Research Briefs

Rural Veterans and Access to High-Quality Care for High-Risk Surgeries

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Objectives. To determine whether older Veterans Health Administration (VA) health care enrollees obtain most high-risk surgeries in non-VA hospitals under Medicare, whether residence in less populous areas increases this reliance on non-VA care or the likelihood of obtaining it in hospitals with higher mortality rates, and whether directing VA enrollees to better hospitals would add a substantial travel burden.

Data Sources. VA and Medicare hospital discharge data from 2000 and 2001 for VA enrollees 65 years or older who received any of 14 high-risk elective procedures, including heart, vascular, and cancer surgeries.

Study Design/Data Extraction. We compared urban, suburban, and rural patients on use of VA versus non-VA hospitals, use of non-VA hospitals of higher versus lower mortality rates, travel times to get to these hospitals, and the additional travel burden if they had gone to lower mortality hospitals.

Principal Findings. Regardless of residence, VA enrollees obtained most high-risk surgeries in non-VA hospitals. Urban veterans were most likely to get heart or cancer surgeries in lower mortality hospitals, but rural veterans were most likely to get vascular surgeries in lower mortality hospitals. Average travel times to lower or higher mortality hospitals did not differ greatly.

Conclusions. Accessing better hospitals need not add a great travel burden for rural veterans.

Key Words. Veterans, rural, surgical mortality, travel burden

Many veterans enrolled in the Veterans Health Administration (VA) also obtain health care from non-VA providers (Wright et al. 1997, 1999; Weeks et al. 2005a, 2002, 2003, 2006), particularly if they live far from VA care (Lahiri and Xing 2004; Hynes et al. 2007) or have alternative health care insurance, such as Medicare (Veterans' Health Care 1994; Shen et al. 2005). Since the VA's reorganization a decade ago, its high-technology and high-cost specialty services now are provided through regional referral centers, usually located in metropolitan areas. Rural patients often must travel much farther than urban patients to access this care, and therefore rely on it less (Burgess and DeFiore

1994; Mooney et al. 2000; Weeks et al. 2005a; Weeks, Mahar, and Wright 2005b; Wallace et al. 2007); on the other hand, rural residents often have less access to high-quality non-VA care, as well (Heady 2007).

Most VA patients 65 years or older also are enrolled in Medicare (Fisher and Welch 1995; Hynes et al. 2007), and their reliance on Medicare over VA hospitals has grown with time (Wright et al. 1999; Shen et al. 2005); their use of Medicare hospitalizations is at least two to three times higher than their VA utilization (Weeks et al. 2003, 2006; Hynes et al. 2007). Recently, we found (Weeks et al. 2007) that elderly VA enrollees who received any of 14 high-risk surgeries were about six times more likely to obtain them in non-VA hospitals, under Medicare, than in the VA. The non-VA hospitals performing these surgeries varied widely on historical volumes and mortality rates, and if those veterans who went to lower performance hospitals had gone instead to high-performance hospitals, 376–584 deaths in a 2-year period might have been avoided, with minimal additional travel burden. We found, however, no evidence that past performance determined the hospitals chosen for these high-risk surgeries. Here, we report additional analyses to assess whether rural VA enrollees are at a disadvantage in obtaining this care because of greater travel burden, limited choice, or lack of knowledge about hospital quality, which may lead to obtaining high-risk surgeries in hospitals with higher mortality rates.

METHOD

The “VA-Medicare” dataset includes discharge data for all non-VA hospitalizations obtained by veterans enrolled in VA health care for which Medicare claims are submitted (<http://www.virec.research.va.gov/DataSourcesName/VA-MedicareData/Background.htm>). Discharge data for all hospitalizations in

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VA facilities are recorded in VA's Patient Treatment Files (PTF). We acquired the PTF hospitalizations for the federal fiscal years 2000 or 2001 (so our PTF data included all VA acute care admissions beginning between October 1, 1999 and September 30, 2001) and the VA-Medicare hospitalizations for calendar years 2000 or 2001 (admissions beginning any time between January 1, 2000 and December 31, 2001). From either dataset, we drew ICD-9-CM diagnostic and procedural codes for each admission; despite structural differences in the two datasets, the numbers of either diagnostic or procedural codes were comparable. Additional methodological details are described in our related article (Weeks et al. 2007).

