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RESEARCH ARTICLE

Use of VA and Medicare Services By Dually Eligible Veterans with Psychiatric Problems

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Objective. To examine how service accessibility measured by geographic distance affects service sector choices for veterans who are dually eligible for veterans affairs (VA) and Medicare services and who are diagnosed with mental health and/or substance abuse (MH/SA) disorders.

Data Sources. Primary VA data sources were the Patient Treatment (acute care), Extended Care (long-term care), and Outpatient Clinic files. VA cost data were obtained from (1) inpatient and outpatient cost files developed by the VA Health Economics and Resource Center and (2) outpatient VA Decision Support System files. Medicare data sources were the denominator, Medicare Provider Analysis Review (MEDPAR), Provider-of-Service, Outpatient Standard Analytic and Physician/Supplier Standard Analytic files. Additional sources included the Area Resource File and Census Bureau data.

Study Design. We identified dually eligible veterans who had either an inpatient or outpatient MH/SA diagnosis in the VA system during fiscal year (FY)'99. We then estimated one- and two-part regression models to explain the effects of geographic distance on both VA and Medicare total and MH/SA costs.

Principal Findings. Results provide evidence for substitution between the VA and Medicare, demonstrating that poorer geographic access to VA inpatient and outpatient clinics decreased VA expenditures but increased Medicare expenditures, while poorer access to Medicare-certified general and psychiatric hospitals decreased Medicare expenditures but increased VA expenditures.

Conclusions. As geographic distance to VA medical facility increases, Medicare plays an increasingly important role in providing mental health services to veterans.

Key Words. Veterans, Medicare, expenditures, mental health and substance abuse

Non-VA services may provide an important alternative to veterans affairs (VA) services for VA patients who are eligible for Medicare coverage, especially in areas with poor geographic access to the VA. As Medicare and the VA are legally prohibited from billing each other for services provided to

dually eligible veterans, cost-shifting may occur, especially as the population ages and increasingly more veterans become Medicare eligible. It is of strong interest to understand which VA patients are also obtaining services outside of the VA and how their outside utilization responds to the allocation of VA resources. That is, where access to VA services becomes more limited, do dually eligible veterans increasingly turn to the Medicare sector for their care (substitution), or do they actually receive fewer Medicare services, e.g., due to fewer VA referrals (complementarity)?

Veterans 65 and older use Medicare for their medical care (Borowsky and Cowper 1999; Wright et al. 1999; Weeks et al. 2005, 2006), but only one previous study, limited to elderly veterans in northern New England (Weeks et al. 2005), has examined use of Medicare for behavioral health care among dually eligible veterans. The question of cost-shifting and substitution is particularly interesting for veterans with mental health and substance abuse (MH/SA) disorders. The prevalence of mental disorders is generally higher in the VA than in other health care systems, with approximately 29 percent of veterans having at least one MH/SA disorder (Hankin et al. 1999; Piette, Baisden, and Moos 1999). Psychiatric comorbidities are common as well.

Although the VA is sometimes viewed as a "provider of last resort" for medical care, due to its limited choice of providers and lack of resources, the limitations of Medicare coverage on behavioral health care (Ettner 1997), in conjunction with the wide array of services provided by VA in this area, makes the VA an indispensable source of care for many veterans with behavioral health problems. The VA operates the largest mental health service delivery system in the nation, servicing over 900,000 veterans annually at a cost of more than $2.5 billion. Special emphasis programs target populations including the severely mentally ill, the homeless, and those with posttraumatic stress disorder (PTSD) and SA problems. Furthermore, the VA provides more

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comprehensive prescription drug coverage than Medicare, so patients have a strong financial incentive to receive pharmacotherapy from VA providers. Yet, the greater relative distance to VA versus Medicare providers may impede some veterans from taking advantage of VA's unique MH/SA services.

