Fee-based Care is Important for Access to Prompt Treatment of Hip Fractures Among Veterans

Kelly K. Richardson PhD, Peter Cram MD,
Mary Vaughan-Sarrazin PhD, Peter J. Kaboli MD, MS

Received: 19 April 2012 / Accepted: 2 January 2013 / Published online: 16 January 2013
© The Association of Bone and Joint Surgeons® 2013

Abstract

Background Hip fracture is a medical emergency for which delayed treatment increases risk of disability and death. In emergencies, veterans without access to a Veterans Administration (VA) hospital may be admitted to non-VA hospitals under fee-based (NVA-FB) care paid by the VA. The affect of NVA-FB care for treatment and outcomes of hip fractures is unknown.

Questions/Purposes This research seeks to answer three questions: (1) What patient characteristics determine use of VA versus NVA-FB hospitals for hip fracture? (2) Does time between admission and surgery differ by hospital (VA versus NVA-FB)? (3) Does mortality differ by hospital?

Methods Veterans admitted for hip fractures to VA (n = 9308) and NVA-FB (n = 1881) hospitals from 2003 to 2008 were identified. Primary outcomes were time to surgery

and death. Logistic regression identified patient characteristics associated with NVA-FB hospital admissions; differences in time to surgery and death were evaluated using Cox proportional hazards regression, controlling for patient covariates.

Results Patients admitted to NVA-FB hospitals were more likely to be younger, have service-connected disabilities, and live more than 50 miles from a VA hospital. Median days to surgery were less for NVA-FB admissions compared with VA admissions (1 versus 3 days, respectively). NVA-FB admissions were associated with 21% lower relative risk of death within 1 year compared with VA hospital admissions.

Conclusions For veterans with hip fractures, NVA-FB hospital admission was associated with shorter time to surgery and lower 1-year mortality. These findings suggest fee-based care, especially for veterans living greater

The institution of one or more of the authors (KKR, MV-S, PC, PJK) has received, during the study period, funding from the U.S. Department of Veterans Affairs. This study was supported by the Department of Veterans Affairs, Veterans Health Administration, Office of Rural Health, Veterans Rural Health Resource Center-Central Region, and the Health Services Research and Development Service, Department of Veterans Affairs, Comprehensive Access & Delivery Research and Evaluation (CADRE) Center at the Iowa City VAMC (REA 09-220). The authors do not have any conflicts of interest or financial relationships related to the content of this manuscript. The authors had full access to and take full responsibility for the integrity of the data. The views expressed in this article are those of the authors and do not necessarily represent the views of the Department of Veterans Affairs.

All ICMJE Conflict of Interest Forms for authors and Clinical Orthopaedics and Related Research editors and board members are on file with the publication and can be viewed on request. Each author certifies that his or her institution approved or waived approval for the human protocol for this investigation and that all investigations were conducted in conformity with ethical principles of research.

This work was performed at the Comprehensive Access & Delivery Research and Evaluation Center, Iowa City VA Healthcare System, Iowa City, IA, USA

K. K. Richardson, P. Cram, M. Vaughan-Sarrazin,
P. J. Kaboli (✉)
Comprehensive Access & Delivery Research and Evaluation
Center, Iowa City VA Healthcare System, Mailstop 152,
601 Highway West, Iowa City, IA 52246, USA
e-mail: peter.kaboli@va.gov

K. K. Richardson, P. Cram, M. Vaughan-Sarrazin, P. J. Kaboli
Veterans Rural Health Resource Center - Central Region, Iowa
City VA Healthcare System, Iowa City, IA, USA

P. Cram, M. Vaughan-Sarrazin, P. J. Kaboli
University of Iowa Carver College of Medicine,
Iowa City, IA, USA

distances from VA hospitals, may improve access to care and health outcomes.

Level of Evidence Level II, prognostic study. See the Guidelines for Authors for a complete description of levels of evidence.