Most persons 65 years or older are eligible for Medicare, but younger persons become eligible due to disability only; younger VA enrollees who obtain VA hospitalizations, on the other hand, often are not disabled. Therefore, comparing VA and Medicare utilization among younger veterans may be inappropriate. To eliminate potential age-related bias in our comparisons of VA and Medicare utilization, we selected only those hospitalizations for patients who were 65 years or older on the date of admission. We included both men and women, although these patients were virtually all (>98 percent) males, regardless of the system of care used.

We classified patients as rural, suburban, or urban residents by matching their residence zip codes to Rural-Urban Commuting Area (RUCA) codes (Rural Urban Commuting Area Code 2001). Then, we applied the Washington State Department of Health's RUCA consolidation system (WWMAI Rural Health Research Center 2004) to define three groups of veterans: (1) those living in urban areas of 50,000 persons or more (RUCA codes 1.0 and 1.1, corresponding to the U.S. Census Bureau's Urbanized Areas); (2) suburban residents living in small cities/large towns (RUCA codes 2.0, 2.1, 3.0, 4.0, 4.1, 4.2, 5.0, 5.1, 5.2, 6.0, 6.1, 7.1, 7.2, 8.1, 8.2, 10.1, and 10.2); and (3) rural veterans living in small towns with populations below 10,000 or in isolated rural areas (RUCA codes 7.0, 7.3, 7.4, 8.0, 8.3, 8.4, 9.0, 9.1, 9.2, 10.0, 10.3, 10.4, 10.5, and 10.6). During the 2-year span, VA enrollees 65 or older with residence zip codes available (>96 percent of admissions) had 2,332,115 hospitalizations in the VA-Medicare data (1,241,489 for urban, 575,006 for suburban, and 515,620 for rural residents) and 495,487 PTF admissions (289,098 for urban, 110,122 for suburban, and 96,267 for rural residents).

We searched each admission in either dataset for 14 high-risk elective surgical procedures, including three types of heart surgery, three vascular surgeries, and eight cancer resections. These procedures, with their corresponding ICD-9-CM codes, as well as codes for required or excluded con-

comitant procedures or diagnoses, are listed in Table 1. Each admission was coded for either the occurrence or nonoccurrence of each procedure during the hospitalization. We selected these surgeries because they have nontrivial risk-adjusted mortality rates that vary substantially from hospital to hospital (Birkmeyer et al. 2002), and their mortality rates in prior years predict subsequent hospital performance (Birkmeyer, Dimick, and Staiger 2006), so

Table 1: Criteria to Identify 14 High-Risk Surgical Procedures in Discharge Data

<i>Procedure</i>	<i>ICD-9-CM Codes</i>	<i>Specifications</i>	<i>Number of VA Medical Centers Performing More Than 2 in 2 Years</i>
<i>Elective heart surgery</i>			44
Mitral valve replacement	35.21 or 35.22	None	33
Aortic valve replacement	35.23 or 35.24	None	44
Coronary artery bypass grafting (CABG)	36.10–36.19	Exclude concomitant valve repair (35.11–35.14, 35.21–35.25, 35.28)	44
<i>Vascular surgery</i>			89
Carotid endarterectomy	38.12	None	87
Elective abdominal aortic aneurysm (AAA) repair	38.44 or 39.25 without 38.45 also	Include AAA without rupture (441.4, 441.7, 441.9) but not other 441s	80
Lower extremity bypass	39.29	Exclude upper extremity arteries (444.21) and end-stage renal disease (ESRD) (585 or 586)	88
<i>Cancer resection</i>		Include only with concomitant	111
Lobectomy	32.4	Lung cancer (162–165.9)	74
Pneumonectomy	32.5	Lung cancer (162–165.9)	17
Esophagectomy	42.40–42.42, 43.99	Esophageal cancer (150–150.9)	16
Gastrectomy	43.5–43.99	Stomach cancer (151–151.9)	42
Colectomy	45.73–45.76	Colon cancer (153–153.9, 154.0)	111
Pancreatic resection	52.51, 52.53, 52.7	Duodenal, biliary, or pancreatic cancer (152–152.9, 156–157.9)	12
Nephrectomy	55.51 or 55.52	Kidney or urinary cancer (189–189.9)	73
Cystectomy	57.7–57.79	Bladder, kidney, or urinary cancer (188–189.9)	43

