Hospital Choice of Rural Medicare Beneficiaries: Patient, Hospital Attributes, and the Patient–Physician Relationship

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Objective. To examine how patient and hospital attributes and the patient–physician relationship influence hospital choice of rural Medicare beneficiaries.

Data Sources. Medicare Current Beneficiary Survey (MCBS), Health Care Financing Administration (HCFA) Provider of Services (POS) file, American Hospital Association (AHA) Annual Survey, and Medicare Hospital Service Area (HSA) files for 1994 and 1995.

Study Design. The study sample consisted of 1,702 hospitalizations of rural Medicare beneficiaries. McFadden's conditional logit model was used to analyze hospital choices of rural Medicare beneficiaries. The model included independent variables to control for patients' and hospitals' attributes and the distance to hospital alternatives.

Principal Findings. The empirical results show strong preferences of aged patients for closer hospitals and those of greater scale and service capacity. Patients with complex acute medical conditions and those with more resources were more likely to bypass their closest rural hospitals. Beneficiaries were more likely to bypass their closest rural hospital if they had no regular physician, had a shorter patient–physician tie, were dissatisfied with the availability of health care, and had a longer travel time to their physician's office.

Conclusions. The significant influences of patients' socioeconomic, health, and functional status, their satisfaction with and access to primary care, and their strong preferences for certain hospital attributes should inform federal program initiatives about the likely impacts of policy changes on hospital bypassing behavior.

Key Words. Hospital choice, hospital bypassing, rural health, conditional choice model

For more than a decade rural hospitals have struggled to maintain fiscal viability in a market environment characterized by declining patient volume and revenues. They have not generally adopted specialized services and advanced technologies due to limited local demand and fiscal problems. As a consequence, rural residents are often referred to urban hospitals for specialized care. Nationally, nearly one-third of rural Medicare beneficiaries who were hospitalized in 1989 "bypassed" their local rural hospital in favor of admission to an urban hospital (Buczko 1994).

This bypassing of local hospitals by rural patients raises concerns among policymakers because of the potential financial strain it places on already fragile rural hospital systems. If increased financial strain leads to further reductions in the service capacities of rural hospitals or additional closures of rural hospitals, rural patients will face greater access barriers for routine inpatient hospital care. This scenario may be particularly harmful to older beneficiaries who have more difficulty traveling long distances for care (Adams et al. 1991; Buczko 1994).

Recently, the Essential Access Community Hospital (EACH) program (PL 101–239) under Omnibus Budget Reconciliation Act (OBRA) 1989 legislation sought to develop rural health networks consisting of Rural Primary Care Hospitals (RPCHs), providing only outpatient and short-term inpatient hospital care. After 1997 federal Critical Access Hospital (CAH) legislation contained in the Balanced Budget Act of 1997 (PL 105–33) the Medicare Rural Hospital Flexibility Program replaced this program and broadened support for the development of rural health networks with formal agreements for patient referral and transfer. Its effects are yet to be seen.

The current study is intended to inform rural hospital policy by identifying key patient characteristics and hospital attributes that affect admission choices of rural aged Medicare beneficiaries. The present study adds new information by using the Medicare Current Beneficiary Survey (MCBS) with far richer social, demographic, economic, and health status data for hospitalized Medicare beneficiaries. This is one of a few hospital-choice studies to use a national sample which, given substantial state-level variations in the demographics of Medicare beneficiaries, helps in generalizing the results.

Previous Research

Earlier studies of hospital choice and bypassing behavior have shed insight on the extent of bypassing, where patients go, and what patient and hospital

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characteristics affect choice. While bypassing of local rural hospitals occurs in all markets, significant geographic variation exists. Less than 60 percent of rural women used the nearest hospital for delivery in Alabama (Bronstein and Morrisey 1991), while over 70 percent of rural hospital patients of New York State were hospitalized within their county (Hogan 1988) and about 82 percent of hospitalized rural Delaware Medicare beneficiaries were admitted locally (Buczko 1994). A study of rural Medicare beneficiaries in rural Minnesota, North Dakota, and South Dakota found 40 percent bypassed their closest hospital (Adams et al. 1991). In the first national study, Buczko (1992) found that 30 percent of rural Medicare beneficiaries hospitalized in 1989 were admitted to an urban hospital. In a recent study examining the extent of hospital choice among residents of rural areas, Slifkin, Ricketts, and Howard (1996) identified 2,259 nonmetropolitan zip codes where all hospitalized Medicare patients of the zip code were admitted to the same hospital in 1990. In 28 percent of these zip codes, all patients bypassed their closest hospital for admission to a common more distant alternative hospital. The destination hospital of bypassers also varies geographically. Among rural patients who crossed county borders in New York, almost two-thirds were admitted to an urban hospital (Hogan 1988). Yet, half of rural Medicare beneficiaries who bypassed local hospitals in Delaware were admitted to another rural hospital (Buczko 1994), and about 43 percent of bypassers used another rural hospital in the upper Midwest (Adams and Wright 1991).