Introduction

A hip fracture is a common emergency condition that, if not promptly treated, poses substantial risk for subsequent complications [4, 5, 18]. Hip fractures have been associated with a 25% reduction in life expectancy and 17% increased likelihood of impaired functioning to the point that placement in a nursing facility is required; disability and death are even greater among the elderly [10, 37]. Hip fracture treatment poses a particular challenge to the Veterans Administration (VA) healthcare system and the 5.5 million veterans it serves annually. Specifically, VA provides care through 129 acute-care hospitals, located across the United States, and more than 1000 community-based outpatient clinics. This network of hospitals and clinics functions well for delivering chronic care and provision of elective surgeries, but the delivery of emergency services is a challenge. Nearly $\frac{2}{3}$ of VA enrollees reside more than 30 minutes from the nearest VA hospital [6], and some VA hospitals are not equipped to handle all emergencies. Thus, a VA hospital may not be the optimal setting for all emergency conditions.

To improve access in emergency situations, federal legislation passed in November 1999 allows the VA to pay for emergency treatment of veterans at non-VA hospitals if there are no VA hospitals available at the time of the emergency to treat the condition. This care, referred to as non-VA fee-based (NVA-FB) care, takes place in non-VA hospitals and is paid for by the VA as part of the veteran's healthcare benefits. If disparate outcomes result from delayed treatment, the ability to use private-sector facilities for emergency situations should decrease mortality and other disabilities associated with delay. Hip fractures are usually emergencies that are sensitive to timely management, making them an ideal condition for studying the impact of the availability of fee-based care.

We therefore sought to determine (1) whether patient characteristics, including age, race, sex, income, distance to nearest VA facility, and comorbidity, predict the use of VA hospitals versus non-VA fee-based hospitals in cases of hip fracture, (2) whether the time between hospital admission and surgical repair of hip fracture differ by hospital admission type (VA versus NVA-FB), and (3) whether patient mortality differs by hospital admission type.

Patients and Methods

This retrospective comparative study used four complementary data sources from VA administrative data files to study veterans with acute hip fractures: (1) VA and non-VA Fee-based Patient Treatment Files (PTF), (2) Outpatient Care Dataset (OPC), (3) Professional Fee Basis File, and (4) Vital Status File for fiscal years 2003 through 2008 (October 1, 2002 - September 30, 2008). The VA and non-VA PTF include all admissions to VA facilities and non-VA facilities paid on a fee bases. Additional services provided on a fee basis are identified in the Professional Fee Basis File available through the VA Health Economic Resource Center (HERC; <http://www.herc.research.va.gov/home/default.asp>). The data included patient demographics (ie, age, sex, race, and zip code), veteran characteristics (eg, service-related disability), ICD-9-CM diagnoses codes and associated dates of surgery, and hospital admission and discharge dates. Dates of death were obtained from the Vital Status File.

We identified all the patients with hip fractures admitted to VA and NVA-FB hospitals with ICD-9-CM codes 820.00–820.09, 820.20–820.22, 820.8, and 820.2 ($n = 11,189$). Overall, 83% of the patients were admitted to VA hospitals ($n = 9308$) and 17% were admitted to NVA-FB hospitals ($n = 1881$). Patients who were transferred to the hospital from another hospital or were admitted with ICD-9-CM trauma codes (E800–E848, E881–E884, E908–E909, E916–E928) were excluded.

Hip fracture surgery was defined as having an internal fixation of the femur, closed reduction with an internal fixation of the femur, open reduction without an internal fixation of the femur, and a total hip replacement or a partial hip replacement (ICD-9-CM procedure codes 7855, 7915, 7935, 8151, 8152, or CPT codes 27235, 27236, 27244, 27245, 27125, 27130). The time to hip surgery was defined as the number of days between the hospital admission date and surgery. Death was coded if it occurred within 1 year of the initial hip fracture.