efforts to direct patients to high-performance hospitals could be achieved effectively despite the lag time needed to determine historical mortality rates. Table 1 also shows the numbers of VA medical centers (VAMCs) that performed more than two of any of these procedures during federal fiscal years 2000 and 2001. Fewer VAMCs performed heart surgeries than vascular surgeries, and although the highest number of VAMCs performed at least one type of cancer surgery (colectomy), for other cancer resections the number of providing VAMCs generally was considerably lower. We would anticipate, therefore, that reliance on non-VA care would be greatest for heart surgeries. On the other hand, if vascular surgeries are more widely available in the VA, then for these procedures differences in the quality of non-VA care might have greater impact on choosing non-VA hospitals.

Applying the established method (Birkmeyer et al. 2002; Birkmeyer, Dimick, and Staiger 2006), we assigned non-VA hospitals to mortality quintiles, with mortality defined as death during hospitalization or within 30 days of discharge: For each type of surgery, all non-VA hospitals nationwide that Medicare reimbursed for providing it, and which performed a minimum of 30 surgeries during a given year, were assigned to quintiles based on mortality rates risk adjusted for age, gender, and comorbidities. Hospitals were ranked separately for 2000 and 2001, based on their mortality rates during prior 3-year spans. For each procedure and year, we combined quintiles to define a group of "higher performance" hospitals (the two quintiles, or 40 percent of hospitals, with the lowest mortality rates) and a group of "lower performance" hospitals (the remaining three quintiles). Each high-risk surgery in our VA-Medicare dataset was then defined as having been performed in a higher or lower performance hospital.

For each non-VA surgery, we also calculated the quickest travel time in minutes from the patient's residence to the hospital where care was provided, using a methodology that accounts for actual routes, road types and conditions, speed limits, and traffic congestion between zip code centroids (Birkmeyer et al. 2003). For those surgeries that were performed in average or higher mortality hospitals, we also calculated travel time from the patient's residence to the nearest lower mortality hospital providing that type of surgery.

For each type of surgery separately, and for the combined counts for the heart surgeries, the vascular surgeries, and the cancer resections, we used χ^2 analyses to compare urban, suburban, and rural veterans on their utilization of VA versus non-VA care, and their utilization of non-VA hospitals of lower versus average or higher mortality. We also used general linear models analysis of variance to (a) compare their actual travel times to higher or lower

performance non-VA hospitals, and (b) compare urban, suburban, and rural veterans who had obtained care in lower performance hospitals on the additional travel times that they would have incurred had they instead gone to the nearest higher performance hospital providing the same type of surgery. We calculated utilization percentages and travel time means and 25th and 75th percentiles (interquartile ranges) for display in the tables below. All analyses were conducted using SAS version 9.1.

RESULTS

The columns in the left half of Table 2 show, for each procedure type, ratios of non-VA to VA admissions, and the percentages of all admissions that were non-VA, for urban, suburban, and rural residents, with the statistical significance of χ^2 tests comparing them. We found little absolute difference and no consistent trends in veterans' reliance on non-VA care associated with living in a rural as opposed to an urban or suburban setting. Overall, VA enrollees obtained 89 percent of their heart surgeries, 84 percent of their vascular surgeries, and 79 percent of their cancer resections in non-VA hospitals. For most procedures, residents of different settings varied in their reliance on non-VA care by a few percentage points at most, and although some significant differences emerged, they were inconsistent: compared with urban veterans, rural and suburban veterans were less likely to use non-VA care for carotid endarterectomy, elective abdominal aortic aneurysm (AAA) repair, and nephrectomy, but more likely to use non-VA care for coronary artery bypass graft (CABG) and lower extremity bypass.