Although there is often little data on patient characteristics, studies have shown that older rural patients exhibit stronger preferences for rural versus urban hospitals (Adams et al. 1991; Buczko 1992). Women are more likely to be hospitalized locally than men (Buczko 1992; Hogan 1988) and tend to use nonteaching hospitals (Cohen and Lee 1985). Socioeconomic status is also important for choice. Women residing in higher-income areas were more likely to bypass their closest rural hospital for obstetrical care (Bronstein and Morrisey 1991) while Medicaid recipients were more likely than the privately insured to be admitted to public hospitals, higher-charge hospitals, and hospitals with worse prenatal outcomes, presumably as a result of choice restrictions (Phibbs et al. 1993). Bypassing of rural hospitals by rural Medicare beneficiaries is associated with needing specialized care or severity and complexity of illness, often involving the need for surgical treatment (Buczko 1992; 1994; Codman Research Group 1990; Adams et al. 1991). Research has long shown that patients have a strong preference for admission to their closest hospital, especially for the rural elderly (Porell and Adams 1995). As bypassing the closest rural hospital is more likely when there is greater accessibility

to local alternatives (Bronstein and Morrisey 1991), the differing spatial configurations of rural hospitals throughout the country underscore the need to use national data.

Other than proximity, patients exhibit preferences for hospitals with more beds, teaching hospitals, and those with more extensive service capacity (Porell and Adams 1995). Patients also exhibit a preference for hospitals with "better than expected" outcomes on mortality and complications (e.g., Luft et al. 1990; Phibbs et al. 1993). Despite the limited geographic scope of samples and patient information, these studies are insightful. We extend the literature by using national survey data accompanied by patients' claims data. In particular, the inclusion of information on older patients' socioeconomic and functional status as well as their physician–patient relationship adds to our understanding of bypassing choices.

Data and Methodology

Data Sources

The primary data source was the Medicare Current Beneficiary Survey (MCBS), a continuous panel national survey of Medicare beneficiaries in the United States with information on socioeconomic and demographic characteristics, health status and functioning, satisfaction with and access to care, and insurance coverage (Adler 1994), for 1994 and 1995. The analytic version of MCBS data files also contain administrative geographic residence identifiers and all Medicare fee-for-service claims for covered services with associated diagnostic and procedure codes and Medicare provider numbers (Eppig and Edwards 1996). Although only a small proportion of nonmetropolitan counties are included in the MCBS sample due to its clustered complex survey design, the nonmetropolitan sample is generally representative of the nonmetropolitan Medicare population (Stearns, Slifkin, and Walke 1997). The Provider of Service (POS) file contains administrative data on hospitals routinely collected by the Center for Medicare and Medicaid Services (CMS), including five-digit zip code, beds, and teaching status. The American Hospital Association (AHA) annual hospital survey data on hospital services were used to create a Guttman scale of service capacity as discussed later. Data from the Medicare Hospital Service Area file, containing aggregated counts of annual discharges and patient days for all Medicare beneficiaries of a five-digit zip code to various hospitals, were used to delineate feasible choice sets of hospital alternatives for individual MCBS respondents based on their residence zip code.

Study Sample

The beneficiary sample was restricted to noninstitutionalized beneficiaries who were 65 years of age or older, continuously enrolled in Part A and B of Medicare but not in a health maintenance organization (HMO), residing in a nonmetropolitan county, and having at least one hospitalization in 1994 or 1995. Exclusions included those hospitalized rural MCBS respondents whose closest hospital was an urban one ($n = 111$) and cases missing critical data ($n = 19$). The resulting study sample was 1,702 hospitalized MCBS respondents, comprised of 849 in 1994 and 853 in 1995. We also excluded a few beneficiaries ($n = 18$) whose travel distance for admission exceeded 500 miles.

