

# Veterans' Access to and Use of Medicare and Veterans Affairs Health Care

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**Objectives:** We examined the impact of access to care characteristics on health care use patterns among those veterans dually eligible for Medicare and Veterans Affairs (VA) services.

**Methods:** We used a retrospective, cross-sectional design to identify veterans who were eligible to use VA and Medicare health care in calendar year 1999. We analyzed national VA utilization and Medicare claims data. We used descriptive and multivariable generalized ordered logit analyses to examine how patient, geographic, and environmental factors affect the percent reliance on VA and Medicare inpatient and outpatient services.

**Results:** Of the 1.47 million veterans in our study population with outpatient use, 18% were VA-only users, 36% were Medicare-only users, and 46% were both VA and Medicare users. Among veterans with inpatient use, 24% were VA only, 69% were Medicare only, and 6% were both VA and Medicare users. Multivariable analysis revealed that veterans who were black or had a higher VA priority were most likely to rely on the VA. Patient with higher risk scores were most likely to rely on a combination of VA and Medicare health care. Patients who lived farther from VA hospitals were less likely to rely on VA health care, particularly for inpatient care. Patients living in urban areas with more health care resources were less likely to rely on VA health care.

**Conclusions:** VA health care provides an important safety net for vulnerable populations. Targeted approaches that carefully consider the simultaneous impacts of VA and Medicare policy changes on

minority and high-risk populations are essential to ensure veterans have access to needed health care.

**Key Words:** Veterans, Medicare, access to care, health services, health services research

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In an increasingly complex and expensive health care environment, patients seek care from multiple providers and across health plans to meet their health care needs. For elderly veterans eligible for benefits through the Department of Veterans Affairs (VA) and Medicare, such dual use has been estimated to be as high as 54% among surgical patients<sup>1</sup> and nearly 30% among outpatients.<sup>2</sup> Among some chronic disease populations such as end-stage renal disease and mental health, cross-systems use may be driven by differences in benefit coverage for essential medications and resource availability as well as geographic factors.<sup>3,4</sup> Cross-systems use, or dual use, of VA and non-VA care may enhance access, flexibility, and choice in health care for veterans, especially as demand for health care exceeds capacity. However, there are concerns that dual use may create discontinuity and duplication of care, leading to wasteful use of health care resources with little or no benefit to patients. Alternatively, a judicious use of both VA and Medicare systems may help patients manage their diseases better with improved outcomes. It is important to understand the patterns of dual use by veterans and the underlying determinants of seeking care in either or both systems of care.

Few recent studies have examined overall patterns of dual use between the VA and Medicare. Only a U.S. General Accounting Office (GAO) analysis more than 10 years ago examined the use of VA health care services by Medicare-eligible veterans.<sup>5</sup> Although more recent studies have demonstrated how individual-level characteristics impact health care use among veterans, including residence in an urban or rural area,<sup>6,7</sup> gender,<sup>8–10</sup> age,<sup>1,10–12</sup> distance from a VA facility,<sup>13–15</sup> and whether or not the veteran will be required to pay a copayment,<sup>16</sup> none have examined the multiple effects of these and other important access to care factors on patients' patterns of health care use across systems of care. Using detailed health care claims and utilization data, we

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focus on the impact of access to care characteristics on health care use patterns among those dually eligible for services in the 2 largest health care programs in the United States: Medicare and the VA.

## METHODS

### Research Design and Study Sample

We used a retrospective, cross-sectional design to identify veterans who were eligible to use VA and Medicare health care in calendar year 1999. Our sampling frame comprised 6.4 million veterans who had used VA health care services between calendar years 1997 and 1999, were eligible to use VA health care because they were enrolled in the Veterans Health Administration, or received compensation or pension benefits from the VA. We combined data from our sampling frame with Centers for Medicare & Medicaid Services (CMS) enrollment data using conservative matching criteria<sup>17</sup> to ensure valid data linkages, which resulted in an cohort of 2.6 million veterans eligible for VA health care and enrolled in Medicare during 1999 (Fig. 1).

We excluded individuals for whom veteran status was unknown, individuals with missing or invalid zip codes, or those who lived in Puerto Rico or other U.S. territories. Individuals who were 65 or younger on January 1, 1999, were also excluded. Patients with end-stage renal disease (n = 23,977) were excluded as a result of differences in costing and accounting for dialysis services in the VA and in Medicare. Individuals enrolled in a Medicare+Choice (M+C) plan during 1999 (n = 430,657) were excluded because CMS does not collect claims data on M+C enrollees, so we could not calculate their Medicare costs or their risk score. Finally, we excluded 63,037 veterans with no health care use in either VA or Medicare in 1999 because no information was available on other sources of health insurance and therefore

whether there was any health care use outside of VA or Medicare. Our final cohort comprised 1.48 million veterans (see Fig. 1).