Proximity to care has been shown to influence medical utilization in the general population (Nemet and Bailey 2000; Shahain et al. 2000; Arcury et al. 2005) as well as in the VA (Mooney et al. 2000; Fortney et al. 2005). For mental health care, earlier studies found that VA patients living further from VA facilities used fewer VA resources (Fortney et al. 1995, 1998; Rosenheck and Stolar 1998; Druss and Rosenheck 2000), but were unable to determine whether the reduction in the use of VA services was offset by increased Medicare utilization. Another paper found that rural veterans experience changes in policy that restrict access to SA services more dramatically than urban veterans, without substituting private-sector care (Wallace et al. 2007). Similarly, studies have identified a role of distance to provider in determining treatment patterns of Medicare patients with psychiatric conditions (Ettner and Hermann 1997; Ettner 1999; Ettner, Hermann, and Tang 1999), but did not look at crossover between the VA and Medicare among patients who had a choice between the two. A recent study showed that dual eligibles who lived farther from VA hospitals were less likely to rely on VA health care, particularly inpatient care (Hynes et al. 2007). However, this study focused on patient characteristics and did not examine behavioral health care.

This research uses a national linked VA-Medicare database to examine health care sector choices among VA patients diagnosed with MH/SA disorders who are dually eligible for Medicare. We focus on the effects of geographic proximity to care on utilization of services in each sector. Our goal is to establish whether veterans with more limited geographic access to VA behavioral health services reduce their utilization of these services and whether their use of Medicare behavioral health services increases or decreases concomitantly. This issue has important policy implications regarding allocation of MH/SA resources within the VA system. If Medicare behavioral health care serves as a substitute for VA care, then an understanding of the nature of the cost-shifting involved is important information for VA managers in their budget allocation decisions. If Medicare services are complementary to VA services, then the VA may need to increase its outreach efforts to identify veterans who are in need of behavioral care but not receiving it.

METHODS

Sample

We identified veterans who had a primary or secondary MH/SA diagnosis (International Classification of Diseases 9th Revision Clinical Modification [ICD-9-CM] codes 290-312.9 or 316) on any VA inpatient or outpatient claim during FY'99 (October 1, 1998 to September 30, 1999). After excluding patients with dental or telephone service use only, those younger than 18 or older than 112, and nonveterans, there were 914,225 individuals, or 29.6 percent of all veterans who received VA services during FY'99.

In order to examine substitutability across sectors, we further limited the study cohort to veterans who were dually eligible for Medicare, reducing our sample to 453,688 veterans. Our sample was further restricted to dual eligibles enrolled in the Medicare fee-for-service program who had continuous Parts A and B coverage during FY'99, although beneficiaries who died during the year were retained. All analyses were stratified according to whether Medicare eligibility was based on age (with or without disability) or on disability only.

Databases

FY'99 data were obtained from VA and Medicare files and other sources of data on practitioner supply. For the VA, our primary data sources were the Patient Treatment File (PTF) (acute care), the Extended Care File (ECF) (long-term care), and the Outpatient Clinic File (OPC). Information on date of death was obtained from the Beneficiary Identification and Record Locator Subsystem (BIRLS) file. Planning Systems Support Group (PSSG) data from Systems Planning and Analysis (SPA) was used to obtain information on the location of VA facilities. Facility-level data on the number of general practitioners, psychiatrists, and other mental health professionals was obtained from the VHA Support Service Center database (KLF).

The VA does not generate bills for health care services, so we used two secondary sources to obtain VA cost data: (1) inpatient and outpatient cost files developed by the VA Health Economics and Resource Center (HERC) and (2) outpatient VA Decision Support System (DSS) files. HERC developed its own methodology for estimating costs by combining VA cost and utilization databases with non-VA measures of relative value from the Medicare Provider Analysis Review (MEDPAR) file (Barnett and Wagner 2003; Wagner and Barnett 2003). Average costs were estimated differently for acute and nonacute hospitalizations in order to achieve comparability with MEDPAR, which contains only acute hospitalizations (Wagner and Barnett 2003).

Because HERC estimated only inpatient pharmacy costs, DSS files were used to obtain outpatient pharmacy cost data. DSS is an automated management information system that combines health care utilization and cost data for outpatient care at the patient encounter level.

Medicare inpatient claims were obtained from the MEDPAR file and outpatient claims from the Medicare Outpatient and Physician/Supplier Standard Analytic Files. Pharmacy data for Medicare patients were unavailable. The Medicare Provider-of-Service file was used to obtain information on the distance between the patient's zip code of residence and Medicare providers. We also linked our data to the Area Resource File to obtain information on the numbers of general practitioners, psychiatrists, and residents per county, and data from the Bureau of Labor Statistics (BLS) on the numbers of clinical psychologists, social workers, and MH/SA counselors per state.