Analytic File Construction

Patient attributes, including residence zip code, were linked to inpatient hospital records using the unique MCBS identifier. Hospital attributes from the Medicare POS file and AHA Annual Survey files, including hospital zip code, were merged using the Medicare provider number. A national zip code file from the Census Geographic Information Coding Scheme (GICS), containing the longitudes and latitudes of the centroids of all five-digit zip codes, was used to calculate straight-line distances between patient and hospital zip codes for the admission and alternative hospitals in the choice set (discussed later).

Conceptual Model

Both patients and physicians contribute to the decision on where the patient will be admitted. Although it is not obvious to what degree physicians control this choice (Porell and Adams 1995), our empirical model, similar to most past empirical studies, is based on utility theory and the conditional choice model developed by McFadden (1974). This model asserts that individuals (or physicians as agents), given their needs and preferences, choose hospitals on the basis of their hospital attractiveness.

Definition of Hospital Alternatives

Since specification of patient attributes in a conditional logit choice model requires that alternative-specific coefficients be estimated for each patient attribute, hospital alternatives are often defined in terms of a few aggregate typologies, such as urban or rural choices (Kim 1990). Adams et al. (1991) used seven distinct categories based on location and hospital bed size. While more

categories reduce heterogeneity within choice alternatives, such a typology may not apply nationally given variation in the configurations of individual hospital alternatives that likely exist across rural markets. In this study a simple four-category hospital typology is defined by combining the two more common binary hospital typologies found in the literature: (1) closest rural hospital; (2) other rural hospital; (3) urban teaching hospital; and (4) urban nonteaching hospital.

Since numerous hospitals could be assigned to the latter three choice alternatives, we imposed a meaningful limit on the number in each choice alternative by using the actual admission choices of *all* hospitalized Medicare beneficiaries residing in the same zip code as a guide. To exclude "unusual" admissions arising from changes of residence or out-of-residence area travel, the hospital choice set for each zip code was restricted to those hospitals accounting for at least 1 percent of all Medicare admissions from that zip code. This method yielded multiple hospitals for categories other than the "closest rural hospital" and hence these were treated as "aggregated choice alternatives." A patient's utility for an aggregate hospital type alternative should be a function of: (1) the average utility for the elemental hospitals comprising the aggregate alternative, (2) the variability of patient utilities for individual elemental hospitals of an alternative, and (3) the number of elemental hospitals comprising the aggregate alternative (Ben-Akiva and Lerman 1985). Hospital attributes were therefore specified at the mean of hospitals comprising the aggregate choice alternative. Furthermore, the number of hospitals in each alternative was specified as an additional attribute variable.

Variable Specification

The dependent variable was the actual hospital admission choice among the four mutually exclusive hospital choice alternatives with the closest rural hospital as the reference choice. Table 1 contains variable definitions and descriptive statistics for all specified variables.

Patient Attributes. Patient demographic variables were specified for age, gender, and marital status. We expect older, female patients to be less likely to bypass while marital status may affect informal support in such a way as to encourage travel. We also specified variables to test for effects of education, income, dual Medicaid enrollment, race, and number of children. We expect higher-educated patients, as well as those with higher incomes, to choose more sophisticated, distant hospitals. While Medicaid eligibility indicates lower socioeconomic status, this coverage decreases out-of-pocket costs and may

Table 1: Descriptive Statistics of Patient and Hospital Attributes for Sample Persons, 1994 and 1995 (N= 1,702)

Variables	*Descriptions*	*Mean or %*	*S.D.*
DEPENDENT VARIABLE			
Hospital choice	Choice of a typology of hospital (Reference: 1 = the closest rural hospital)	0.56	1.18
	2 = Other rural hospital	0.13	
	3 = Urban non-teaching urban hospital type	0.13	
	4 = Urban teaching hospital type	0.18	
INDEPENDENT VARIABLES			
Patient Attributes			
Demographic Characteristics			
Age 75–84	Sample person is between 75–84 years old, 1 = Yes, 0 = Otherwise	0.452	0.498
Age 85 and older	Sample person is older than or equal to 85 years, 1 = Yes, 0 = Otherwise	0.200	0.400
Male	1 = Male, 0 = Female	0.425	0.494
Married	1 = Yes, 0 = Otherwise	0.479	0.500
Social Structural Variables			
College	Sample person has 16 or more years of education, 1 = Yes, 0 = Otherwise	0.890	0.313
White	Sample person reports to be of white race, 1 = White, 0 = Otherwise	0.168	0.374
Income more than $25,000	1 = Income is more than $25k, 0 = Otherwise	0.199	0.399
Medicaid	Sample person self-reported to be Medicaid eligible, 1 = Yes, 0 = Otherwise	0.157	0.364
Number of children	Number of children of sample respondent	3.250	2.596
Health, Functional Status, and Diagnostic Category			
ADLs	Sum of reported difficulty in performing any of the following six activities: bathing, getting in/out of a chair, dressing, eating, toileting, and/or walking	1.647	1.934
Bedridden	1 = Yes, 0 = Otherwise	0.066	0.249
Poor health	1 = Reported perceived health as poor, 0 = Otherwise	0.214	0.410
Surgical DRG	1 = Yes, 0 = Otherwise	0.295	0.456
Psychiatric diagnosis	1 = Yes, 0 = Otherwise	0.011	0.102