The right hand columns of Table 2 show the ratios of admissions to higher versus lower performance non-VA hospitals, and the percentages of all non-VA admissions that were in higher performance hospitals. Because our definition of higher performance comprises those hospitals in the best two quintiles, by chance the percentages should be 40 percent. Although percentages generally did not deviate greatly from 40 percent, urban-rural differences among them were more consistent: compared with rural or suburban VA enrollees, urban veterans were more likely to obtain heart surgeries in higher performance hospitals; this difference, however, was statistically significant only for CABG. Urban veterans also were more likely to go to higher performance hospitals for cancer resections, particularly for colectomy, esophagectomy, and pancreatic resection (although the large percentage differences for the latter two procedures are suspect due to small sample sizes).

Table 2: Numbers of Admissions in 2000 and 2001 for Each Procedure Type, for Urban, Suburban, or Rural Veterans to (a) Non-V A (Medicare) or V A Hospitals, and (b) Non-V A Hospitals with Higher versus Lower Performance (i.e., Lower Mortality versus Average or Higher Mortality Rates)

Procedure	(a) Non-V A Admissions/V A Admissions (% Non-V A)				(b) Non-V A Admissions to High-Performance/Low-Performance Hospitals (% in High Performance)			
	Urban	Suburban	Rural	χ^2 Significance	Urban	Suburban	Rural	χ^2 Significance
Elective heart surgery	27,488/3,382 (89.0%)	14,317/1,649 (89.7%)	12,110/1,457 (89.3%)	NS	10,961/15,554 (41.3%)	5,502/8,093 (40.5%)	4,616/6,886 (40.1%)	NS
Mitral valve replacement	1,171/128 (90.1%)	545/70 (88.6%)	474/47 (91.0%)	NS	450/669 (40.2%)	209/298 (41.2%)	174/270 (39.2%)	NS
Aortic valve replacement	4,245/566 (88.2%)	1,942/292 (86.9%)	1,688/267 (86.3%)	NS	1,611/2,523 (39.0%)	752/1,097 (40.7%)	628/1,000 (38.6%)	NS
Coronary artery bypass grafting (CABG)	22,072/2,688 (89.1%)	11,830/1,287 (90.2%)	9,948/1,143 (89.7%)	$p < .01$	8,900/12,362 (41.9%)	4,541/6,698 (40.4%)	3,814/5,616 (40.5%)	$p < .05$
Vascular surgery	22,755/4,177 (84.5%)	11,609/2,060 (84.9%)	9,624/1,912 (83.4%)	$p < .01$	8,883/13,649 (39.4%)	4,641/6,712 (40.9%)	3,906/5,499 (41.5%)	$p < .001$
Carotid endarterectomy	12,441/2,135 (85.4%)	6,903/1,184 (85.4%)	5,721/1,130 (83.5%)	$p < .001$	4,808/7,520 (39.0%)	2,827/3,920 (41.9%)	2,304/3,281 (41.3%)	$p < .0001$
Elective abdominal aortic aneurysm (AAA) repair	3,366/563 (85.7%)	1,822/363 (83.4%)	1,493/328 (82.0%)	$p < .001$	1,336/2,000 (40.1%)	693/1,089 (38.9%)	659/808 (44.9%)	$p < .001$
Lower extremity bypass	6,948/1,479 (82.4%)	2,884/513 (84.9%)	2,410/454 (84.2%)	$p < .01$	2,739/4,129 (39.9%)	1,121/1,703 (39.7%)	943/1,410 (40.1%)	NS