Dependent Variables: Total Costs and MH/SA Costs

Total expenditures included all acute and nonacute inpatient and outpatient utilization. Total VA expenditures also included all inpatient and outpatient pharmacy costs. MH/SA expenditures included all inpatient and outpatient MH/SA expenditures and (for the VA only) all inpatient pharmacy expenditures. Because the DSS (outpatient) pharmacy files do not contain information on specific type of medication, we could not distinguish psychotropic from other drugs and therefore included all VA outpatient pharmacy in total expenditures only.

MH/SA inpatient utilization in the VA was identified by bedsection codes indicating any psychiatric or substance abuse treatment. Similarly, MH/SA outpatient utilization in the VA was defined by any specialty outpatient clinic stop code indicating psychiatric or substance abuse treatment or by any nonspecialty clinic stop code for which a MH/SA diagnosis had been assigned. We used national (rather than facility-specific) rates to estimate expenditures to eliminate geographic differences in prices and wages. Because an acute hospitalization could overlap fiscal years, we prorated expenditures according to the ratio of fiscal year days to the total. Expenditures were imputed for the 1.7 percent of patients who were not in the HERC files, because either they were still hospitalized or had been admitted to the hospital before FY'98. Finally, we annualized expenditures for patients who died during the fiscal year.

To construct Medicare expenditures, we summed the payments made to providers by beneficiaries, the Medicare program, and the primary payer

(if it was different from Medicare). Expenditures for a particular claim were allocated to MH/SA versus medical based on whether a psychiatric diagnosis was coded on the claim. As with the VA-dependent variables, we prorated expenditures for overlapping fiscal years, and annualized expenditures for deceased patients.

Independent Variables

The main covariates in the analysis were distances to the closest VA inpatient medical facility, inpatient MH facility, outpatient medical facility, and outpatient MH facility; and distances to the nearest Medicare inpatient medical facility and inpatient MH facility. We measured distance as the straight line distance in miles between zip code centroids associated with the facilities and the patient's residence (Fortney, Rost, and Warren 2000). VA mental health facilities were defined as VA health care facilities in which patients in our cohort received mental health care services. Medicare mental health facilities were defined as Medicare psychiatric or drug/alcohol facilities or short-term facilities having a psychiatric unit selected from the Provider-of-Service File. To account for nonlinear effects, all regressions included squared terms as well as the main effects for each distance measure.

Owing to the potential for confounding, we also controlled for the following measures of practitioners per million state residents: VA general practitioners, VA psychiatrists, VA psychologists, other VA MH professionals (social workers, allied MH assistants, and students/trainees), general practice physicians, psychiatrists, psychologists (including clinical, counseling, and school), and other MH professionals (social workers and MH/SA counselors).

Patient-level covariates included sex-age category; race/ethnicity (white, black, Asian, Native American, Latino, and unknown); whether the VA "priority group" required copayments; and case mix. Race/ethnicity was obtained from the VA files, or in the case of missing or unknown values, from the Medicare files. Patient case mix was measured using ICD-9-CM diagnosis codes from FY'99 inpatient and outpatient claims. To classify medical diagnoses, we used version 5.01 of the adjusted clinical groups (ACGs) (Wahls, Barnett, and Rosenthal 2004). A total of 29 adjusted diagnosis groups (ADGs), components of the ACG model, were used (three psychosocial ADGs were excluded). To classify MH/SA diagnoses, we used the PsyCMS, a psychiatric case-mix system developed specifically to predict costs/utilization of VA patients with MH/SA diagnoses (Rosen et al. 2006; Sloan et al. 2006).

To eliminate rule-out diagnoses, we limited ambulatory diagnoses to those from provider encounters.

Data Analysis

We fit one-part regression models for VA expenditures, using ordinary least squares (OLS) regression with a square root transformation to address skewness in the distribution while permitting expenditures to take on zero values. Montez-Rath et al. (2006) also found the square root transformation to be preferred in predictive models of MH/SA expenditures. To avoid retransformation bias in generating expenditure predictions (Manning 1998), the average value of the squared residuals (Duan et al. 1983) was added to the square of the predicted latent index Xb, where X is the covariate matrix and b is the vector of parameter estimates.

Because many Medicare-eligible veterans do not utilize Medicare benefits, we fit two-part regression models for Medicare total and MH/SA expenditures. The first part estimated the probability of positive expenditures using logistic regression. The second part estimated the level of expenditures among the subsample of patients with any expenditures, using OLS regression of the square root-transformed outcome. The final predictions for the two-part models are the estimated probabilities of having any expenditures times predicted conditional expenditures.