continued

Table 1: *Continued*

Variables	*Descriptions*	*Mean or %*	*S.D.*
Cardiovascular procedure	1 = Hospitalization for DRG 103-112, 117, 124, 125; 0 = Otherwise	0.079	0.269
Technical intensive conditions	1 = Hospitalization for DRG 5, 106, 107, 112, 214, 410; 0 = Otherwise	0.042	0.201
Case-mix index weight	The relative Medicare hospital case-mix weight for the DRG of the hospitalization	1.394	1.045
Number of surgical procedures	Number of surgical procedures performed in the hospital stay	1.144	1.573
Satisfaction with and Access to Medical Care			
Regular source of care	1 = Sample person has a regular source of care, 0 = otherwise	0.981	0.136
Longer physician–patient tie	Sample person has seen his/her regular physician for one year or more, 1 = Yes, 0 = Otherwise	0.860	0.347
Less accessible to physician	Sample person is 30 minutes or more away from physician's office 1 = Yes, 0 = Otherwise	0.136	0.343
Dissatisfaction with the availability of health care	1 = dissatisfied/very dissatisfied about service availability or there was trouble getting care because unavailable, or not see doctor because of access, 0 = otherwise	0.223	0.417
Dissatisfaction with the quality of physician	1 = dissatisfaction on questions regarding overall quality of physician care, regarding physician's technical competence, or with physician practice style, 0 = otherwise	0.375	0.484
Prior Use			
Bypass in 12 month	1 = Sample person utilized a hospital other than the closest rural hospital in the past 12 months, 0 = Otherwise	0.405	0.491
Hospitalized in 12 month	1 = Sample person was hospitalized in the past 12 months, 0 = Otherwise	0.174	0.379
Hospital Attributes*			
Bed size	Average number of acute care beds of the aggregate choice alternative	CR = 105.14 OR = 133.69 OU = 243.90 UT = 585.86	

continued

Table 1: *Continued*

Variables	*Descriptions*	*Mean or %*	*S.D.*
Guttman scale of hospital service capacity	Average of the Guttman Scale of service complexity of the aggregate choice alternative	CR = 5.91 OR = 6.24 OU = 7.30 UT = 10.68	
Number of hospitals	Total number of hospitals of the aggregated choice alternative	CR = 1.06 OR = 2.95 OU = 3.55 UT = 4.31	
Distance to hospital	Average distance between sample person and the hospital alternative	CR = 5.56 OR = 96.14 OU = 211.42 UT = 172.70	

+CR = closest rural hospital,
OR = Other rural hospital,
OU = Other urban hospital
UT = urban teaching hospital.
*Choice alternative means are significantly different at 1% level under ANOVA.

thereby increase access to more hospitals. Nonwhites are hypothesized to be more likely than whites to be admitted to smaller and less sophisticated rural hospitals (e.g., Bach et al. 2000; Williams et al. 1995). Finally, the elderly, with more children and hence more informal support, may travel farther.

This study tests a broader set of health status variables: self-reported health status, functional status, and the medical conditions leading to admission. Functional status was measured as a (0–6) count of reported difficulties in performing, or the inability to perform due to health, six activities of daily living (ADLs) (Verbrugge and Jette 1994), and a separate dummy variable distinguished bedridden individuals. A higher level of functional disability is expected to decrease the probability of hospital bypassing. While patients with poorer health may need more sophisticated urban hospitals, severity of the specific condition leading to admission may be more important in determining hospital choice. The principle diagnosis codes were used to distinguish two subgroups of "high-technology" hospitalizations: cardiovascular procedures and technically intensive conditions (Codman Research Group 1990). Finally, the Medicare case-mix intensity (CMI), available by diagnosis related group (DRG), and number of surgical procedures performed during the hospital stay were specified as severity indicators associated with the need for more complex hospital care (Buczko 1992).