### Reliance on Veterans Affairs Health Care Use Categories

We calculated the percent reliance on VA health care as a percentage of total VA and Medicare costs in calendar year 1999; inpatient and outpatient care reliance measures were calculated separately. Because this measure was not normally distributed, for analytic purposes, we also defined ordered categories. For outpatient services, we defined 5 mutually exclusive ordered categories based on the proportion of an individual patient's total (VA and Medicare) health care costs for outpatient services received in 1999 that were for VA health care. The groups included those with 0% of their outpatient health care costs attributable to VA health care (Medicare-only users), 1% to 25% of outpatient costs in the VA (mostly Medicare users), 26% to 74% of outpatient costs in the VA (equally dual users), 75% to 99% of outpatient costs in the VA (mostly VA users), and those with 100% of their outpatient costs attributable to VA health care (VA-only users). For inpatient services, we defined 3 categories resulting from the small number of veterans who had inpatient services in both VA and Medicare: those with 0% of their inpatient costs attributable to VA health care (Medicare-only users), 1% to 99% of inpatient costs in the VA (dual users), and those with 100% of their inpatient costs attributable to VA health care (VA-only users).

VA use was determined by searching all VA workload data files that contain information on inpatient or outpatient care provided at a VA facility or paid for by the VA on a fee basis for calendar year 1999.<sup>18</sup> Costs for VA health care use were obtained from the VA Health Economics Resource Center (HERC) cost data sets, which use a Medicare payment approach to estimate average costs for VA inpatient and outpatient events.<sup>19,20</sup> Cost estimates for VA outpatient visits are based on reimbursement rates from Medicare and other health care payers to estimate hypothetical payments for outpatient visits; these payments were adjusted to reflect the actual aggregate cost of VA outpatient care.<sup>19</sup> Costs for VA inpatient stays in these data sets are calculated using a Medicare cost function estimate derived from characteristics of the patient admission such as length of stay and diagnosis-related group relative weights.<sup>20</sup>

Medicare use was determined by searching CMS fee-for-service (FFS) claims files. We included CMS claims files for inpatient services using the Inpatient Standard Analytic File (SAF) and for outpatient services using the Outpatient, Home Health Agency, and Carrier (physician/supplier) SAFs.<sup>18</sup> We used Medicare payments to estimate costs separately for inpatient and outpatient care. Carrier claims that were concomitant with an inpatient admission were classified as inpatient events.

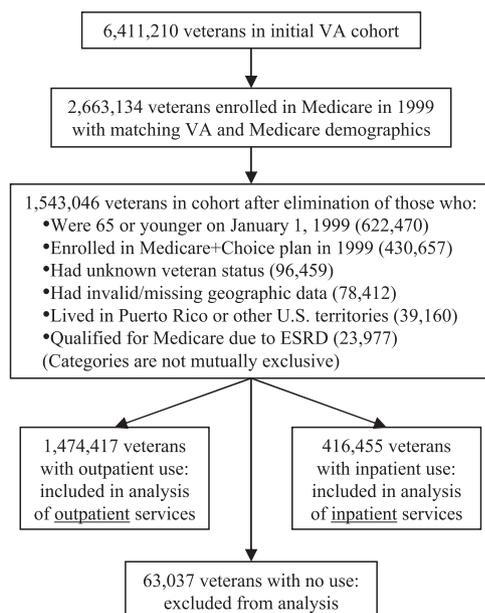


FIGURE 1. Pathway from sampling frame to final cohort.

### Access to Health Care Factors

We examined 3 categories of access to care characteristics: patient, geographic, and environmental. These characteristics are consistent with prior work on health

care behavior<sup>21,22</sup> and empiric studies of health care demand among veterans.<sup>5,6,13,15,23</sup>

### Patient Characteristics

Patient characteristics included age, gender, race, vital status, priority level within the VA, and a patient health status risk score. Age, gender, race, and vital status were obtained from the Medicare Vital Status file, a source considered to be of superior quality to that in the VA files.<sup>24,25</sup> Age was parameterized as a 3-level variable grouping: 66 to 74 years, 75 to 84 years, and 85 years or older. Race was examined as a dichotomous variable indicating black or nonblack race, because until recently, CMS did not collect data on other minority groups and reliability of ethnicity data was poor.<sup>24</sup> VA priority level was defined as a dichotomous variable in which “high-priority” veterans included those who had a service-connected condition or whose income was less than a threshold annually established by the VA (VA priority groups 1–6).<sup>23</sup> The “low-priority” designation included only those whose income was greater than the annual income threshold in 1999.

To account for patient health status, we computed risk scores based on all VA and Medicare health care claims data using the Hierarchical Condition Category (HCC) method.<sup>26–28</sup> The HCC risk method has been used by CMS to risk-adjust payments to Medicare+Choice plans since 2004. The HCC model is unique because it uses groups of related conditions, or hierarchies, to limit the number of related conditions that contribute to a person’s risk score. Less serious conditions in the same hierarchy are excluded. For example, someone with myocardial infarction (MI) may also have unstable angina in the same year. Unstable angina will not contribute to the risk score because it is ranked lower than MI in the same hierarchy. Thus, the hierarchical method reduces the sensitivity of the risk scores to the coding variations by providers and is especially appropriate to use in this study that involves 2 systems of care with different incentives to code diseases.

To calculate the HCC risk scores, we used demographic information, including age, gender, Medicaid eligibility, and original reason for Medicare entitlement from the 1999 Medicare Denominator file. Medical conditions were determined by combining all diagnostic codes from VA and Medicare inpatient and outpatient encounters during 1999. We divided the sample into quartiles based on HCC values separately for the inpatient and outpatient users.