continued

Table 2: Continued

Procedure	(a) Non-VA Admissions/VA Admissions (% Non-VA)				(b) Non-VA Admissions to High-Performance/Low-Performance Hospitals (% in High Performance)			
	Urban	Suburban	Rural	χ^2 Significance	Urban	Suburban	Rural	χ^2 Significance
Cancer resection	9,386/2,529 (78.8%)	4,346/1,106 (79.7%)	3,625/1,045 (77.6%)	$p < .05$	3,839/5,352 (41.8%)	1,620/2,616 (38.2%)	1,337/2,147 (38.4%)	$p < .0001$
Lobectomy	1,731/441 (79.7%)	838/204 (80.4%)	735/201 (78.5%)	NS	693/1,011 (40.7%)	331/490 (40.3%)	286/434 (39.7%)	NS
Pneumonectomy	181/66 (73.3%)	98/30 (76.6%)	106/29 (78.5%)	NS	66/101 (39.5%)	41/49 (45.6%)	41/55 (42.7%)	NS
Esophagectomy	177/69 (72.0%)	73/28 (72.3%)	76/25 (75.3%)	NS	73/76 (49.0%)	29/36 (44.6%)	18/48 (27.3%)	$p < .05$
Gastrectomy	670/166 (80.1%)	268/44 (85.9%)	187/42 (81.7%)	NS	262/389 (40.3%)	89/163 (35.3%)	68/96 (41.5%)	NS
Colectomy	4,566/1,327 (77.5%)	2,209/571 (79.5%)	1,809/541 (77.0%)	NS	1,922/2,611 (42.4%)	810/1,377 (37.0%)	675/1,089 (38.3%)	$p < .0001$
Pancreatic resection	256/56 (82.1%)	106/23 (82.2%)	82/17 (82.8%)	NS	111/113 (49.6%)	31/66 (32.0%)	28/42 (40.0%)	$p < .05$
Nephrectomy	1,451/276 (84.0%)	598/153 (79.6%)	504/138 (78.5%)	$p < .01$	575/846 (40.5%)	231/355 (39.4%)	176/311 (36.1%)	NS
Cystectomy	354/128 (73.4%)	156/53 (74.6%)	126/52 (70.8%)	NS	137/205 (40.1%)	58/80 (42.0%)	45/72 (38.5%)	NS

Conversely, rural veterans were consistently more likely than urban veterans to get vascular surgeries in higher performance hospitals.

To estimate access to high-risk surgical care, we compared urban, suburban, and rural patients on the number of minutes they traveled to reach higher versus lower performance non-VA hospitals. For each major category of surgery (heart, vascular, or cancer), Table 3 shows actual travel time

Table 3. Travel Times to Reach Non-VA Hospitals

			Average Minutes of Travel (Interquartile Range)			
			Residence	Urban	Suburban	Rural
Elective heart surgeries	(a) Minutes actually traveled to reach hospitals whose performance was*:	Higher	24.3 (7.1–22.8)	54.2 (18.6–65.6)	79.6 (41.0–101.3)	
		Lower	27.1 (7.0–22.7)	57.3 (21.8–70.1)	80.5 (43.7–100.9)	
	(b) Additional travel time if redirected to nearest higher performance hospital [†]		20.6	30.1	30.9	
Vascular surgeries	(a) Minutes actually traveled to reach hospitals whose performance was*:	Higher	25.4 (7.2–22.7)	53.9 (17.8–63.2)	76.9 (38.4–96.0)	
		Lower	25.1 (7.1–22.0)	53.7 (19.0–64.4)	75.0 (38.7–94.4)	
	(b) Additional travel time if redirected to nearest higher performance hospital [†]		– 1.9	– 4.0	– 6.7	
Cancer resections	(a) Minutes actually traveled to reach hospitals whose performance was*:	Higher	26.3 (7.0–23.2)	55.9 (18.7–65.4)	77.2 (36.0–96.6)	
		Lower	27.1 (7.0–23.2)	51.9 (18.1–62.3)	71.8 (32.2–93.3)	
	(b) Additional travel time if redirected to nearest higher performance hospital [†]		– 0.2	1.1	– 1.2	

*Average minutes actually traveled (with interquartile range) to reach hospitals with higher performance (lower mortality) rates or those with lower performance (average or higher mortality) rates.

