22.1	21.3	17.9	16.2	–30.8
Psychiatric clinic visits	14.8	15.3	15.3	15.3	15.6	+5.4
Urgent care visits	2.4	2.2	1.8	1.4	1.5	–37.5
Testing and consultation visits	12.9	13.7	14.0	14.1	15.7	+21.7

* The rates are per 12 months of follow-up and are adjusted for age, race, marital status, VA means-test status, principal diagnosis, number of coexisting conditions, body systems affected by coexisting conditions, and year of cohort entry. Risk-adjusted rates at the VA network level were averaged to yield VA-wide rates. Expressed as a percentage of the rate, the width of the 95 percent confidence interval (the upper bound minus the lower bound) ranged from 5 to 20 percent for most rates, but in the psychiatric cohorts, the range was from 14 to 30 percent for the rates of psychiatric clinic visits and the rates of testing and consultation visits. The bed-day rate is based on the number of hospital days, regardless of the number of stays; the discharge rate is based on the number of discharges, regardless of the number of bed-days; and the length of stay is the bed-day rate divided by the discharge rate. A clinic visit was recorded for each day on which a patient received outpatient services provided by VA staff.

coexisting illness in addition to the system affected by the primary diagnosis, increased each year from 1994 through 1998 (data not shown).

Analysis of covariance was used to adjust annual network-level and VA-wide utilization rates for the covariates listed above. The data are hierarchical (patients within medical centers and centers within networks), and we treated the patient and the medical center as random variables within the model and the VA network as a fixed effect.[12]

A nonhierarchical Cox regression model[13] was used to estimate network-level survival rates at one

year, adjusted for the covariates listed above. Patients entering a cohort in a given year had a slightly higher likelihood of dying in that year than survivors who entered in earlier years. To minimize the possibility of "healthy-survivor" bias, covariates included a year-of-entry variable, and one-year survival rates were calculated by using data from five-year cohorts only. For example, the 1997 rate was calculated by using data only from patients who had entered the cohort during or after 1993.

Random-coefficient linear regression[14] of network-level survival rates on time was used to test the significance of year-to-year changes in survival rates. Random-coefficient models incorporate variation within and among networks. The slope of the regression line is equal to the average annual rate of change across the networks. Two-sided significance tests were used to test the hypothesis that the slope equaled zero (no change).

Temporal changes in systemwide VA utilization or survival rates could have been a product of uniform changes across all 22 networks or large changes in only a few networks. To avoid misinterpreting the latter instance as VA-wide change, we computed Pearson correlation coefficients between each network's annual survival rates and bed-day rates over the five-year study period. The correlation coefficients are summary measures of the relation between survival and bed-day rates. The equality of the 22 correlation coefficients was tested. Equal correlation coefficients would indicate homogeneous correlation across networks. Homogeneity, in turn, would indicate that the pattern of temporal change was the same in all 22 networks.

RESULTS

CHANGES OVER TIME IN USE OF VA HOSPITALS AND CLINICS

The patterns of change from 1994 through 1998 were the same in all nine cohorts. VA bed-day rates fell by about half and discharge rates by 33 percent. Rates of urgent care visits fell by 37 percent. Rates of medical or psychiatric clinic visits showed a small increase, with a somewhat larger increase in rates of testing and consultation visits (Table 2).

The declines in bed-day rates ranged from a decrease of 8.1 days per patient-year in the cohort with congestive heart failure (from 18.7 to 10.6 days, a change of −43.3 percent) to a decrease of 13.8 days per patient-year in the cohort with major depressive disorders (from 23.2 to 9.4 days, a change of −59.5 percent). The rate of visits to medical or psychiatric clinics across all cohorts increased from 3.3 to 14.0 percent. The increases in the rate of visits to medical clinics exceeded 10 percent in all the cohorts of medical patients except those with chronic obstructive pulmonary disease.

SURVIVAL RATES

Among the cohorts of medical patients, the one-year survival rates in 1994 were lowest in the cohorts with chronic renal failure (76.3 percent) and congestive heart failure (78.1 percent) and highest in the cohorts with angina (96.2 percent) and diabetes (94.4 percent) (Table 3). The survival rates in all three cohorts of psychiatric patients were roughly 98 percent in 1994.