This study is the first to test for the influence of one's primary care physician on choice. We expect that patients with a regular source of care, and those with longer ties to their regular physician, will be more likely to use local hospitals over more distant ones. Another dummy variable distinguished patients who had to travel at least 30 minutes to see their regular physician. Poor geographic access to one's doctor should be positively associated with bypassing the closest rural hospital. Finally, dummy variables were specified to distinguish patients who expressed dissatisfaction with the costs or availability of care, or with the quality of care provided by their regular physician (Porell and Miltiades 2001). Since physician access and satisfaction variable data are missing for reasons other than nonresponse for beneficiaries without a regular source of care, these variables were specified as interaction terms with the regular source of physician care indicator, resulting in a zero score for such beneficiaries (Little and Rubin 1990).

Although repeat bypassing of closer rural hospitals has not been studied, it is plausible to expect that patients who bypassed their "closest rural hospital" alternative before will be more likely to bypass it again. Using the 1993–1995 data, dummy variables were used to flag patients who had a prior admission and of those, who were admitted to a hospital other than their closest rural hospital in the previous year.

Hospital Attributes. Patients are expected to prefer larger and more sophisticated hospitals. In addition to hospital bed size, a Guttman scale was used to reflect the availability of more complex services and to account for the tendency of hospitals to acquire services from less to more complex. In the Guttman service scale, each individual hospital is scored by its highest-ranking (least common) service. The regionalization of a noncomplex hospital service could distort a Guttman service scale derived from data for a small sample of hospitals. Since our Guttman scaling was performed with a large national sample of both urban and rural hospitals, we should observe more than one regionalized hospital with such rare noncomplex services. Hence most services should be observed and "score" in our Guttman. A review of four Guttman scale indices concluded they have internal validity and provide good summary variables for scope of service and "allow for measurement—however rough—of differences in the complexity of hospital care" (Edwards, Miller, and Schumacher1972). As noted earlier, a count of hospitals comprising a choice alternative was specified because of the aggregate choice alternatives included in patient choice sets. All other factors equal, patients should be more likely to choose aggregate choice alternatives comprised of more rather than fewer hospitals. Finally, distance

to a specific hospital was measured in miles as "the crow flies" between the centroids of the zip codes of patient residence and the hospital choice alternative. For aggregate hospital type alternatives, the mean patient-to-hospital distance was specified.

Empirical Results

Descriptive Statistics

As shown in Table 1, the majority of hospitalized aged rural Medicare beneficiaries were admitted to their "closest rural hospital" alternative (56 percent). The remaining admissions were roughly equally split among "other rural hospital" (13 percent), "urban teaching hospital" (18 percent), and "other urban hospital" (13 percent) alternatives.

With the exception of being older, the demographic composition of the study sample was similar to that of the general aged Medicare population. On average, the sample of hospital patients was a little more disabled (1.65 ADLs) and more likely to be bedridden (6 percent) than the general aged Medicare population, and much more likely to have been hospitalized at least once in the past 12 months (40 percent). However, only 17 percent of the sample bypassed their closest rural hospital in a prior admission. Most of the sample were satisfied with their medical care and relatively few reported an access barrier related to service availability (22 percent) or living thirty minutes or more away from their regular physician's office (14 percent). More reported dissatisfaction (38 percent) with some aspect of physician quality, however.

Mean hospital attributes are reported separately for the four choice alternatives. The patterns conform to an expected ordinal ranking with the closest rural hospitals having fewer beds and services than other rural hospitals, urban hospitals, and urban teaching hospitals, respectively. While fewer services make these closest rural hospitals less desirable, they are considerably closer than the other three choice alternatives. While the hospitals that comprise the other rural choice alternative appear to be similar to the closest rural hospital alternative with respect to bedsize and service capacity, they are more similar to the two urban hospital alternatives with respect to the mean number of hospitals and distance. These data indicate that the "other rural hospital" alternative in this study cannot be implicitly treated as meaning something akin to " the next closest rural hospital."