[†]Average additional travel minutes that would have been required if those patients who used lower performance hospitals had used the nearest higher performance hospital instead.

averages and interquartile ranges for admissions to either higher or lower performance hospitals (i.e., in the rows beginning with “(a) Minutes actually traveled . . .”). Travel times were submitted to general linear model analyses of variance with residence and hospital performance level as crossed factors. For each surgical category, the main effect of residence was highly significant ($p < .0001$), indicating that, as expected, urban veterans had the least, and rural veterans the greatest, travel burdens. More noteworthy is the finding that for heart surgeries, travel times to get to higher performance hospitals actually were a few minutes shorter, on average ($p < .0001$), regardless of residence. Hospital performance did not significantly affect travel times to obtain vascular surgeries, while for cancer resections, performance and residence interacted ($p < .05$), because suburban and rural veterans who went to higher performance hospitals traveled a few minutes longer. Mean travel times for urban veterans consistently fell above the interquartile ranges; this skewness indicates that some urban veterans opted for care in hospitals (of either lower or higher mortality) at considerable distance from their homes. We note, however, that regardless of the surgical procedure, only about one percent of driving times ever exceeded 4 hours; it is possible, although unknowable, that some of these extreme travel times arise due to zip codes that represent patients’ second or vacation homes rather than their primary residences—in any event, because these extreme values are rare, the impact of “snowbirds” on our results is likely to be negligible.

For those patients who went to lower performance hospitals, we considered how long they would have traveled if they had gone instead to the nearest higher performance hospital; for each major category of surgery, Table 3 also shows the average difference between potential and actual travel times (i.e., in the rows beginning with “(b) Additional travel time . . .”). For heart surgeries, the additional travel burden would have been about 20 minutes for urban veterans and a half an hour for suburban and rural dwelling veterans ($p < .0001$ for this residence effect). If those who went to lower performance hospitals for vascular surgeries had been redirected to higher performance care, their travel times would have been reduced slightly, especially if they lived in more rural settings ($p < .0001$). Redirection to higher performance cancer care would have affected average travel times very little.

DISCUSSION

Regardless of whether they live in rural, suburban, or urban settings, elderly VA enrollees obtain most of these high-risk surgeries in non-VA hospitals.

Furthermore, their non-VA surgeries generally are obtained in higher performance hospitals about as often as would be expected by chance. This result suggests that neither veterans nor their referring physicians have been selecting non-VA hospitals for high-risk surgeries on the basis of the hospitals' past performance. Nevertheless, the likelihood that VA enrollees will use higher or lower performance non-VA hospitals is influenced to some extent by where they live, at least for some types of surgeries: although percentage differences are not great, rural veterans are more likely than others to obtain vascular surgeries, but less likely to get cancer resections, in higher performance hospitals. Additionally, suburban and rural veterans obtain some cancer resections in the better hospitals less often than chance would predict. Together these findings suggest that veterans might benefit from an effort to direct them to higher performance hospitals for these high-risk surgeries, and that this effort might best be initiated by focusing on veterans living beyond urban areas.

On average, to get to non-VA surgical care, rural VA enrollees must travel about 20 minutes longer than suburban enrollees, who in turn must travel about 30 minutes longer than urban enrollees. But no matter where they live, veterans generally must travel about as long to get to higher performance hospitals as to reach lower performance hospitals. If those who were treated in lower performance hospitals had instead gone to the higher performance hospitals nearest to their homes, travel times to heart surgeries would have increased by 20–30 minutes on average, but the effect on travel to vascular or cancer surgeries would have been negligible. Because fewer VAMCs perform heart surgeries, and therefore enrollees rely somewhat more heavily on non-VA care for them than for other high-risk surgeries, the increased travel burden to obtain them in better hospitals is significant. But in general, as we have found previously (Weeks et al. 2006, 2007), directing veterans to higher performance non-VA hospitals for high-risk surgeries would not add substantially to their, or their families', travel burden.

One of the limitations of this study is that we restricted our analysis to patients of ages 65 and older, because younger Medicare enrollees must be disabled and therefore would not be comparable to younger VA inpatients generally. Younger veterans often require these procedures as well (Weeks et al. 2006), and they are as likely to be hospitalized in non-VA hospitals as in the VA (West and Weeks 2007). But we do not know if our findings would generalize to them. Second, although gender was incorporated into the risk-adjustment methodology, the risk-adjusted mortality rates that we used to rank Medicare hospitals were not specific to males. This raises the possibility that hospital performance levels may be different for VA enrollees who use

Medicare, the overwhelming majority of whom are males. We have shown elsewhere that being a VA patient does not contribute independently to a clinical risk-adjustment model that New York State applies to CABG care (Weeks et al. 2005), but a recent study (Vaughan-Sarrazin, Wakefield, and Rosenthal 2007) found that Medicare beneficiaries who obtain private sector CABGs or percutaneous coronary interventions may have a slightly higher mortality risk if they also are enrolled in VA health care.