For both VA and Medicare, we used weighted regressions of annualized costs. Covariates were identical in all models except age-sex categories, which depended on whether the elderly or disabled were analyzed. Generalized estimating equations (Liang and Zeger 1986) with an independent covariance structure were used to account for hospital-level clustering.

Predictive margins (PMs) were computed for each distance variable evaluated at the 25th and 75th percentiles of the distribution, with the quadratic terms reset appropriately. The PMs indicate the average of the predicted expenditure changes across the entire sample if patients moved from the 25th to the 75th percentile of the corresponding distance variable, holding all of the other covariates constant at their original values. Significance was evaluated by computing 99 percent bias-corrected empirical confidence intervals, using bootstrapping with 1,000 replications; resampling took the data structure into account by sampling from hospitals. Analyses were performed using *Stata/SE* (version 7.0) (Stata Corporation, College Station, TX) and the *Statistical Analysis System* (*SAS*), version 8.01 (SAS Institute, Cary, NC).

RESULTS

Descriptive Statistics

In results not shown in the tables, both the Medicare elderly and Medicare disabled subsamples are primarily composed of male (98 and 96 percent, respectively) and non-Hispanic white (85 and 75 percent) veterans. Only 2.3 percent of disabled veterans and 7.4 percent of aged veterans faced copayments. Nearly 50 percent of the disabled group is in the 45–54 age bracket. On average, the distances to VA health care facilities are much greater than to Medicare facilities. For inpatient care, there is nearly a 10-fold difference (39.3 versus 4.3 miles) and for inpatient MH care, approximately a fourfold difference (41.5 versus 11.6 miles). This disparity is offset somewhat by the proximity of VA outpatient care, which on average is only about one-third as far as the nearest VA inpatient facility (13.8 versus 39.3 miles).

Table 1 summarizes mean total and MH/SA expenditures in each sector, conditional on positive expenditures in that sector. Seventy-one percent of aged veterans had any Medicare expenditures, compared with 58 percent of disabled veterans. In both sectors, disabled veterans were slightly more likely than elderly veterans to use any MH/SA services (98 versus 94 percent for the VA and 28 versus 22 percent for Medicare). Among veterans who used VA MH/SA services, the disabled had almost three times the level of mean expenditures as the elderly ($4,496 versus $1,636). Among veterans using

Table 1: VA and Medicare Expenditures for Dually Eligible Patients

	Basis of Medicare Eligibility			
	Aged (N= 166,223)		*Disabled (N= 98,396)*	
Dependent Variable	*# Patients (%) with Positive Expenditures*	*Conditional Mean (SD)*	*# Patients (%) with Positive Expenditures*	*Conditional Mean (SD)*
Total VA expenditures	166,223 (100%)	$11,528 ($25,336)	98,396 (100%)	$10,588 ($23,653)
Total Medicare expenditures	117,217 (71%)	$6,336* ($13,423)	57,184 (58%)	$5,936* ($14,049)
VA MH/SA expenditures	155,803 (94%)	$1,636* ($11,136)	96,425 (98%)	$4,496* ($16,676)
Medicare MH/SA expenditures	36,856 (22%)	$5,023 ($10,738)	27,137 (28%)	$4,014 ($8,392)

*Conditional averages based on the subset of patients with positive expenditures.

VA, veterans affairs; MH/SA, mental health and/or substance abuse.

Medicare MH/SA services, the elderly had about 25 percent higher expenditures than the disabled ($5,023 versus $4,014).

Regression Analyses

The effects of the geographic access measures on total expenditures are summarized in Table 2A for aged veterans and Table 2B for disabled veterans; effects on MH/SA expenditures are shown in Tables 3A and 3B.