Conditional Logit Model Results

The empirical results for the multivariate conditional logit model are reported in Table 2. A single odds ratio is estimated for each of the three hospital attributes and distance. Three alternative-specific odds ratios are estimated for each patient attribute with the "closest rural hospital" serving as the reference choice. The model chi-square statistic indicates that the joint association of all independent variables in the models with the dependent variables was highly significant ($p<0.01$) and the pseudo R-square (0.37) is comparable to previous studies, ranging from 0.23 to 0.44 (Adams et al. 1991).

The findings confirm a strong negative relationship between distance and the choice of a hospital type. Holding all other variables constant, the results suggest that aged rural Medicare beneficiaries were about 2 percent less likely to choose admission to a hospital alternative 10 miles farther from their residence than an otherwise similar hospital. The results indicate that aged rural Medicare patients prefer larger hospitals and those offering a broader scope of services. The estimated parameter for hospital bed size suggests a 20 percent increase in the odds of an aged rural Medicare patient choosing admission to a hospital with 100 more beds over an otherwise similar hospital alternative with fewer beds. The odds of admission to a hospital type with a one-point higher average Guttman service capacity score are about 8.8 percent higher than to an otherwise similar hospital type with a lower service capacity score. Finally, as expected, aggregated choice alternatives comprised of more hospitals are more likely to be chosen over otherwise similar alternatives with fewer hospitals.

The results also indicate that older rural beneficiaries seeking hospital care, and particularly those 85 years of age and older, are less likely to bypass the closest rural hospital than their younger counterparts. The odds of choosing the "urban teaching hospital" over the "closest rural hospital" were about 75 percent lower among patients 85 years or older relative to their counterparts between 65 and 74 years old. Unmarried men were more likely than women of any marital status to choose an "other urban hospital" alternative over the closest rural hospital (OR = 1.72).

Being white and being more highly educated were both associated with a higher likelihood of choosing an "urban teaching hospital" over the "closest rural hospital" alternative. For example, the odds of admission to an urban teaching hospital over the closest rural hospital were more than double for white patients relative to otherwise similar nonwhite patients. Higher-income aged rural beneficiaries were more likely to choose the "other

Table 2: Empirical Results of Conditional Hospital Choice Model: All Patients ($n = 1{,}702$)

Independent Variable	*Odds Ratio*	*Wald Statistic*	*Odds Ratio*	*Wald Statistic*	*Odds Ratio*	*Wald Statistic*
Hospital Alternative Attributes						
Distance	0.998	27.223***				
Bed Size	1.002	17.838***				
Guttman Scale of Hospital Service Capacity	1.088	21.035***				
Number of Hospital	1.187	82.772***				
Patient Attributes	**Other Rural/Closest Rural**		**Other Urban/Closest Rural**		**Urban Teaching/Closest Rural**	
Intercept	0.257	3.938**	0.036	15.607***	0.007	42.087***
Demographic Characteristics						
Age 75–84	0.847	0.730	0.805	1.274	0.641	5.603**
Age 85+	0.744	1.258	0.515	5.649**	0.248	20.466***
Male	1.046	0.026	1.719	3.910**	1.158	0.254
Married	0.895	0.175	1.221	0.585	1.452	2.145
Married * male	0.963	0.010	0.448	4.657**	0.697	0.915
Social Structural Variables						
White	1.187	0.287	0.975	0.008	2.000	3.955**
College degree	1.039	0.021	0.948	0.039	2.760	17.465***
Medicaid Eligibility	0.588	4.211**	0.755	1.329	1.154	0.290
Income More Than $25,000	0.984	0.003	2.193	8.928***	1.431	2.062
Number of Children	1.082	5.352**	1.021	0.374	1.021	0.351
Health, Functional Status, and Diagnostic Category						
ADL Impairments	0.878	5.445**	0.990	0.037	1.242	16.978***
Bedridden	1.173	0.162	0.429	2.939*	0.428	4.388**
Poor Health	0.934	0.082	1.140	0.300	0.881	0.269
Surgical DRG	1.650	4.035**	1.296	1.083	2.372	13.052***
Psychiatric Diagnosis	3.496	2.866*	7.139	7.485***	2.540	1.133