The VA has committed to providing safe, high-quality care to its enrolled service population. As we have suggested elsewhere (Weeks et al. 2006, 2007; Weeks and Fisher 2007), because VA enrollees obtain most of their hospitalizations in the private sector, one effective mechanism to meet this obligation may be to direct veterans to better care beyond the VA's walls, and its impact may be larger and require less investment than additional efforts at quality improvement within the VA. Through cooperative efforts between the VA and Medicare, the VA may be able to influence where veterans choose to obtain their non-VA care, and demonstration projects may well be undertaken to determine rural veterans' response to such programs. We know neither the specific mechanism that might induce veterans to select the better non-VA hospitals for care, nor the degree to which veterans would be willing to heed such recommendations. But the VA, Medicare, and particularly veterans would all benefit from the improved outcomes that directing patients to higher performance non-VA care would likely yield. The good news for veterans is that, regardless of where they live, if they obtain care for these procedures from high-performance hospitals, they should experience a lower mortality risk, without needing to drive much further.

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REFERENCES

- Birkmeyer, J. D., J. B. Dimick, and D. O. Staiger. 2006. "Operative Mortality and Procedure Volume as Predictors of Subsequent Hospital Performance." *Annals of Surgery* 243: 411–7.
- Birkmeyer, J. D., A. E. Siewers, E. V. Finlayson, T. A. Stukel, F. L. Lucas, I. Batista, H. G. Welch, and D. E. Wennberg. 2002. "Hospital Volume and Surgical Mortality in the United States." *New England Journal of Medicine* 346 (15): 1128–37.
- Birkmeyer, J. D., A. E. Siewers, N. Marth, and D. C. Goodman. 2003. "Regionalizing High Risk Surgery and Implications for Patient Travel Times." *Journal of the American Medical Association* 290: 2703–8.
- Burgess, J., and D. DeFiore. 1994. "The Effect of Distance to VA Facilities on the Choice and Level of Utilization of VA Outpatient Services." *Social Science and Medicine* 39: 95–104.
- Fisher, E. S., and H. G. Welch. 1995. "The Future of the Department of Veterans Affairs Health Care System." *Journal of the American Medical Association* 10 (4): 869–78.
- Heady, H. R. 2007. "Rural Veterans: A Special Concern for Rural Health Advocates." National Rural Health Associates Issue Paper, February 2007 [accessed on May 21, 2008]. Available at www.nrharural.org/go/left/policy-and-advocate/rural-health-policy.board/issues-papers-and-policy-brief
- Hynes, D. M., K. Koelling, K. Stroupe, N. Arnold, K. Mallin, M.-W. Sohn, F. M. Weaver, L. Manheim, and L. Kok. 2007. "Veterans' Access to and Use of Medicare and Veterans Affairs Health Care." *Medical Care* 45 (3): 214–23.
- Lahiri, K., and G. Xing. 2004. "An Econometric Analysis of Veterans' Health Care Utilization Using Two-Part Models." *Empirical Economics* 29: 431–49.
- Mooney, C., J. Zwanziger, C. Phibbs, and S. Schmitt. 2000. "Is Travel Distance a Barrier to Veterans' Use of VA Hospitals for Medical Surgical Care?" *Social Science and Medicine* 50: 1743–55.
- Rural Urban Commuting Area Code. 2001. Volume 2004. Economic Research Service of the U.S. Department of Agriculture.
- Shen, Y., A. Hendricks, L. Duozhe, J. Gardner, and L. Kazis. 2005. "VA-Medicare Dual Beneficiaries' Enrollment in Medicare HMOs: Access to VA, Availability of HMOs, and Favorable Selection." *Medical Care Research and Review* 62 (4): 479–95.
- Vaughan-Sarrazin, M. S., B. Wakefield, and G. E. Rosenthal. 2007. "Mortality of Department of Veterans Affairs Patients Undergoing Coronary Revascularization in Private Sector Hospitals." *Health Services Research* 42 (5): 1802–21.
- Veterans' Health Care. 1994. *Veterans' Health Care: Use of VA Services by Medicare-Eligible Veterans*. (GAO/HEHS-95-13, October 24, 1994). Washington, DC: United States General Accounting Office.
- Wallace, A. E., A. N. West, B. M. Booth, and W. B. Weeks. 2007. "Unintended Consequences of Regionalizing Specialized VA Addiction Services." *Psychiatric Services* 58 (5): 668–74.