### Geographic Factors

We considered 3 measures of geographic access: distances to the nearest VA inpatient hospital, VA outpatient center, and Medicare inpatient hospital based on prior research.<sup>6,7,15</sup> Distance was measured in miles as a straight-line distance between the location of health care facility and the centroid of the zip code of the patient’s residence and was obtained from the VA Planning Systems Support Group.<sup>29</sup> As a result of collinearity between these distance variables, we chose to use only the distance to the nearest VA inpatient hospital in the regression models. We used a 5-level grouping to capture distance effects in the first 20 to 30 miles.<sup>14,15</sup>

### Environmental Characteristics

Measures for the environmental category describe the patient’s zip code or county of residence. The urban/rural nature of the zip code is based on 2000 census data from the VA Planning Systems Support Group.<sup>29</sup> Poverty level was derived from the 2000 census as a dichotomous measure indicating whether at least 20% of households in the zip code were below the poverty level (high poverty).<sup>30</sup>

Descriptors of the health care resources in the individual’s county of residence included the number of physicians, the number of short-term general hospitals, and the number of short-term general hospital beds.<sup>30</sup> As a result of collinearity between these variables, we chose to use only the number of beds in our final models. Counties were divided into quartiles based on the number of beds: low (0–125 beds), medium–low (126–514 beds), medium–high (515–1697 beds), and high (1698–24,791 beds).

### Statistical Analysis

We used descriptive and multivariable analyses to examine how access to care factors affected patterns of reliance on VA and Medicare in 1999. We completed separate analyses for outpatient care ( $n = 1,474,417$ ) and inpatient care ( $n = 416,455$ ). We used generalized ordered logit regression in STATA<sup>31–33</sup> to examine an increasing preponderance of VA services relative to Medicare services. We used this approach because the independence of irrelevant alternatives assumption<sup>34</sup> was not met for the multinomial logistic model and the parallel regression assumption was not met for an ordered logistic model. Unlike the ordered logistic model, the advantage of the generalized ordered logit model is that it does not constrain the parameter estimates to be constant across all the groups of interest, in this case our health care use groupings. The generalized ordered logit model is specified as:

$$\text{Prob.}(Y_i > j) = \exp(\beta_{0j} + X_i \beta_j) / [1 + \exp(\beta_{0j} + X_i \beta_j)], j = 1, 2, \dots, M-1$$

where  $M$  is the number of health care use categories (for outpatient use  $M = 5$ ; for inpatient use  $M = 3$ );  $j$  is the health care use category (for outpatient use: 1 = Medicare only, 2 = mostly Medicare, 3 = equally dual, 4 = mostly VA, 5 = VA only; for inpatient use: 1 = Medicare only, 2 = dual, 3 = VA only);  $Y_i$  is the category of health care use for the  $i^{\text{th}}$  patient; and  $X_i$  are the patient, geographic, and environmental variables. A key aspect of this model is that it allows the estimated coefficients,  $\beta$ , for variables that violate the parallel lines assumption, to vary across all categories,  $j$ , but remain constant for across all categories for variables that do not violate the parallel lines assumption.<sup>31</sup>

To control for unobserved cross-network heterogeneity, our generalized ordered logit regressions included dummy variables representing the 22 Veterans Integrated Service Network in which a veteran resided. We also included a dummy variable indicating whether the individual died during the year. We report odds ratios (ORs) for all parameter estimates except for the control variables. Regression results reported are for the full sample. Although not reported here,

we also estimated the same model using a 5% random sample to ascertain any effects resulting from sample size and found similar results.<sup>35</sup>

## RESULTS

### Outpatient Use

Among patients who had VA or Medicare outpatient health care use, 18% used only VA care, nearly 36% used only Medicare, and 46% used a combination of VA and Medicare services (Table 1). Patients who used both VA and Medicare services had higher outpatient costs than patients who used VA or Medicare services only. Patients who used mostly Medicare services had the highest average annual cost per patient (\$5088). The other dual use groups also had higher mean outpatient costs (\$3112 for mostly VA and \$2815 for equally dual users) than patients who were single-system users (\$2323 for Medicare only and \$2645 for VA-only users).

Among all outpatient users, the median age was 74 years, 8% were black, 2% were women, 79% had a high priority designation by the VA, and 25% lived within 10 miles of a VA hospital. For environmental characteristics, 79% lived in an urban zip code and 14% of patients lived in areas with high poverty rates.

Table 2 shows the generalized ordered logit regression results for the outpatient model. As patient age increased, the likelihood of relying on VA care decreased. For example, veterans who were 75 to 84 years of age were less likely (OR = 0.64) and veterans 85 years and older were even less likely (OR = 0.50) than those aged 66 to 74 years to use the VA exclusively than to use any Medicare services. Black veterans were increasingly likely to rely on VA care. Black veterans were more likely to rely on VA care exclusively than nonblacks (OR = 2.32) and were always more likely to rely on some VA care than to use Medicare services exclusively. Male veterans were less likely to rely exclusively on VA care (OR = 0.87) than female veterans and less likely overall to rely on some VA care. Patients' priority status for VA services had the largest impact on reliance on VA health care. Patients with a high priority designation were far more likely than their low-priority counterparts to rely exclusively on VA care (OR = 3.59) and more likely overall to rely on some VA care.

With regard to health risk, the lowest-risk patients were most likely to use VA services exclusively. As risk score increased, the reliance on VA services decreased. For example, compared with the lowest risk group, veterans who had medium–low risk scores were less likely (OR = 0.84) to use the VA exclusively. Similarly, veterans who were at medium–high risk were less likely (OR = 0.63) and those who were at high risk were least likely (OR = 0.33) to use VA exclusively compared with the lowest risk group. Moreover, patients at highest risk were also less likely to use Medicare exclusively. For example, the highest risk patients were more likely (OR = 1.42) to use any VA service than to use Medicare only. This pattern indicates that the highest risk patients were using a combination of VA and Medicare services.