The survival rates in five cohorts (pneumonia, congestive heart failure, angina, bipolar disorder, and major depressive disorder) showed statistically significant annual improvements from 1994 through 1998 ($P<0.05$), as estimated by the slope of the regression of one-year survival rates on time (Table 3). No significant change was noted in the other four cohorts. The correlation between survival rates and bed-day rates was homogeneous across the networks (data not shown), indicating that the pattern of change was uniform throughout the VA system instead of being limited to certain geographic areas.

USE OF MEDICARE-REIMBURSED NON-VA HOSPITAL CARE

In each year from 1994 through 1998, patients who were eligible for both Medicare and VA care had a higher rate of bed-days in VA hospitals (Table 4). The drop in the use of VA hospitals was not accompanied by a proportional increase in the use of non-VA hospitals. The rate of Medicare-reimbursed non-VA bed-days was roughly two or three days per patient-year, and it declined in four cohorts.

DISCUSSION

This study showed that marked declines in hospital use, on the order of 50 percent, occurred among VA beneficiaries with serious chronic illnesses during a period when the nation's largest health care system implemented multiple strategies aimed at reducing hospital utilization and improving primary care. These drops in VA-hospital use resulted from fewer admissions as well as shorter stays and coincided with moderate increases in the use of outpa-

Table 3. Risk-Adjusted One-Year Survival Rates in Nine Disease Cohorts and Changes over Time from 1994 through 1998.

Cohort	Survival Rate at 1 Yr (99% CI)*					Absolute Change, 1994–1998	Average Annual Rate of Change†	P Value‡
	1994	1995	1996	1997	1998			
			percent			*percentage points*	*percent*	
Chronic obstructive pulmonary disease	85.1 (84.5–85.7)	85.7 (85.1–86.3)	85.4 (84.8–86.1)	85.1 (84.5–85.8)	85.5 (84.8–86.2)	+0.4	–0.02	0.83
Pneumonia	85.3 (84.7–86.0)	85.9 (85.2–86.5)	86.2 (85.6–86.8)	86.2 (85.6–86.8)	86.3 (85.7–87.0)	+1.0	0.23	0.02
Congestive heart failure	78.1 (77.4–78.8)	78.7 (78.0–79.4)	78.8 (78.0–79.5)	79.7 (78.9–80.4)	79.5 (78.8–80.3)	+1.4	0.35	<0.001
Angina	96.2 (95.9–96.4)	96.3 (96.1–96.5)	96.4 (96.1–96.6)	96.6 (96.4–96.9)	96.9 (96.6–97.1)	+0.7	0.16	<0.001
Diabetes	94.4 (94.0–94.9)	94.2 (93.7–94.6)	94.3 (93.8–94.7)	94.0 (93.5–94.5)	94.1 (93.6–94.7)	–0.3	–0.06	0.22
Chronic renal failure	76.3 (75.1–77.6)	76.2 (75.0–77.6)	76.1 (74.8–77.4)	76.0 (74.7–77.5)	75.7 (74.2–77.1)	–0.6	–0.14	0.40
Bipolar disorder	98.3 (97.9–98.6)	98.0 (97.7–98.4)	98.4 (98.1–98.8)	98.5 (98.2–98.8)	98.5 (98.2–98.8)	+0.2	0.09	0.007
Major depressive disorder	97.9 (97.6–98.2)	97.9 (97.6–98.2)	98.2 (97.9–98.5)	98.3 (98.1–98.6)	98.4 (98.1–98.6)	+0.5	0.13	<0.001
Schizophrenia	98.2 (98.0–98.4)	98.1 (97.8–98.3)	98.2 (98.0–98.4)	98.2 (97.9–98.4)	98.3 (98.0–98.5)	+0.1	0.01	0.69

* The rates are adjusted for age, race, marital status, Veterans Affairs means-test status, principal diagnosis, number of coexisting conditions, body systems affected by coexisting conditions, and year of cohort entry. CI denotes confidence interval.
† The average annual rate of change is the slope of the regression of network-level survival rate on time (year). For example, in the cohort of patients with congestive heart failure, the survival rate increased by 0.35 percent each year.
‡ The hypothesis tested was that the average annual rate of change (or slope) equaled zero (no change). All P values are based on two-sided tests.