Total Expenditures. Based on the measures of distance to inpatient but not outpatient facilities, Table 2A provides some evidence to support the hypothesis of substitution between VA and Medicare. For VA expenditures,

Table 2A: Effect of Access Measures on Total Expenditures for the Aged

	Percentile		*Total VA Expenditures*†		*Total Medicare Expenditures*‡	
Explanatory Variables	*25th*	*75th*	*PM($)*§	*99% CI*¶	*PM($)*§	*99% CI*¶
Distance to nearest Medicare inpatient facility	0.0	6.3	76	(−16, 174)	−141*	(−185, −94)
Distance to nearest Medicare inpatient MH facility	1.8	16.8	506*	(408, 614)	−244*	(−297, −194)
Distance to nearest VA inpatient medical facility	7.2	55.0	−1,278*	(−1,447, −1,133)	543*	(459, 622)
Distance to nearest VA inpatient MH facility	8.1	62.3	−1,913*	(−2,114, −1,693)	570*	(466, 688)
Distance to nearest VA outpatient medical facility	3.3	20.8	163	(0, 294)	−19	(−92, 42)
Distance to nearest VA outpatient MH facility	4.2	30.9	−123	(−286, 40)	−126*	(−198, −37)

*Significant at the .01 level.

†Based on a one-part model final estimates (after retransformation).

‡Based on a two-part model final estimates (unconditional: taking into account both parts, and after retransformation).

§Predictive margin: estimated average increase or decrease in expenditures when changing the value of the access measure from the 25th to the 75th percentile, holding the other covariate values constant. Covariates include practitioner density, age-sex category, race/ethnicity, VA copayment requirement, and case mix.

¶Bias corrected empirical bootstrap confidence interval at the 0.01 level.

VA, veterans affairs; MH, mental health.

Table 2B: Effect of Access Measures on Total Expenditures for the Disabled

	Percentile		*Total VA Expenditures*[†]		*Total Medicare Expenditures*[‡]	
Explanatory Variables	*25th*	*75th*	*PM($)*[§]	*99% CI*[¶]	*PM($)*[§]	*99% CI*[¶]
Distance to nearest Medicare inpatient facility	0.0	6.0	76	(−25, 184)	−153*	(−204, −106)
Distance to nearest Medicare inpatient MH facility	1.6	15.5	370*	(263, 465)	−236*	(−285, −193)
Distance to nearest VA inpatient medical facility	6.9	55.8	−425*	(−634, −217)	265*	(174, 365)
Distance to nearest VA inpatient MH facility	7.5	62.5	−1,856*	(−2,129, −1,592)	338*	(212, 471)
Distance to nearest VA outpatient medical facility	3.1	19.8	73	(−95, 208)	16	(−49, 82)
Distance to nearest VA outpatient MH facility	4.0	29.0	−202*	(−407, −29)	9	(−69, 99)

*Significant at the .01 level.

[†]Based on a one-part model final estimates (after retransformation).

[‡]Based on a two-part model final estimates (unconditional: taking into account both parts, and after retransformation).

[§]Predictive margin: estimated average increase or decrease in expenditures when changing the value of the access measure from the 25th to the 75th percentile, holding the other covariate values constant. Covariates include practitioner density, age-sex category, race/ethnicity, VA copayment requirement, and case mix.

[¶]Bias corrected empirical bootstrap confidence interval at the .01 level.

VA, veterans affairs.

the PM associated with distance to a Medicare inpatient facility is $76, although we cannot reject the null hypothesis of a zero effect. The interpretation is that after adjusting for observable covariates, VA expenditures are expected to be $76 greater on average if veterans lived 6.3 versus 0 miles (i.e., within the same zip code) away from a Medicare inpatient facility, reflecting the difference in distance between the 75th and 25th percentiles. In contrast, an increase in distance from a Medicare inpatient facility from 0 to 6.3 miles is associated with a significant average regression-adjusted decrease in total Medicare expenditures of $141. For distance to the nearest Medicare inpatient MH facility, the PMs are again statistically significant and more pronounced in magnitude: $506 higher VA expenditures and $244 lower Medicare expenditures.

The pattern of total expenditures associated with greater distance to VA inpatient facilities similarly suggests that there is substitution between VA and Medicare services: greater distance to VA inpatient facilities (both medical and MH/SA) significantly lowers VA and increases Medicare expenditures. However, we do not observe this pattern of substitution with regard to distance to VA outpatient facilities, for which results are generally insignificant. Table 2B displays the same estimates for the disabled dually eligible veterans. Results are similar, except that for disabled veterans, the distance to VA outpatient mental health care does appear to matter slightly. A move from 4.0 to 29.0 miles from the nearest outpatient MH facility results in a significant regression-adjusted average decrease of $202 in VA