Results for the geographic distance variable are consistent with prior research: as distance to a VA inpatient hospital

decreased, the likelihood of using VA services exclusively increased. Veterans who lived more than 40 miles from a VA hospital were less likely (OR = 0.30) to use the VA exclusively compared with those who lived within 5 miles, and reliance on VA care decreased with greater distances from a VA hospital.

We found that patients who lived in urban areas or in areas with a greater number of hospital beds, where choices for health care tend to be greater, were less likely to rely on VA care exclusively than patients in rural areas (OR = 0.78) or in counties with fewer hospital beds (OR = 0.89). Also, patients living in high poverty areas were more likely (OR = 1.28) to rely on VA services exclusively.

### Inpatient Use

Of the 416,455 veterans who had VA or Medicare inpatient health care use, 24% used only VA care, 69% used only Medicare, and 6% used a combination of VA and Medicare inpatient services (Table 3). Average annual inpatient costs for dual users were more than double the average costs for patients using a single system (\$34,668 for dual users vs. \$16,464 for VA only and \$15,612 for Medicare-only users). Similarly, dual users had an average of 3.46 inpatient admissions compared with 1.58 for VA-only users and 1.71 for Medicare-only users.

Among inpatient users, the median age was 75 years, 9% were black, 2% were women, 83% had a high priority designation by the VA, and 25% lived within 10 miles of a VA hospital. For environmental characteristics, 79% lived in an urban zip code and 15% of patients lived in areas with high poverty rates. Distributions were similar when we examined only those patients who had at least 2 inpatient admissions during the year.

Table 4 shows generalized ordered logit regression results for the inpatient model. Regression results were consistent with the outpatient model for trends and showed an increasing likelihood of reliance on VA use among patients who were younger, black, female, healthier, had a high priority designation within the VA, lived in a rural area, lived in a high poverty area, lived close to a VA hospital, and lived in a county with the fewest number of hospital beds. Only the magnitude of the effects differed. In particular, patients who were designated as high priority for VA care had a greater likelihood than low-priority veterans (OR = 5.19) to use the VA exclusively for their inpatient care.

## DISCUSSION

We characterized veterans who were eligible to use both VA and Medicare FFS in 1999 in 5 health care user groups based on their reliance on VA health care relative to Medicare. We examined inpatient and outpatient care separately but found similar patterns of reliance on VA care; we found an increasing preponderance of VA use among patients who were younger, black, female, healthier, had a high priority designation in the VA, lived in a rural area, lived in a high poverty area, lived close to a VA hospital, and lived in a county with the fewest numbers of hospital beds. Although these results for specific variables are consistent with prior research, several issues are noteworthy.

**TABLE 1.** Characteristics of Users of Veterans Affairs (VA) or Medicare Outpatient Services

Outpatient Users	Total	VA Only*	Mostly VA†	Equally Dual‡	Mostly Medicare§	Medicare Only¶
Total (n)	1,474,417	270,993 (18.4%)	176,242 (12.0%)	235,096 (15.9%)	267,408 (18.1%)	524,678 (35.6%)
Median payments						
VA	\$305	\$1401	\$1803	\$839	\$283	\$0
Medicare	\$750	\$0	\$145	\$917	\$3089	\$1332
Total	\$1838	\$1401	\$2015	\$1837	\$3484	\$1332
Mean payments						
VA	\$1056	\$2323	\$2820	\$1342	\$432	\$0
Medicare	\$2055	\$0	\$292	\$1473	\$4656	\$2645
Total	\$3112	\$2323	\$3112	\$2815	\$5088	\$2645
Age as of January 1, 1999						
Median	74 yr	72 yr	73 yr	74 yr	74 yr	75 yr
66–74 (%)	53.7	63.6	57.3	53.8	50.5	48.9
75–84 (%)	42.5	33.8	39.7	42.9	46.1	45.9
85+ (%)	3.9	2.6	3.0	3.3	3.5	5.3
Race						
Nonblack (%)	91.7	82.4	90.2	92.5	95.4	94.7
Black (%)	8.3	17.6	9.8	7.5	4.6	5.3
Gender						
Female (%)	2.0	2.3	2.1	1.9	1.9	2.1
Male (%)	98.0	97.7	97.9	98.1	98.1	97.9
VA priority level						
Low (%)	20.9	8.3	11.6	19.8	30.9	26.0
High (%)	79.1	91.7	88.4	80.2	69.1	74.0
Hierarchical condition category risk score						
Median	1.105	0.909	1.079	1.192	1.498	1.033
Low (%)	25.0	32.9	24.4	21.4	14.2	28.3
Medium–low (%)	25.0	28.8	26.7	24.5	20.7	24.8
Medium–high (%)	25.0	23.3	26.1	26.6	27.4	23.6
High (%)	25.0	15.0	22.9	27.4	37.7	23.3
Type of zip code						
Rural (%)	20.9	20.8	26.2	23.1	20.2	18.5
Urban (%)	79.1	79.2	73.8	76.9	79.8	81.5
Poverty level of zip code						
Low (%)	85.8	78.7	83.8	85.7	88.5	88.9
High (%)	14.2	21.3	16.2	14.3	11.5	11.1
Distance to nearest VA hospital						
Median	30 miles	18 miles	33 miles	36 miles	35 miles	30 miles
0–4.9 miles (%)	12.6	21.6	13.9	11.3	9.5	9.8
5–9.9 miles (%)	12.0	15.5	10.9	10.3	10.2	12.2
10–19.9 miles (%)	14.7	14.9	12.4	12.7	14.5	16.4
20–39.9 miles (%)	19.8	17.7	19.7	19.8	20.5	20.5
40+ miles (%)	40.9	30.3	43.1	46.1	45.4	41.1
Number of hospital beds in county						
Low (%)	25.0	24.0	32.1	27.9	24.2	22.3
Medium–Low (%)	25.0	20.5	25.3	27.1	26.6	25.5
Medium–high (%)	24.9	22.8	22.0	24.6	26.1	26.4
High (%)	25.1	32.8	20.6	20.4	23.1	25.8