- Weeks, W. B., D. A. Bazos, D. M. Bott, R. Lombardo, M. J. Racz, E. L. Hannan, and E. S. Fisher. 2005c. "New York's Statistical Model Accurately Predicts Mortality Risk for Veterans Who Obtain Private Sector CABG." *Health Services Research* 40 (4): 1186–96.
- Weeks, W. B., D. M. Bott, D. A. Bazos, S. L. Campbell, R. Lombardo, M. J. Racz, E. L. Hannan, S. M. Wright, and E. S. Fisher. 2006. "VA Patients' Use of the Private Sector for Coronary Revascularization in New York: Opportunities to Improve Outcomes by Directing Care to High Performance Hospitals." *Medical Care* 44 (6): 519–26.
- Weeks, W. B., D. M. Bott, R. P. Lamkin, and S. M. Wright. 2005a. "Veterans Health Administration and Medicare Outpatient Health Care Utilization by Older Rural and Urban New England Veterans." *Journal of Rural Health* 21 (2): 167–71.
- Weeks, W. B., and E. S. Fisher. 2007. "Characteristics of VA Patients Who Use Low Quality Private Sector CABG Centers in New York." *Medical Care Research and Review* 64 (6): 691–705.
- Weeks, W. B., P. J. Mahar, and S. M. Wright. 2005b. "Utilization of VA and Medicare Services by Medicare-Eligible Veterans in Northern New England: The Impact of Additional Access Points in a Rural Setting." *Journal of Health Care Management* 50 (2): 95–106.
- Weeks, W. B., D. J. O'Rourke, L. B. Ryder, and M. M. Straw. 2002. "Veterans' Care Preference for Coronary Artery Bypass Grafting in a Rural Setting." *Military Medicine* 167 (7): 556–9.
- . 2003. "Veterans' System-of-Care Preferences for Percutaneous Transluminal Coronary Angioplasty in a Rural Setting." *Journal of Rural Health* 19 (2): 105–8.
- Weeks, W. B., A. N. West, A. E. Wallace, R. E. Lee, D. C. Goodman, J. B. Dimick, and J. P. Bagian. 2007. "Reducing Avoidable Deaths among Veterans: Directing Private-Sector Surgical Care to High-Performance Hospitals." *American Journal of Public Health* 97: 2186–92.
- West, A. N., and W. B. Weeks. 2007. "Who Pays When VA Users Are Hospitalized in the Private Sector? Evidence from Three Data Sources." *Medical Care* 45: 1003–7.
- Wright, S. M., J. Daley, E. S. Fisher, and G. E. Thibault. 1997. "Where Do Elderly Veterans Obtain Care for Acute Myocardial Infarction: Department of Veterans Affairs or Medicare?" *Health Services Research* 31 (6): 739–54.
- Wright, S. M., L. A. Petersen, R. P. Lamkin, and J. Daley. 1999. "Increasing Use of Medicare Services by Veterans with Acute Myocardial Infarction." *Medical Care* 37 (6): 529–37.
- WWMRI Rural Health Research Center. 2004. ZIP Code RUCA Approximation Methodology, Volume 2004.

SUPPLEMENTARY MATERIAL

The following supplementary material for this article is available online:
Appendix SA1. Author Matrix.

This material is available as part of the online article from <http://www.blackwell-synergy.com/doi/abs/10.1111/j.1475-6773.2008.00876.x>
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