continued

Table 2: *Continued*

Independent Variable	*Odds Ratio*	*Wald Statistic*	*Odds Ratio*	*Wald Statistic*	*Odds Ratio*	*Wald Statistic*
Health, Functional Status, and Diagnostic Category						
Cardiovascular Procedure	2.522	3.404*	3.791	9.111***	6.246	21.999***
Technical Intensive Condition	4.517	2.859*	16.453	11.068***	18.200	13.043***
Case-Mix Index Weight	1.043	0.130	1.042	0.145	1.049	0.235
Number of Procedures	1.183	5.408**	1.306	14.532***	1.477	35.308***
Satisfaction with and Access to Medical Care						
Regular Source of Care	0.348	3.148*	2.561	1.416	0.824	0.093
Longer Patient–Physician Tie	0.893	0.170	0.482	9.416***	0.564	5.304**
Dissatisfaction with the Availability of Health Care	1.660	6.205**	0.953	0.049	0.817	0.879
Less Access to Physician	2.658	15.790***	4.989	46.533***	4.733	38.762***
Dissatisfaction with the Quality of Physician	0.980	0.012	1.109	0.318	1.031	0.027
Prior Use						
Hospitalized in the Past 12 Months	0.284	19.922***	0.646	0.648*	0.767	1.296
Bypassed the Closest Hospital in the Past 12 Months	20.642	85.001***	9.107	9.082***	15.199	93.939***
Chi-Square (degree of freedom)			1672.94(85)			
Pseudo R^2			0.37			

*Significant at 10% level.

**Significant at 5% level.

***Significant at 1% level.

urban hospital" over the "closest rural hospital" alternative. The odds of choosing the "other rural hospital" over the "closest rural hospital" alternative were 41 percent lower for patients who were dually eligible for Medicaid relative to other patients. Finally, patients with more children (specified as an indicator of potential informal support) were more likely to choose the "other rural hospital" over the "closest rural hospital" alternative (OR = 1.08).

The likelihood of bypassing the closest rural hospital varies with the functional disability level of patients. The results suggest that an additional ADL limitation decreases the odds of choosing an "other rural hospital" by 12 percent and increases the odds of choosing an "urban teaching hospital" by almost 24 percent relative to the closest rural hospital. However, if a patient is bedridden, this tendency is fully offset by lower odds of choosing either an "other urban hospital" (OR = 0.57) or an "urban teaching hospital" (OR = 0.57) relative to the closest rural hospital, respectively. Hospitalization for a surgical DRG is associated with a greater likelihood of bypassing one's closest rural hospital for admission to an "other rural hospital" (OR = 1.65) or an "urban teaching hospital" (OR = 2.37). In addition, the estimated odds of admission to an "other urban hospital" over the closest rural hospital were more than seven times greater for patients with a psychiatric diagnosis relative to otherwise similar patients with other principal diagnoses. Hospitalizations for a technical-intensive condition, those involving a cardiovascular procedure, and those with more surgical procedures were all associated with an increased probability of admission to a hospital other than the closest rural hospital. For example, the odds of admission to an "urban teaching hospital" over their closest rural hospital increased by 48 percent for each additional surgical procedure performed during a hospital stay (OR = 1.48). However, no significant relationship was found between hospital choice and relative case-mix index weights.

Having a regular source of care was negatively associated with the choice of the "other rural hospital" over the closest rural hospital; these odds were 65 percent less for patients with a regular source of care. Similarly, a longer "patient–physician tie" decreased the odds of choosing the "other urban hospital" (OR = 0.48) or "urban teaching hospital" (OR = 0.56) over the "closest rural hospital" alternative.

On the other hand, dissatisfaction with the availability of health care was positively associated with bypassing one's closest rural hospital for an "other rural hospital" (OR = 1.66). Poor travel time access to one's regular doctor was strongly associated with bypassing the closest rural hospital. The odds of

admission to a hospital other than the closest rural hospital ranged from 2.6 times higher (other rural hospital) to nearly 5 times higher (urban teaching hospitals) among patients with long travel times to their regular physician relative to otherwise similar patients with better spatial access to a doctor's office. Since we have no information about physician choice alternatives available to beneficiaries with longer travel times to their regular physician, this greater propensity to bypass one's closest rural hospital could reflect a greater willingness to travel for care perceived to be better, rather than spatial access barriers.