To answer our first research question, we investigated patient characteristics related to the relative likelihood of admission to NVA-FB hospitals. Patient characteristics included race (categorized as white, black, and other non-white), gender, means category (categorized as eligible for VA owing to service-connected injury, eligible owing to low income, and all other eligibility criteria); distance to nearest VA hospital (based on miles between residence and hospital zip codes, and categorized as less than 6 miles, 6–15 miles, 16–50 miles, 51–90 miles, and more than 90 miles), comorbid conditions defined by previously published algorithms [22], and age (treated as continuous). Analysis used chi-square statistics for categorical variables and t-tests for continuous variables. Multivariable logistic

regression examined patient characteristics that were related to the use of NVA-FB hospitals, with particular attention to the distance from the nearest VA hospital. Variables for the logistic regression models were selected based on a multistep process that included reviewing prior literature to identify variables known to predict the use of private-sector hospitals by VA patients, analyzing bivariate relationships to identify patient characteristics related to ($p < .05$) admission to a NVA-FB hospital, examining variable collinearity, and identifying variables that were independently related to admission to a NVA-FB hospital ($p < .01$) using a stepwise selection process.

We investigated differences in time to hip surgery for patients admitted to VA and NVA-FB hospitals using Kaplan–Meier estimates. Subsequently, Cox proportional hazards regression was used to evaluate the relative hazard of hip surgery for patients admitted to NVA-FB hospitals versus VA hospitals. Relative hazards were estimated using three time-dependent covariates representing hip repair surgery within 0–1 days, 2–5 days, and more than 5 days after hospital admission. These times were selected in part owing to current medical guidelines with respect to timely surgery after hip fracture and partly because of trends identified in our data. Although there is some disagreement in the literature regarding the definition of early treatment, current guidelines suggest 24 hours as the target to perform surgery on patients with hip fractures to reduce the risk of mortality and other morbidities resulting from delay [14, 20, 27]. We added two additional cutoffs, 2–5 days and more than 5 days, after inspecting the data for time-sensitive relationships between type of hospital and time to surgery.

The patient risk factors for Cox models were identified using steps similar to those used for models that predict the likelihood of a patient's admission to a NVA-FB hospital, including literature review, bivariate analyses to identify candidate variables, and stepwise selection in multivariable models. Variables in the final Cox models included age, race, sex, means category, and comorbid conditions (eg, malignancy).

Finally, we evaluated differences in mortality within 1 year of the hip fracture admission using bivariate analyses and multivariable Cox regression models as described above. The data analysis for this paper was generated using SAS[®] software, Version 9 of the SAS[®] System for Windows[®] (SAS Institute Inc, Cary, NC, USA).

Results

Characteristics of patients admitted to VA and NVA-FB hospitals for hip fracture surgery are shown (Table 1). Patients were more likely to be admitted to NVA-FB

hospitals if they were younger, had service-related disabilities, were white, had higher incomes, and lived greater distances from a VA hospital. Notably, of the 9308 patients admitted to VA hospitals, only 3% lived more than 90 miles away, while 14% of patients who were admitted to NVA-FB hospitals lived greater than 90 miles away.

In multivariable analyses (Table 2), the likelihood of a patient's admission to a NVA-FB hospital increased as the patient's distance from a VA hospital increased. Specifically, for veterans living 16–50 miles away, the odds of admission to a NVA-FB hospital was 1.2 times higher than for patients living within 5 miles of the hospital ($p = 0.01$), 1.9 times higher if a patient lived 51–90 miles away ($p < 0.001$), and five times higher for patients living more than 90 miles from the closest VA hospital ($p < 0.001$). Blacks (OR = 0.56; 95% CI, 0.45–0.71) and Hispanics (OR = 0.62; 95% CI, 0.45–0.85) were less likely to be admitted to NVA-FB hospitals, as were the most indigent veterans (OR = 0.43; 95% CI, 0.38–0.48), and older veterans (OR = 0.97; 95% CI, 0.96–0.97). Finally, patients admitted to NVA-hospitals were less likely to have cardiovascular disease, anemia, and peripheral vascular disease, but more likely to have a coagulopathy, depression, and chronic obstructive pulmonary disease.