\*Veterans who had 100% of their outpatient health care costs in the VA and none in Medicare.

†Veterans who had 75–99% of their outpatient health care costs in the VA and 1–25% in Medicare.

‡Veterans who had 26–74% of their outpatient health care costs in the VA and 26–74% in Medicare.

§Veterans who had 1–25% of their outpatient health care costs in the VA and 75–99% in Medicare.

¶Veterans who had none of their outpatient health care costs in the VA and 100% in Medicare.

**TABLE 2.** Adjusted Odds Ratios of Using Veterans Affairs (VA) or Medicare Outpatient Services\*

	VA Only, Mostly VA, Equally Dual, and Mostly Medicare Users Vs. Medicare-Only Users	VA Only, Mostly VA, and Equally Dual Users Vs. Mostly Medicare and Medicare-Only Users	VA Only and Mostly VA Users Vs. Equally Dual, Mostly Medicare, and Medicare-Only Users	VA-Only Users Vs. Mostly VA, Equally Dual, Mostly Medicare, and Medicare-Only Users
Age as of January 1, 1999				
66–74	Ref	Ref	Ref	Ref
75–84	0.71	0.70	0.67	0.64
85+	0.40	0.49	0.50	0.50
Race				
Nonblack	Ref	Ref	Ref	Ref
Black	1.85	2.09	2.22	2.32
Gender				
Female	Ref	Ref	Ref	Ref
Male	0.87	0.88	0.86	0.87
VA priority level				
Low	Ref	Ref	Ref	Ref
High	1.55	2.51	3.38	3.59
Hierarchical condition category risk score				
Low	Ref	Ref	Ref	Ref
Medium–low	1.28	1.04	0.93	0.84
Medium–high	1.43	0.94	0.76	0.63
High	1.42	0.65	0.46	0.33
Type of zip code				
Rural	Ref	Ref	Ref	Ref
Urban	0.83	0.80	0.76	0.78
Poverty level of zip code				
Low	Ref	Ref	Ref	Ref
High	1.19	1.23	1.25	1.28
Distance to nearest VA hospital				
0–4.9 miles	Ref	Ref	Ref	Ref
5–9.9 miles	0.73	0.73	0.73	0.73
10–19.9 miles	0.62	0.59	0.57	0.59
20–39.9 miles	0.61	0.54	0.48	0.47
40+ miles	0.54	0.44	0.34	0.30
Number of hospital beds in county				
Low	Ref	Ref	Ref	Ref
Medium–low	0.89	0.85	0.82	0.87
Medium–high	0.80	0.76	0.73	0.82
High	0.72	0.70	0.73	0.89

\*Odds ratios are also adjusted for a veteran's vital status and the Veterans Integrated Service Network of residence. No variables in this model met the parallel lines assumption; parallel lines were not imposed for any variable. All odds ratios are statistically significant at the  $P < 0.01$  level.

In our models, VA priority status was the strongest factor affecting an individual's reliance on VA care. A high priority designation in the VA means that 100% of veterans' health care services are covered by the VA; there are no copayments for any services, except medications for conditions unrelated to military service. The low priority designation has changed over time depending on the resources available in the VA budget. In 1999, although the VA offered services to all veterans, copayments were required for services provided to low-priority veterans, ie, those with higher incomes.<sup>23</sup> As VA copayments and income thresholds change, future research should consider the extent to which such changes impact the reliance on VA health care.

Second, we found that for outpatient and inpatient care, blacks were more likely to rely on the VA exclusively for their care beyond that explained by other factors. Blacks were also more likely to rely on some VA care even when they used Medicare services. Consistent with previous survey research that blacks, compared with nonblacks, are more likely to prefer VA to non-VA providers for their outpatient care,<sup>36,37</sup> this result suggests that policy initiatives aimed at restructuring VA services may disproportionately affect black veterans. Paradoxically, since 2004, the VA's ability to monitor racial disparities has been hampered by poor data quality on race and ethnicity of its patients. As a result of implementation of an Office of Management and Budget (OMB)