Prior hospital use within a year was very influential in the hospital choice of aged rural Medicare beneficiaries. Previous bypassing of the closest rural hospital within one year had a very strong and positive influence on the likelihood of choosing an "other rural hospital" (OR = 20.6), an "other urban hospital" (OR = 9.1), and an "urban teaching hospital" (OR = 15.2) over the "closest rural hospital" alternative. Furthermore, among patients who did not bypass their closest rural hospital in the past 12 months (i.e., previous bypassing = 0), the significant negative estimated parameter for hospitalization in the past year for the "other rural hospital" alternative suggests that patients hospitalized within the last year in their "closest rural hospital" were less likely to bypass it for admission to an "other rural hospital" (OR = 0.28).

Finally, the choice-specific constants in the estimated model reflect systematic effects of unspecified attributes of the hospital type alternatives revealed by patients' admission choices. The significant negative coefficients estimated for these choice-specific constants are suggestive of a strong underlying preference for admission to one's closest rural hospital among rural Medicare beneficiaries who are hospitalized.

DISCUSSION

This analysis of a national sample confirms many of the findings of earlier studies based on subnational regions. Specifically, the present results confirm the substantial influence that distance and certain hospital (greater size and scope) and patient characteristics (age and income) have on hospital admission choices. The study has produced new insights regarding the influence of functional and socioeconomic status, access barriers, and physician dissatisfaction as well as prior hospitalization on hospital choice.

The results clearly indicate that elderly people with limitations in ADLs are less likely to bypass rural facilities and, yet, many areas lack the long-term

care services needed by these beneficiaries. Rural hospitals can potentially expand new services such as long-term care, development of satellite clinics, and expansion of onsite outpatient capacity (Ormond 2000), but would not likely be able to meet more specialized medical care needs without entering into broader regional cooperatives or networks. Since the present results indicate that rural choice alternatives comprised of more individual hospitals are more likely to be chosen over alternatives with otherwise similar attributes with fewer hospitals, rural hospitals may better respond to patients' needs by entering into broader regional cooperatives or networks. Rural networking efforts can include rural health alliances, sharing of administrative responsibilities, and working with community health centers and health departments.

The study findings are also important to rural communities' efforts to attract and retain local physician practices. These new findings indicate that some aspects of physician availability impact the decisions of rural Medicare beneficiaries to bypass their closest rural hospital. Rural aged Medicare beneficiaries were more likely to bypass their closest rural hospital for inpatient care if they had no regular source of primary care, did not have a longer patient–physician tie, reported dissatisfaction with the availability of health care, and had a longer travel time to their physician's office. The availability and accessibility of local physicians appear to influence patients' decisions, and may indirectly affect the fiscal health of rural hospitals. If dissatisfied rural beneficiaries bypass local hospitals for services that could have been provided locally, this can translate into revenue losses that can affect the "bottom line." The lack of an adequate provider base is also an issue for the expansion of Medicare + Choice to rural areas (Medicare Payment Advisory Commission 2001).

Rural hospitals can perhaps expand rural physician supply by employing doctors, thereby offering them a predictable income and reduced expenses for overhead and equipment. Some hospitals open clinics while others have visiting specialist programs, which involve regularly scheduled visits by specialists from neighborhood counties (Ormond 2000). To the extent that such efforts decrease distance to physicians and improve physician–patient ties among rural Medicare beneficiaries, our study findings suggest they should have favorable impacts on the use of local rural hospitals. Since beneficiaries who bypassed the closest rural hospital previously were more likely to bypass again, efforts that increase admissions to local rural hospitals in the short run may have even greater impacts over the longer run.

This study highlights that the hospital choice of low-income and functionally impaired elderly Medicare beneficiaries is restricted relative to others.

The maintenance of adequate physician supply in rural areas could address the travel barrier directly and also discourage rural hospital bypassing by potentially increasing the number of Medicare enrollees with ties to a regular physician. Dual enrollment in Medicaid can also increase access by reducing the burden of out-of-pocket costs for physician and other services among the poor/near poor rural elderly, while, as our finding indicate, also decreasing the probability of rural hospital bypassing. Efforts to ensure that Medicaid enrollment is procured for eligible elderly should be continued (Rosenbach and Lamphere 1999).

This study is the first to date to use a nationally representative sample of aged rural Medicare beneficiaries to model rural hospital bypassing. While it yields some interesting findings, additional research is warranted to more fully understand the impact of hospital bypassing from both providers' and patients' perspectives. In particular, it is important to better understand the micro-relationships underlying the influence of patient–physician relationships upon hospital admission. Future research should also be directed at comparing utilization, outcomes, and future medical costs of rural hospital bypassers and nonbypassers to identify the potential impacts of rural hospital bypassing on patient welfare.

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