Table 3A: Effect of Access Measures on MH/SA Expenditures for the Aged

	Percentile		*VA MH/SA Expenditures*†		*Medicare MH/SA Expenditures*‡	
Explanatory Variables	*25th*	*75th*	*PM($)*§	*99% CI*¶	*PM($)*§	*99% CI*¶
Distance to nearest Medicare inpatient facility	0.0	6.3	3	(−8, 15)	−54*	(−78, −28)
Distance to nearest Medicare inpatient MH facility	1.8	16.8	15*	(2, 27)	−72*	(−96, −52)
Distance to nearest VA inpatient medical facility	7.2	55.0	6	(−8, 19)	122*	(78, 158)
Distance to nearest VA inpatient MH facility	8.1	62.3	−146*	(−170, −123)	138*	(92, 190)
Distance to nearest VA outpatient medical facility	3.3	20.8	−11	(−30, 4)	−6	(−37, 28)
Distance to nearest VA outpatient MH facility	4.2	30.9	−5	(−26, 14)	−26	(−73, 12)

*Significant at the .01 level.

†Based on a one-part model final estimates (after retransformation).

‡Based on a two-part model final estimates (unconditional: taking into account both parts, and after retransformation).

§Predictive margin: estimated average increase or decrease in expenditures when changing the value of the access measure from the 25th to the 75th percentile, holding the other covariate values constant. Covariates include practitioner density, age-sex category, race/ethnicity, VA copayment requirement, and case mix.

¶Bias corrected empirical bootstrap confidence interval at the .01 level.

VA, veterans affairs; MH, mental health.

Table 3B: Effect of Access Measures on MH/SA Expenditures for the Disabled

	Percentile		*VA MH/SA Expenditures*[†]		*Medicare MH/SA Expenditures*[‡]	
Explanatory Variables	*25th*	*75th*	*PM($)*[§]	*99% CI*[¶]	*PM($)*[§]	*99% CI*[¶]
Distance to nearest Medicare inpatient facility	0.0	6.0	6	(−37, 44)	−96*	(−132, −62)
Distance to nearest Medicare inpatient MH facility	1.6	15.5	64*	(20, 114)	−143*	(−176, −111)
Distance to nearest VA inpatient medical facility	6.9	55.8	70	(−18, 149)	161*	(93, 240)
Distance to nearest VA inpatient MH facility	7.5	62.5	−610*	(−719, −498)	80	(−8, 170)
Distance to nearest VA outpatient medical facility	3.1	19.8	14	(−36, 68)	5	(−44, 54)
Distance to nearest VA outpatient MH facility	4.0	29.0	−92*	(−161, −18)	−48	(−105, 14)

*Significant at the .01 level.

[†]Based on a one-part model final estimates (after retransformation).

[‡]Based on a two-part model final estimates (unconditional: taking into account both parts, and after retransformation).

[§]Predictive margin: estimated average increase or decrease in expenditures when changing the value of the access measure from the 25th to the 75th percentile, holding the other covariate values constant. Covariates include practitioner density, age-sex category, race/ethnicity, VA copayment requirement, and case mix.

[¶]Bias corrected empirical bootstrap confidence interval at the .01 level.

VA, veterans affairs; MH, mental health.

expenditures. This is not, however, offset by a significant increase in Medicare expenditures.

Mental Health and Substance Abuse Costs. MH/SA expenditures exhibit patterns similar to total expenditures, although the magnitudes of the effects are much smaller (Tables 3A and 3B). Among aged veterans, an increase in distance from 8.1 to 62.3 miles from the nearest VA inpatient mental health facility is associated with $146 less in expected MH/SA expenditures in the VA, but $138 more in Medicare expenditures. Among

disabled veterans, an increase from 1.6 to 15.5 miles from the nearest Medicare inpatient mental health facility is associated with $64 more in VA and $143 less in Medicare expenditures. As in the case of total expenditures for disabled veterans, the expected VA MH/SA costs are lower when distance to a VA MH outpatient facility increases (e.g., by $92 when moving from 4 to 29 miles away).

Subgroup Analyses. We supplemented these analyses with regressions on specific subgroups of our main sample to explore whether certain patients were more or less likely to substitute between sectors. Veterans with PTSD might be more attracted to VA because PTSD is a war-related illness, and because VA has a wide array of special programs for PTSD patients. Schizophrenic patients, who are heavy utilizers of services, might have greater loyalty to VA because of VA's strong reputation for chronic disease care and unlimited benefits available from VA, including pharmaceutical therapies and residential programs, services not reimbursable under Medicare. Veterans with a diagnosis of depression, on the other hand, may have less attachment to VA and be more likely to substitute across sectors.