Kaplan–Meier estimates of time to hip surgery showed that the median time to surgery was shorter ($p < 0.001$) for veterans admitted to NVA-FB hospitals than for veterans in VA hospitals: 1 day versus 3 days, respectively (Fig. 1). After controlling for patient characteristics using Cox proportional hazards regression (Table 3), the relative hazard of hip surgery was greater in NVA-FB hospitals compared with VA hospitals overall, with the largest differences in the relative hazard of surgery occurring early in the stay. Relative hazards of surgery in NVA-FB hospitals within 2 days were 2.63 times greater, (95% CI, 2.47–2.81; $p < .001$), within 2 to 5 days there was no significant difference between the two hospital types, and more than 5 days after the initial fracture the relative hazards of surgery in NVA-FB hospitals were 51% smaller (95% CI, 0.35–0.68; $p < .001$ [Table 4]).

Finally, the likelihood of death within 1 year of admission was 21% less for the veterans who were admitted to NVA-FB hospitals ($p = 0.001$).

Discussion

Historically, VA patients experiencing emergency conditions had limited options for timely care. Patients either could travel to the closest VA hospital, which may be far away or may not have the capability of addressing the condition, or travel to closer private-sector hospitals but risk tremendous financial liability. With the passage of the

Table 1. Patient characteristics in VA and non-VA fee-based (NVA-FB) hospitals

Variable	VA admission (n = 9308)	NVA-FB admission (n = 1881)	p value
Age (years) (mean, SD)	76 (10.9)	71 (12.7)	< 0.001
Male (% = n)	96 (8888)	95 (1784)	0.225
Race			< 0.001
White	79 (7367)	80.6 (1513)	
Black	10 (960)	5.2 (96)	
Hispanic	5 (437)	2.7 (49)	
Other	1 (95)	2.8 (55)	
Missing	5 (449)	8.7 (168)	
Means category			< 0.001
Service connected	38 (3493)	58 (1096)	
Low income	52 (4817)	35 (650)	
Other	11 (998)	7 (135)	
Distance to nearest VA hospital			< 0.001
0–5 miles	26 (2446)	16 (307)	
6–15 miles	29 (2688)	16 (305)	
16–50 miles	28 (2625)	29 (549)	
51–90 miles	10 (972)	18 (346)	
More than 90 miles	3 (258)	14 (260)	
Missing	3 (319)	6 (114)	
Length of stay (days, SD)	11 (11.1)	9 (40.6)	0.020
Liver disorder	4 (393)	7 (181)	< 0.001
Nonmetastatic cancer	7 (691)	4 (256)	< 0.001
Dementia	11 (1004)	8 (218)	< 0.001
Fluid disorder	23 (2110)	27 (509)	< 0.001
Mild liver disorder	4 (377)	7 (124)	< 0.001
Renal disorder	13 (1163)	10 (196)	0.012
Obesity	1 (129)	2 (32)	0.295
Drug abuse	2 (204)	4 (78)	< 0.001
Malignancy	8 (763)	5 (90)	< 0.001
Cardiovascular disease	13 (1161)	9 (166)	< 0.001
Hypertension	51 (4707)	47 (887)	0.007
Hypertension*	11 (982)	9 (166)	0.025
Coagulation disorder	4 (354)	7 (133)	< 0.001
Anemia	2 (171)	3 (60)	< 0.001
Iron deficiency anemia	7 (622)	4 (75)	< 0.001
Alcohol abuse	11 (989)	19 (349)	< 0.001
Depression	11 (1058)	16 (294)	< 0.001
Chronic obstructive pulmonary disease	28 (2611)	37 (693)	< 0.001
Renal failure	12 (1146)	10 (195)	0.018
Arrhythmia	23 (2154)	20 (378)	0.004
Peptic ulcer disease	2 (187)	2 (30)	0.235
Peripheral vascular disease	9 (809)	6 (121)	0.001
Diabetes (no complication)	22 (2082)	20 (380)	0.039

* Complicated.