**TABLE 3.** Characteristics of Users of Veterans Affairs (VA) or Medicare Inpatient Services

	Total	VA Only*	Dual†	Medicare Only‡
Total (n)	416,455	102,234 (24.5%)	26,591 (6.4%)	287,630 (69.1%)
Mean admissions				
VA	0.50	1.58	1.71	0.00
Medicare	1.29	0.00	1.75	1.71
Total	1.79	1.58	3.46	1.71
Median payments				
VA	\$0	\$8411	\$9985	\$0
Medicare	\$6213	\$0	\$8510	\$9738
Total	\$10,116	\$8411	\$24,206	\$9738
Mean payments				
VA	\$5302	\$16,646	\$19,038	\$0
Medicare	\$11,780	\$0	\$15,630	\$15,612
Total	\$17,082	\$16,646	\$34,668	\$15,612
Age as of January 1, 1999				
Median	75 yr	74 yr	75 yr	75 yr
66–74 (%)	47.9	53.5	49.3	45.8
75–84 (%)	46.8	41.6	45.5	48.7
85+ (%)	5.4	4.9	5.2	5.5
Race				
Nonblack (%)	91.0	84.8	85.7	93.7
Black (%)	9.0	15.2	14.3	6.3
Gender				
Female (%)	2.0	2.1	1.9	1.9
Male (%)	98.0	97.9	98.1	98.1
VA priority level				
Low (%)	16.5	5.0	5.6	21.6
High (%)	83.5	95.0	94.4	78.4
Hierarchical condition category risk score				
Median	2.303	2.004	3.441	2.329
Low (%)	25.0	31.6	7.8	24.4
Medium–low (%)	25.0	27.2	16.5	25.0
Medium–high (%)	25.0	24.5	26.7	24.9
High (%)	25.0	16.7	49.0	25.7
Type of zip code				
Rural (%)	21.1	22.0	23.2	20.5
Urban (%)	78.9	78.0	76.8	79.5
Poverty level of zip code				
Low (%)	84.7	79.7	80.3	86.9
High (%)	15.3	20.3	19.7	13.1
Distance to nearest VA hospital				
Median	29 miles	16 miles	27 miles	34 miles
0–4.9 miles (%)	13.4	23.3	16.4	9.6
5–9.9 miles (%)	12.1	15.7	12.9	10.8
10–19.9 miles (%)	14.5	15.0	13.6	14.5
20–39.9 miles (%)	19.5	17.9	18.1	20.3
40+ miles (%)	40.4	28.2	39.0	44.8
Number of hospital beds in county				
Low (%)	25.5	26.8	28.9	24.6
Medium–low (%)	24.6	20.3	23.8	26.3
Medium–high (%)	24.4	22.1	21.1	25.6
High (%)	25.5	30.8	26.2	23.5

\*Veterans who had 100% of their inpatient health care costs in the VA and none in Medicare.

†Veterans who had 1–99% of their inpatient health care costs in the VA and 1–99% in Medicare.

‡Veterans who had none of their inpatient health care costs in the VA and 100% in Medicare.

**TABLE 4.** Adjusted Odds Ratios of Using Veterans Affairs (VA) or Medicare Inpatient Services\*

	VA Only and Dual Users Vs. Medicare-Only Users	VA-Only Users Vs. Dual and Medicare-Only Users
Age as of January 1, 1999		
66–74	Ref	Ref
75–84	0.71	0.72
85+	0.63	0.65
Race		
Nonblack	Ref	Ref
Black	1.98	1.87
Gender		
Female	Ref	Ref
Male	0.85	0.89
VA priority level		
Low	Ref	Ref
High†	5.19	5.19
Hierarchical condition category risk score		
Low	Ref	Ref
Medium–low	0.87	0.76
Medium–high	0.80	0.60
High	0.63	0.31
Type of zip code		
Rural	Ref	Ref
Urban†	0.73	0.73
Poverty level of zip code		
Low	Ref	Ref
High	1.20	1.18
Distance to nearest VA hospital		
0–4.9 miles	Ref	Ref
5–9.9 miles†	0.66	0.66
10–19.9 miles†	0.46	0.46
20–39.9 miles	0.31	0.31
40+ miles	0.18	0.17
Number of hospital beds in county		
Low	Ref	Ref
Medium–low†	0.73	0.73
Medium–high	0.61	0.62
High	0.59	0.61

\*Odds ratios are also adjusted for a veteran's vital status and the Veterans Integrated Service Network of residence. All odds ratios are statistically significant at the  $P < 0.01$  level.

†These variables met the parallel lines assumption; parallel lines were imposed for these variables across all outcomes.

mandate that all race and ethnicity data be self-reported in a new format,<sup>38,39</sup> the response rate plummeted in 2004 and is missing for the majority of patients.<sup>40</sup> New approaches are needed to minimize response burden and to improve accuracy for race and ethnicity data, (eg,<sup>41</sup>), in particular to evaluate efforts aimed at addressing racial and ethnic disparities in reliance on VA and Medicare services.

Patients' health status as measured by the risk (HCC) score was also a very strong predictor of VA reliance. The

higher risk patients were more likely to be dual users than to use one system of care exclusively for either inpatient or outpatient care. These results imply that there is an unmet need for services in the Medicare system among dually eligible high-risk veterans. Patients in the high-risk group may, for example, be more likely to have emergency or unscheduled hospital admissions or specialty care, for which private sector hospitals provide needed or preferred resources. The role of patient preferences also warrants study. Additionally, as research in specific disease populations has begun to show, the dynamics of access to care may differ across chronic disease populations. For example, for patients with service-connected mental health conditions, the course of illness differs from that of patients with end-stage renal disease, in which resources and benefit programs and extent of coverage in VA and Medicare differ markedly.<sup>4,42</sup> Future research and policy initiatives should consider the differential effects that policy changes might have on patient choice within specific chronic disease populations, especially those with multiple comorbidities and complex chronic illnesses.