tient medical services and substantial decreases in the use of emergency and urgent care services. The declines in VA hospital use were far greater than those observed in the non-VA sector from 1994 through 1998. National Hospital Discharge Survey data show that during this period, hospital bed-day rates among men in the United States declined by 15 percent, discharge rates declined by 3.6 percent, and the length of stay declined by 10.9 percent.[15,16]

Although it was reasonable to expect that decreased access to hospital care might adversely affect the prognosis for the patients we studied, the changes in hospital and clinic utilization were not associated with a decline in long-term survival rates. Since our study was observational, it could document only temporal associations between changes in hospital use and rates of clinic visits and between changes in hospital use and one-year survival rates. Mindful of this, we propose several explanations for the stability of survival rates despite marked declines in hospital use. The most likely is that before the reorganization, the VA system was providing more hospital services to its beneficiaries than they needed. If so, reducing the overuse of hospital services would not adversely affect survival. In fact, before 1996, many of the VA eligibility statutes required hospitalization even when it was not medically indicated. For example, a veteran with chronic obstructive lung disease and chronic hypoxemia was not eligible for home oxygen without being hospitalized first. Hospital use has been higher in the VA system than in other U.S. health care sectors,[6,7] although it has been declining since the 1980s.[17-19]

Table 4. Risk-Adjusted Total, Veterans Affairs (VA), and Non-VA Bed-Day Rate per Patient-Year among Cohort Members 65 Years of Age or Older Who Were Enrolled in Fee-for-Service Medicare between 1994 and 1998.*

Cohort and Health Care System	Bed-Day Rate					Change, 1994–1998
	1994	1995	1996	1997	1998	
						percent
Chronic obstructive pulmonary disease						
Total	21.2	19.2	16.5	13.6	11.5	–45.8
VA	18.5	16.6	13.7	10.8	8.6	–53.5
Non-VA	2.7	2.7	2.8	2.8	2.9	+7.4
Pneumonia						
Total	20.5	18.0	15.8	13.2	11.6	–43.4
VA	18.8	16.4	14.0	11.3	9.7	–48.4
Non-VA	1.8	1.6	1.8	1.9	2.0	+11.1
Congestive heart failure						
Total	22.3	20.3	18.0	15.4	14.0	–37.2
VA	19.8	17.7	15.4	12.6	11.1	–43.9
Non-VA	2.6	2.6	2.6	2.9	2.9	+11.5
Angina						
Total	11.3	10.4	9.1	7.3	6.5	–42.5
VA	9.6	8.9	7.4	5.7	4.9	–49.0
Non-VA	1.7	1.5	1.7	1.7	1.7	0.0
Diabetes						
Total	16.2	14.6	13.9	11.2	9.4	–42.0
VA	14.3	12.8	11.9	9.0	7.2	–49.7
Non-VA	2.0	1.9	2.0	2.2	2.3	+15.0
Chronic renal failure						
Total	33.0	29.1	25.6	21.5	19.3	–41.5
VA	29.4	25.7	21.7	17.4	15.5	–47.3
Non-VA	3.9	3.6	3.9	4.1	3.9	0.0
Bipolar disorder						
Total	32.5	27.9	26.7	21.1	18.0	–44.6
VA	29.3	25.0	24.0	18.3	14.9	–49.1
Non-VA	3.7	3.1	2.9	2.9	3.1	–16.2

A contributing factor may have been that the shift to primary care enhanced the quality of ambulatory care and allowed services to be delivered on an outpatient rather than an inpatient basis. By the fall of 1996, 76 percent of VA beneficiaries had been enrolled with a VA primary care practitioner.[1] Empirical U.S. data on the effects of primary care on the use of health services and on survival are somewhat sparse, but some work appears to support a cause–effect relation for some of the statistical associations we observed.[20-22] However, two randomized trials, one of which was a VA trial conducted from 1992 through 1994,[23] showed that improving access to comprehensive primary care actually increased the use of ambulatory[24] and hospital[23] services. Another possible contributing factor is that keeping people out of the hospital may be beneficial because hospitals can be dangerous places. In addition, technological and therapeutic advances during the study period may have decreased the need for hospital care and at the same time improved survival. For example, the drop in hospital use and the small gain in survival observed in the cohort with congestive heart failure may be attributable

Table 4. (Continued.)