Table 2. Adjusted odds of admission to a NVA-FB hospital (logistic regression)

Variable	Odds ratio (95% CI)	p value
Age	0.97 (0.96–0.97)	< 0.001
Sex (referent = male)	0.69 (0.53–0.88)	0.003
Race (referent = white)		
Black	0.60 (0.47–0.76)	< 0.001
Hispanic	0.64 (0.46–0.88)	0.006
Other nonwhite	2.60 (1.77–3.80)	< 0.001
Missing	1.78 (1.44–2.21)	< 0.001
Means category (referent = service connected)		
Indigent	0.42 (0.37–0.47)	< 0.001
Other	0.21 (0.42–0.62)	< 0.001
Distance (referent = less than 6 miles)		
6–15 miles	0.82 (0.70–0.98)	0.027
16–50 miles	1.45 (1.24–1.70)	< 0.001
51–90 miles	2.29 (1.92–2.73)	< 0.001
More than 90 miles	6.33 (5.08–7.89)	< 0.001
Cardiovascular disease	0.79 (0.65–0.95)	0.011
Ulcer (nonbleeding)	0.62 (0.37–1.05)	0.074
Coagulopathy	1.65 (1.31–2.08)	< 0.001
Blood loss anemia	1.86 (1.32–2.63)	0.004
Iron deficiency anemia	0.61 (0.47–0.80)	0.003
Alcohol abuse	1.43 (1.22–1.67)	< 0.001
Depression	1.12 (0.96–1.32)	0.149
Malignancy	0.64 (0.50–0.82)	< 0.001
Peripheral vascular disease	0.74 (0.60–0.92)	0.006
Chronic obstructive pulmonary disease	1.45 (1.29–1.63)	< 0.001

Millenium Health Care and Benefits Act (www.va.gov/vdl/documents/Financial_Admin/Health_Elig_Center) in 2001, VA patients faced with emergency medical conditions may seek care at private-sector hospitals at the expense of the VA. The goal of this legislation is to improve outcomes of emergency conditions for veterans without immediate access to the necessary care through VA facilities.

This study evaluated the use of NVA-FB care for a common emergency situation, hip fracture. After comparing characteristics of veterans admitted to VA and NVA-FB hospitals, we examined whether time to surgical treatment of hip fractures differed across these two types of hospitals and whether mortality within 1 year differed by admission type. Results suggested that NVA-FB hospitals provide treatment for patients with hip fractures that is faster and has lower mortality, compared with VA hospitals.

These findings may be especially important for veterans residing far from VA hospitals who are most likely to receive NVA-FB care. Our data showed that 20% of veterans live more than 50 miles from the nearest VA medical

Fig. 1 The time between hospital admission and surgical repair differs by hospital type. Patients admitted to non-VA hospitals had a median of 1 day (interquartile range [IQR], 0–3 days) to surgery whereas patients admitted to VA hospitals had a median of 3 days (IQR, 1–7 days).

center, and nearly 1/3 of those patients may end up receiving NVA-FB care in emergency situations. Historically, veterans who live greater distances from VA hospitals, particularly in rural areas, have poorer health outcomes than veterans living closer to their healthcare providers [31, 32, 35]. Moreover, other studies have documented poorer care among rural veterans for acute myocardial infarction, another emergent condition [1, 2, 26]. Increasing use of fee-based care among geographically isolated veterans may reduce previously documented deficiencies in care. Other notable patient characteristics related to admission to a NVA-FB hospital were age, race, and income. Patients admitted to a NVA-FB hospital were younger, more likely to be white, and earned higher incomes compared with patients admitted to VA hospitals. Similarly, West and Weeks [36] found that enrolled veterans received most of their health care outside the VA. Vulnerable populations such as poor and minority veterans rely almost exclusively on the VA for treatment [15]. These groups often have no alternative healthcare benefits to use in emergency situations when no VA hospital is accessible. The higher use of VA hospitals for these patients shows the importance of these services. Although other studies have investigated patient characteristics related to the use of private-sector care by veterans when that care is paid through Medicare [8, 16, 17, 21, 23–25, 28, 29], this study is unique in that all care is paid by the VA.