Finally, these multivariate results go beyond previous research by showing how multiple factors affect the likelihood of elderly veterans' use of VA, Medicare, or both systems of health care to meet their needs. Although previous studies of health care use have examined some of these factors for explaining VA health care use using historical survey data<sup>14</sup> and population models,<sup>16</sup> our study examined more current and comprehensive VA and Medicare use. Other studies that have examined VA and Medicare use are now dated as a result of changes in VA health care enrollment policies since 1998,<sup>23</sup> have relied on patient self-report for health care use,<sup>14</sup> or have lacked detailed claims data for non-VA health care use.<sup>43</sup> In this study, we used detailed 1999 VA health care utilization and Medicare claims data to identify specific types of health care use.

There are limitations to our study. First, because we focused on calendar year 1999, we did not measure patients' prior health care experience with the VA or Medicare. We limited our cohort to only those patients who were already eligible for Medicare (that is, those at least 66 years and older). Second, because only calendar year 1999 data were available for both the VA and Medicare, we measured the concurrent risk scores to indicate health status of veterans. However, because both VA and Medicare data include disease coding that also accounts for existing conditions, we expect the impact on our results to be minimal. As future years of data are made available, prospective and concurrent risk status can be measured. It is possible that we may have miscategorized some outpatient dual users as a result of imprecision in the cost valuations; however, the impact is likely minimal because the valuation approach for VA outpatient care is similar to Medicare reimbursement.<sup>19,44,45</sup> Finally, although other access factors such as patient preferences for VA care and waiting times may warrant study, lacking the requisite current national survey and linked health care use data, we focused our study on the available patient, geographic, and environmental access to care factors linked with the detailed VA and Medicare health care use data.

## CONCLUSION

This study is among the first to examine the effects of multiple factors on access to and use of health care for elderly veterans who are dually eligible for VA and Medicare, the 2 largest health care programs in the United States. Reliance on VA health care is greatest among high VA priority and black veterans; constraints in the VA health care budgets that might limit resources or increase copayments may have the greatest impact on these groups, especially if the VA is providing a safety net for these patients. Patients in the highest health risk groups are most likely to rely on both VA and Medicare health care systems, and they may be most vulnerable to changes in health care benefits that would force them to choose one system or the other. Targeted approaches that consider the simultaneous impacts of VA and Medicare system policy changes on highly vulnerable groups are essential in ensuring that our nation's veterans continue to have access to needed health care.