Cohort and Health Care System	Bed-Day Rate					Change, 1994–1998
	1994	1995	1996	1997	1998	
						percent
Major depressive disorder						
Total	26.1	25.2	20.9	16.6	13.7	–47.5
VA	23.2	22.6	18.5	14.0	11.3	–51.3
Non-VA	3.1	2.5	2.5	2.7	2.5	–19.4
Schizophrenia						
Total	34.6	31.2	28.9	20.1	18.1	–47.7
VA	32.9	29.6	27.2	18.0	16.0	–51.4
Non-VA	1.7	1.6	1.8	2.0	1.9	+11.8

* The rates are per 12 months of follow-up and are adjusted for age, race, marital status, VA means-test status, principal diagnosis, number of coexisting conditions, body systems affected by coexisting conditions, and year of cohort entry. The risk-adjusted rates at the VA network level were averaged to yield VA-wide rates. Expressed as a percentage of the rate, the width of the 95 percent confidence interval (the upper bound minus the lower bound) ranged from 15 to 32 percent for total bed-day rates, from 14 to 32 percent for VA bed-day rates, and from 19 to 40 percent for non-VA bed-day rates. The bed-day rate is based on the number of hospital days, regardless of the number of stays. For VA beneficiaries 65 years of age or older who were enrolled in fee-for-service Medicare, the number of patient-years at risk for VA hospital use was not necessarily the same as the number of patient-years at risk for Medicare-reimbursed hospital care (data not shown), because enrollment in Medicare could have occurred before or some time after the beneficiary met the criteria for enrollment in a VA disease cohort.

to the increased use of angiotensin-converting–enzyme inhibitors.[25,26]

Finally, between 1994 and 1998, the death rates in the general U.S. male population fell slightly,[27] and our analysis of the entire VA beneficiary population (data not shown) revealed similar slight declines in most age groups. It may be that the stable or increased survival rates in the cohorts (more than 98 percent of whom were male) are simply a manifestation of a larger phenomenon unrelated to medical care. Although we can only speculate why survival rates remained constant or improved while hospital use fell sharply, our findings support the conclusion that VA beneficiaries did not have a net decrease in access to needed services between 1994 and 1998. Decreased access would have resulted in greater use of urgent care. In fact, we found that the rates of urgent care visits fell by more than a third in all nine cohorts.

A competing explanation for the decreased use of VA hospitals and stable survival rates is that as the VA curtailed hospital care, VA beneficiaries simply shifted to another sector. Cross-use of VA and non-VA hospitals by VA beneficiaries who are also eligible for Medicare has been documented.[28] We can exclude the possibility of cross-use on the basis of our analyses of the relative proportions of use of VA and non-VA hospitals by the VA beneficiaries with the greatest access to non-VA hospital care — that is, those at least 65 years of age who were enrolled in Medicare. The use of non-VA hospitals by these veterans actually declined in four of the nine cohorts and increased very little in the others. This is remarkable, given that the financial incentives for hospitalization were exactly the opposite in the two federal health care systems during the study period. Because of the new capitation-based financing method, VA hospitals had strong incentives to reduce hospital use, whereas non-VA hospitals stood to gain for every hospitalization under the Medicare Prospective Payment System, provided that the use of services was not excessive. We do not have data on use of non-VA hospitals by cohort members under 65 years of age, but such VA beneficiaries generally have very limited access to non-VA care. Most are uninsured or underinsured.[29]

The results of this study corroborate the findings reported after the introduction of the Medicare Prospective Payment System in the 1980s — namely, that long-term survival rates among persons with chronic diseases seem to be unaffected by sharp declines in hospital use.[30]

Our requirement of an initial hospital stay for enrollment in a disease cohort might have introduced subtle variations in frailty and disease burden into the cohorts, because temporal variations in hospital admission practices can bias outcome measures based solely on hospitalized patients.[31] Our long-term follow-up of each patient and the protracted period during which every VA beneficiary had the opportunity to meet the criteria for enrollment (1990 through 1998) would have reduced the influence of such a bias. The requirement of an initial hospitalization also means that our findings on utilization and survival rates may only be extrapolated to patients who are in fairly late stages of their disease. However, such patients are of greatest interest, because they tend to account for the greatest use of high-cost medical services.

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