Our finding that time to hip surgery was shorter in NVA-FB hospitals compared with VA hospitals has important implications for the quality of care for the patient. The standard practice regarding the treatment of hip fractures is to repair the fracture as quickly as possible after admission; the importance of prompt hip repair has been established [4, 18]. Our study suggests that the use of NVA-FB care in the absence of alternative VA care facilitates the provision

of emergency surgeries. Other studies have shown the importance of non-VA services for veterans in emergency situations [19, 38, 39].

Potentially the most important clinical outcome, mortality, was 21% lower within 1 year for patients admitted to NVA-FB hospitals compared with VA hospitals. This finding may have been related to the quicker time to surgery in NVA-FB hospitals. Alternatively, it is possible that unmeasured differences between patients admitted to VA and NVA-FB hospitals exist, confounding the relationship between hospital type and mortality. Regardless, this finding suggested that providing emergency care in non-VA hospitals under fee-based agreements does not appear to put veterans at risk and may be beneficial. Surveys of veterans have shown most believe the VA could meet their special healthcare needs through fee-based care in non-VA hospitals and that quality of care would not be compromised [30].

This study had some limitations. First, the sensitivity and the specificity of ICD-9-CM codes in administrative databases may vary across diagnoses [13, 33], and administrative data do not include some variables that may have had important prognostic value (eg, laboratory values). Studies that formally investigated the accuracy of ICD-9-CM codes, relative to medical records, reported varying levels of agreement between the clinical and administrative data sources [3, 7, 9, 11, 12]. Nevertheless, a previous comparison of risk-adjusted mortality based on administrative and clinical data that were abstracted from medical records concluded that administrative data are satisfactory for characterizing variations in mortality rates associated with hospitalization and for epidemiologic analyses of factors related to patient mortality [17]. Second, VA administrative data do not include admissions for veteran care paid by other benefits, such as Medicare or private insurance. If a veteran is admitted to a VA hospital and

Table 3. Variables associated with hip fracture repair within 10 days of admission and death within 1 year

Variable	Repair within 10 days, hazard ratio (95% CI)	Death within 1 year, hazard ratio (95% CI)
Age	1.00 (1.00–1.00)	1.04 (1.04–1.05)*
Sex (referent = female)	0.83 (0.76–0.91)*	1.90 (1.55–2.33)*
Race (referent = white)		
Black	0.87 (0.81–0.93)*	0.91 (0.81–1.03)
Hispanic	0.79 (0.72–0.87)*	0.96 (0.81–1.13)
Other nonwhite	1.16 (1.00–1.36)	0.75 (0.54–1.04)
Missing	0.94 (0.86–1.02)	1.45 (1.26–1.67)*
Means category (referent = service connected)		
Indigent	1.02 (0.98–1.07)	
Other	1.12 (1.05–1.19)*	
Distance (referent = less than 6 miles)		
6–15 miles	1.03 (0.98–1.09)	
16–50 miles	1.05 (0.99–1.10)	
51–90 miles	1.08 (1.01–1.16)*	
More than 90 miles	1.14 (1.03–1.26)*	
Cardiovascular disease	0.92 (0.87–0.98)*	
Iron deficiency anemia	0.80 (0.74–0.87)*	
Alcohol abuse		0.88 (0.77–1.01)
Malignancy		1.50 (1.33–1.70)*
Peripheral vascular disease	0.85 (0.79–0.91)*	
Chronic obstructive pulmonary disease	0.96 (0.92–1.00)*	1.28 (1.19–1.38)*
Congestive heart failure	0.86 (0.81–0.90)*	1.47 (1.34–1.60)*
Paralysis	0.67 (0.56–0.80)*	
Myocardial infarction	0.90 (0.84–0.98)*	1.39 (1.22–1.57)*
Cardiac arrhythmias	0.96 (0.92–1.00)	
Metastatic cancer	0.80 (0.68–0.94)*	2.55 (2.04–3.19)*
Dementia	0.96 (0.90–1.03)	1.74 (1.58–1.93)*
Fluid and electrolyte disorders		1.33 (1.23–1.45)*
Moderate or severe liver disease		2.76 (2.02–3.78)*
Weight loss	0.88 (0.80–0.96)*	1.50 (1.31–1.74)*
Psychoses		1.05 (0.90–1.22)
Renal disease		1.32 (1.20–1.46)*
Renal failure	0.89 (0.84–0.95)*	
Obesity		0.73 (0.52–1.02)
Pulmonary circulation disorders	0.86 (0.77–0.97)*	1.37 (1.12–1.67)*