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## REFERENCES

1. Wright S, Daley J, Elliott S, et al. Where do elderly veterans obtain care for acute myocardial infarction: Department of Veterans Affairs or Medicare? *Health Serv Res.* 1997;31:739–754.
2. Borowsky S, Cowper D. Dual use of VA and non-VA primary care. *J Gen Intern Med.* 2005;14:274–280.
3. Hynes D, Stroupe K, Greer J, et al. Potential cost savings of erythropoietin administration in end-stage renal disease. *Am J Med.* 2002;112:169–175.
4. Desai R, Rosenheck R. The impact of managed care on cross-system use of mental health services by veterans in Colorado. *Psychiatr Serv.* 2002;53:1599–1604.
5. US General Accounting Office. *Veterans' Health care: Use of VA Services by Medicare Eligible Veterans.* US GAO/HEHS-95-13. October 24, 1994.
6. Mooney C, Zwanziger J, Phibbs C, et al. Is travel distance a barrier to veterans' use of VA hospitals for medical surgical care? *Soc Sci Med.* 2000;50:1743–1755.
7. Weeks W, Bott D, Lamkin R, et al. Veterans Health Administration and Medicare outpatient health care utilization by older rural and urban New England veterans. *J Rural Health.* 2005;Spring:167–171.
8. Hoff R, Rosenheck R. Cross-system service use among psychiatric patients: data from the Department of Veterans Affairs. *J Behav Health Serv Res.* 2000;27:98–106.
9. Weaver F, Hynes D, Hopkinson W, et al. Preoperative risks and outcomes of hip and knee arthroplasty in the Veterans Health Administration. *J Arthroplasty.* 2003;18:693–708.
10. Liu C, Maciejewski M, Sales A. Changes in characteristics of veterans using the VHA health care system between 1996 and 1999. *Health Res Policy Syst.* 2005;3:5.
11. Hynes D, Bastian L, Feussner J. Predictors of use of mammography among women veterans. *J Womens Health.* 1998;7:239–247.
12. Jonk Y, Thiede CY. Health care coverage and access to care. The status of Minnesota's veterans. *Med Care.* 2005;43:769–774.
13. US General Accounting Office. *Veterans Health care: How Distance From VA Facilities Affect Veterans' Use of VA Services.* GAO/HEHS-96-12/20/1995. 1995.
14. Lahiri K, Xing G. An Econometric analysis of veterans health care utilization using two-part models. *Empirical Economics.* 2004;29:431–449.
15. Burgess J, DeFiore D. The effect of distance to VA facilities on the choice and level of utilization of VA outpatient services. *Soc Sci Med.* 1994;39:95–104.
16. Smith M, Sheldon G, Klien R, et al. Data and information requirements for determining veterans' access to health care. *Med Care.* 1996;34:MS45–MS54.
17. Fleming C, Fisher E, Chang C, et al. The advantages of a merged data base for Medicare and Veterans Affairs hospitals. *Med Care.* 1992;30:377–391.
18. VIREC. Research Findings from the VA Medicare Data Merge Initiative: Veterans Enrollment, Access and Use of Medicare and VA Health Services (XVA 69-001). Report to the Under Secretary for Health, Department of Veterans Affairs, 2003. Available at: [www.virec.research.va.gov/DataSourcesName/VA-MedicareData/USHreport.pdf](http://www.virec.research.va.gov/DataSourcesName/VA-MedicareData/USHreport.pdf). Accessed March 15, 2006.
19. Phibbs CS, Bhandari A, Yu W, et al. Estimating the costs of VA ambulatory care. *Med Care Res Rev.* 2003;60:54S–73S.
20. Wagner TH, Chen S, Barnett PG. Using average cost methods to estimate encounter-level costs for medical–surgical stays in the VA. *Med Care Res Rev.* 2003;60:15S–36S.
21. Anderson R, Newman J. Societal and individual determinants of medical care utilization in the United States. *Milbank Memorial Fund Quarterly.* 1973;51:95–124.
22. Anderson R. Revisiting the behavioral model and access to medical care: does it matter? *J Health Soc Behav.* 1995;36:1–10.
23. US General Accounting Office. *Progress and Challenges in Providing Care to Veterans.* GAO/T-HEHS-99-158. 1999.
24. Arday S, Arday D, Monroe S, et al. HCFA's racial and ethnic data: current accuracy and recent improvements. *Health Care Financing Review.* 2000;21:107–116.
25. Boehmer U, Kressin N, Berlowitz D, et al. Self-reported vs administrative race/ethnicity data and study results. *Am J Public Health.* 2002;92:1471–1473.
26. Ash A, Ellis R, Pope G, et al. Using diagnoses to describe populations and predict costs. *Health Care Financing Review.* 2000;21:7–28.
27. McCall N, Korb J. Risk adjustment for dually eligible beneficiaries using long-term care. *Health Care Financing Review.* 1998;20:71–90.
28. Pope G, Kautter J, Ellis R, et al. Risk adjustment of Medicare capitation payments using the CMS-HCC model. *Health Care Financing Review.* 2004;25:119–141.
29. Department of Veterans Affairs, Veterans Health Administration, Office of the Under Secretary for Health for Policy and Planning, Planning System Support Group. *FY2003 Geographic Access to Veterans Health Administration Services.* August 2005.
30. US Department of Health and Human Services, Health Resources Service Administration, Bureau of Health Professions. National Center for Health Workforce Analysis. Area Resource File (ARF). 2001. Available at: [www.arfsys.com/](http://www.arfsys.com/). Accessed March 15, 2006.
31. Williams R. Generalized ordered logit/partial proportional odds models for ordinal dependent variables. *The Stata Journal.* 2006;6:58–82. Available at: [www.nd.edu/~rwilliam/gologit2/gologit2.pdf](http://www.nd.edu/~rwilliam/gologit2/gologit2.pdf). Accessed March 15, 2006.
32. Fu V. Estimating generalized ordered logit models. *Stata Technical Bulletin.* 1998;8:160–164.
33. *Stata Statistical Software: Release 8.0.* College Station, TX: Stata Corp; 2003.
34. Hausman J, McFadden D. Specification tests for the multinomial logit model. *Econometrica.* 1984;52:1219–1240.
35. Kennedy P. *A Guide to Econometrics.* Cambridge, MA: MIT Press; 1998.
36. Washington D, Harada N, Villa V, et al. Racial variations in Department of Veterans Affairs. *Mil Med.* 2002;167:235–241.
37. Harada N, Pourat N. Does membership in veterans' service organizations influence use of the Department of Veterans Affairs as the usual source of care? *Mil Med.* 2004;169:735–740.
38. Friedman D, Cohen B, Averbach A, et al. Race/ethnicity and OMB directive 15: implications for state public health practice. *Am J Public Health.* 2000;90:1714–1719.
39. US Department of Veterans Affairs. VHA Directive 2003-027. *Capture of Race and Ethnicity Categories.* May 29, 2003.
40. Sohn MW, Zhang H, Arnold N, et al. Transition to the new race/ethnicity data collection standards in the Department of Veterans Af-

- fares. *Population Health Metrics*. 2006;4:7. Available at: <http://www.pophealthmetrics.com/content/4/1/7>.
41. Baker D, Cameron K, Feinglass J, et al. A system for rapidly and accurately collecting patients' race and ethnicity. *Am J Public Health*. 2006;96:532–537.
  42. Hynes DM, Stroupe K, Browning M, et al. Chronic care delivery in end stage renal disease: adherence to clinical guidelines for anemia management. *Am J Kidney Dis*. 2006;47:455–461.
  43. Peterson L, Normand S, Leape L, et al. Regionalization and the underuse of angiography in the Veterans Affairs health care system as compared with a fee-for-service system. *N Engl J Med*. 2005;348:2209–2217.
  44. Hynes DM, Reda D, Henderson W, et al. Measuring costs in multi-site randomized controlled trials: lessons from the VA Cooperative Studies Program. *Med Care*. 1999;37:AS27–AS36.
  45. Nugent G, Hendricks A. The cost of VA care: lessons of the evaluating VA costs study. *Med Care*. 2003;41(suppl):II-2-9.