We created subgroups of patients who had any diagnosis of PTSD, schizophrenia, or depression, producing (overlapping) subsamples that contained 17, 17, and 19 percent of the original sample. In response to increased distance, PTSD patients reduced VA expenditures somewhat less than veterans overall, however the differential response is likely explained by their 24 percent lower expenditures. Schizophrenia patients showed considerably more reduction in total and MH expenditures when distance increased from the 25th to the 75th percentile of the distribution for that subgroup. Unlike in the overall sample, increased distance from VA outpatient medical facilities was associated with considerable reduction in total VA expenditures among the elderly. In the case of schizophrenia, higher overall expenditure may not explain all of the additional reduction in VA expenditure. More interestingly, for this subgroup, there does not appear to be a greater offset in increased Medicare expenditures, compared with the main sample. One possibility is that this subgroup may have greater reliance on state mental health services not reimbursed by Medicare. The analysis of veterans with a diagnosis of depression produced results similar to those of the main sample analysis. The results of the subgroup analyses are available in the Supplementary Material Appendix SA1.

DISCUSSION

Our study produces evidence, albeit mixed, that the distance to VA and Medicare providers influences choices between the two sectors among dually eligible veterans with MH/SA diagnoses. In general, greater distance from Medicare inpatient facilities is associated with higher VA and lower Medicare expenditures, and greater distance from VA inpatient facilities is associated with lower VA and higher Medicare expenditures. This tendency is observed for both aged and disabled patients, although the effects are more evident for total than for MH/SA expenditures. The larger impact of access to MH facilities on total costs than on MH/SA costs might result from veterans starting to use the VA for medical care after initially seeking MH/SA services from the VA.

Among the aged, distance to a VA outpatient medical or MH facility does not seem to be a factor in sectoral choice. However, among the disabled, total VA costs are significantly lower for veterans living at greater distances from VA outpatient facilities. These lower expenditures do not appear to be offset by increases in Medicare expenditures. Among both the aged and disabled, expenditures for schizophrenia patients are especially affected by distance to VA services, particularly inpatient MH facilities.

Results suggest a distinction between aged and disabled veterans in choice of sector for outpatient care. The distance from a VA outpatient medical or MH facility did not make a difference in the allocation of expenditures between VA and Medicare for aged veterans. However, distance from a VA outpatient MH facility did matter for disabled veterans, perhaps because they relied much more heavily on VA than on Medicare for MH/SA services than did the aged veterans. Among all veterans, the disabled had 3.9 times more VA than Medicare MH/SA expenditures, compared with 1.4 times for the aged. The failure of our results to indicate significant associations between geographic proximity to VA outpatient services and choice of sector by aged veterans may be due to the relatively small portion of medical expenditures that is accounted for by outpatient care, particularly for the elderly. Total VA and Medicare expenditures may be dominated more by costly inpatient care in this group, even for MH/SA services, if elderly veterans have more comorbidities than younger veterans and are more likely to be treated for MH/SA problems at a VA inpatient facility.

Although not fully consistent, overall our results do support a model of substitution, in which dually eligible veterans increasingly turn to Medicare providers when VA services become less geographically accessible. However,

even when effects went in the expected direction and were significant, they were relatively small in magnitude. For example, controlling for other observable differences, aged dual eligibles would be expected to have $1,913 less in VA costs if they lived 62 instead of 8 miles away from a VA mental health facility, yet only $570 more in Medicare costs. So while there does appear to be a substitution effect, the increased Medicare expenditures do not fully offset the decreased VA expenditures. Moreover, the magnitudes of these effects represent only a relatively small portion of overall average expenditure per individual. Other effect sizes were even smaller. Because the substitution effects are small, the inability of earlier studies to examine crossover to Medicare mental health services may not have created serious bias.