* Variables significant at .05 level.

transfers to a private hospital for surgery that is paid by Medicare, the VA administrative data would include no record of that surgery. Therefore, this study may underestimate the number of patients with hip fractures who received hip repair surgeries. Nevertheless, additional analysis in which we excluded patients who did not receive hip

Table 4. Relative risk of hip repair within 10 days and 1-year mortality

Variable - risk adjusted*	NVA-FB hospital (referent = VA hospital), risk ratio (95% CI)	p value
Hip repair within 10 days		
0–1 day after fracture	2.63 (2.47–2.81)	< .001
2–5 days after fracture	0.97 (0.88–1.08)	0.582
More than 5 days after fracture	0.49 (0.35–0.68)	< .001
1-year mortality	0.79 (0.71–0.88)	< .001

* Controlling for patient age, sex, race, and comorbid conditions; VA = Veterans Administration; NVA-FB = non-Veterans Administration Fee Basis.

surgeries also found significant differences in the time to surgery among patients who received surgery. Overall, this study showed the potential benefit to the VA of outsourcing emergency orthopaedic surgical care to private-sector providers when access to geographically proximate or timely VA services is not feasible. This is supported by previous work showing non-VA hospitals may help the VA substantially reduce costs, save resources, and improve health outcomes for veterans [34]. Given these findings, the VA may consider strategies to regionalize or outsource the provision of emergency care for VA patients, particularly those living far from the nearest VA medical center. Such an approach may provide opportunities to improve communication and coordination of care between the VA and private-sector facilities, thereby optimizing outcomes and improving efficiency of fee-based care for emergency situations.

References

1. Abrams TE, Vaughan-Sarrazin M, Fan VS, Kaboli PJ. Geographic isolation and the risk for chronic obstructive pulmonary disease-related mortality: a cohort study. *Ann Intern Med.* 2011; 155:80–86.
2. Baldwin LM, MacLehose RF, Hart LG, Beaver SK, Every N, Chan L. Quality of care for acute myocardial infarction in rural and urban US hospitals. *J Rural Health.* 2004;20:99–108.
3. Baron JA, Lu-Yao G, Barrett J, McLerran D, Fisher ES. Internal validation of Medicare claims data. *Epidemiology.* 1994;5: 541–544.
4. Bottle A, Aylin P. Mortality associated with delay in operation after hip fracture: observational study. *BMJ.* 2006;332:947–951.
5. Braithwaite RS, Col NF, Wong JB. Estimating hip fracture morbidity, mortality and costs. *J Am Geriatr Soc.* 2003;51: 364–370.
6. Department of Veterans Affairs, Veterans Health Administration, Office of the Assistant Deputy Under Secretary for Health and Policy Planning. Available at: http://vawww.pssg.med.va.gov/geo_access/FY2008/2008GeoAccessFinal.pdf. Accessed April 13, 2012.
7. Fisher ES, Whaley FS, Krushat WM, Malenka DJ, Fleming C, Baron JA, Hsia DC. The accuracy of Medicare's hospital claims