We conclude that cost-shifting between sectors as a result of geographic access barriers may not be of great concern to policy makers. What may be of greater importance from a policy perspective is whether veterans who are at a geographic disadvantage vis-à-vis VA services have alternative sources of health care. Patients with schizophrenia may be particularly vulnerable in this regard. As we found no evidence of complementarity between the two sectors, our study does not support the conjecture that greater distance from VA facilities results in diminished awareness of potential mental health care needs among veterans. Rather, VA policy makers need to be more focused on improving outreach to veterans, because for many veterans who are not eligible for Medicare, the VA is the medical provider of last resort. We chose to examine the cost-shifting issue among dually eligible patients in the area of mental health because of VA's particular strength as a provider in this area, in addition to the growing need for behavioral health services among veterans. Caution should be exercised in generalizing the conclusions of this analysis to other VA subpopulations.

There are several limitations to our analyses. We did not examine dually eligible veterans who used only Medicare services or who had mental health care needs but received no services in either sector. These biases seem likely to lead to conservative estimates of the substitution between VA and Medicare services, because veterans who live very far away from VA services (and use only Medicare services as a result) are excluded from our sample; if we had been able to include them, the distance measures would have shown stronger effects. We were also unable to obtain reliable data on income of veterans, which is a potential driver of expenditures. Claims data lack detailed clinical information, limiting our ability to adjust completely for risk. On the other hand, bias is primarily a concern when the omitted measures are correlated with the covariates of interest, which seems less likely to be true for the access

measures on which we focus. Finally, given our large sample sizes, we chose a more conservative 1 percent (instead of 5 percent) significance level cutoff value and base our conclusions on broad patterns of results rather than individually significant estimates.

Major events have taken place since the time period we studied, elevating the importance of the issues raised in this paper. In the conflicts occurring in Southwest Asia, which include Operation Enduring Freedom (OEF) in Afghanistan and Operation Iraqi Freedom (OIF), improved defense and medical capabilities have vastly improved the survival rates of soldiers (Gawande 2004), but have also created a new generation of veterans who are presenting at VA facilities with multiple traumas, injuries, and disabilities. The increasing incidence of mental health problems among our newest veterans has also now been documented (Hoge, Auchterlonie, and Milliken 2006; Seal et al. 2007), as has the association between severe physical injuries in this veteran population and the prevalence of mental health diagnoses (Grieger et al. 2006). Many of the newly disabled veterans will become dually eligible for VA and Medicare services. VA is currently grappling with the very difficult task of meeting the needs of returning OEF/OIF soldiers under conditions of strained resources. While the time period we studied predates these new conflicts, the results generated here suggest that distance from both inpatient and outpatient care may be an important factor for younger veterans in choosing to seek mental health care in VA. Moreover, even if returning veterans were to become eligible for Medicare on the basis of disability, the behavioral health services offered by Medicare may not be able to compensate adequately for poor access to these services within the VA.

Although our study has focused on veterans, our findings speak more broadly to the need for analyses using multiple data sources to assess the policy "big picture." The President's New Freedom Commission on Mental Health (Azrin, Moran, and Myers 2003) highlighted our fragmented services system as "one of several systemic barriers impeding the delivery of effective mental health care." From a social planning perspective, the system as a whole has an incentive to try to coordinate care across sectors in order to best to meet the clinical needs of patients. Policies made in one sector, e.g., cutting back on mental health benefits or programs, or expanding geographic availability of services, may directly influence the demand placed on other sectors, so that potential "spillover" effects need to be taken into account at the system level. Fragmentation creates incentives for cost-shifting across sectors, and mental health care, for which benefits tend to be relatively volatile, is particularly vulnerable to spillover. VA and Medicare, as well as private sector

administrators, naturally focus on their individual budgets when making policy decisions, and may perceive savings when in reality costs are merely being shifted to another sector. From a societal perspective, it is important that we examine our broader system of mental health care to see the extent to which spillover is occurring.

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SUPPLEMENTARY MATERIAL

The following supplementary material for this article is available online:

Appendix SA1: HSR Author Matrix.

Table S1: VA and Medicare Costs of Dually Eligible Patients (*Schizophrenia*, *Depression*, *PTSD*).

Table S2a: Effect of Access Measures on Total Expenditures for the Aged (*Schizophrenia*, *Depression*, *PTSD*).

Table S2b: Effect of Access Measures on Total Expenditures for the Disabled (*Schizophrenia*, *Depression*, *PTSD*).

Table S3a: Effect of Access Measures on MH/SA Expenditures for the Aged (*Schizophrenia*, *Depression*, *PTSD*).

Table S3b: Effect of Access Measures on MH/SA Expenditures for the Disabled (*Schizophrenia*, *Depression*, *PTSD*).

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