- data: progress has been made, but problems remain. *Am J Public Health*. 1992;82:243–248.
8. Gordon HS, Aron DC, Fuehrer SM, Rosenthal GE. Using severity-adjusted mortality to compare performance in a Veterans Affairs hospital and in private-sector hospitals. *Am J Med Qual*. 2000;15:207–211.
 9. Green J, Wintfeld N. How accurate are hospital discharge data for evaluating effectiveness of care? *Med Care*. 1993;31:719–731.
 10. Haentjens P, Magaziner J, Colón-Emeric CS, Vanderschueren D, Milisen K, Velkeniers B, Boonen S. Meta-analysis: excess mortality after hip fracture among older women and men. *Ann Intern Med*. 2010;152:380–390.
 11. Hannan EL, Kilburn H Jr, Lindsey ML, Lewis R. Clinical versus administrative data bases for CABG surgery. Does it matter? *Med Care*. 1992;30:892–907.
 12. Hannan EL, Racz M, Jollis JG, Peterson ED. Using Medicare claims data to assess provider quality for CABG surgery: does it work well enough? *Health Serv Res*. 1997;31:659–678.
 13. Hsia DC, Krushat WM, Fagan AB, Tebbutt JA, Kusserow RP. Accuracy of diagnostic coding for Medicare patients under the prospective-payment system. *N Engl J Med*. 1988;318:352–355.
 14. Huddleston JM, Whitford KJ. Medical care of elderly patients with hip fractures. *Mayo Clin Proc*. 2001;76:295–298.
 15. Hynes DM, Koelling K, Stroupe K, Arnold N, Mallin K, Sohn MW, Weaver FM, Manheim L, Kok L. Veterans' access to and use of Medicare and Veterans Affairs health care. *Med Care*. 2007;45:214–223.
 16. Kaboli PJ, Barnett MJ, Fuehrer SM, Rosenthal GE. Length of stay as a source of bias in comparing performance in VA and private sector facilities: lessons learned from a regional evaluation of intensive care outcomes. *Med Care*. 2001;39:1014–1024.
 17. Krakauer H, Bailey RC, Skellan KJ, Stewart JD, Hartz AJ, Kuhn EM, Rimm AA. Evaluation of the HCFA model for the analysis of mortality following hospitalization. *Health Serv Res*. 1992;27:317–335.
 18. Lefavre KA, Macadam SA, Davidson DJ, Gandhi R, Chan H, Broekhuysen HM. Length of stay, mortality, morbidity, and delay to surgery in hip fractures. *J Bone Joint Surg Br*. 2009;91:922–927.
 19. Menke, TJ, Wray, NP. Cost implications of regionalizing open heart surgery units. *Inquiry*. 1999;36:57–67.
 20. Morrison RS, Chassin MR, Siu AL. The medical consultant's role in caring for patients with hip fracture. *Ann Intern Med*. 1998;128:1010–1020.
 21. Peterson LA, Normand SL, Daley J, McNeil BJ. Outcome of myocardial infarction in Veterans Health Administration patients as compared with medicare patients. *N Engl J Med*. 2000;343:1934–1941.
 22. Quan H, Sundararajan V, Halfon P, Fong A, Burnand B, Luthi JC, Saunders LD, Beck CA, Feasby TE, Ghali WA. Coding algorithms for defining comorbidities in ICD-9-CM and ICD-10 administrative data. *Med Care*. 2005;43:1130–1139.
 23. Rosenthal GE, Larimer DJ, Owens KE. Treatment of patients with acute myocardial infarction at a Veterans Affairs (VA) hospital and a non-VA hospital. *J Gen Intern Med*. 1994;9:455–458.
 24. Rosenthal GE, Sarrazin MV, Harper DL, Fuehrer SM. Mortality and length of stay in a veterans affairs hospital and private sector hospitals serving a common market. *J Gen Intern Med*. 2003;18:601–608.
 25. Rosenthal GE, Vaughan Sarrazin M, Hannan EL. In-hospital mortality following coronary artery bypass graft surgery in Veterans Health Administration and private sector hospitals. *Med Care*. 2003;41:522–535.
 26. Sheikh K, Bullock C. Urban-rural differences in the quality of care for medicare patients with acute myocardial infarction. *Arch Intern Med*. 2001;161:737–743.
 27. Simunovic N, Devereaux PJ, Sprague S, Guyatt GH, Schemitsch E, Debeer J, Bhandari M. Effect of early surgery after hip fracture on mortality and complications: systematic review and meta-analysis. *CMAJ*. 2010;182:1609–1616.
 28. Stineman MG, Ross RN, Hamilton BB, Maislin G, Bates B, Granger CV, Asch DA. Inpatient rehabilitation after stroke: a comparison of lengths of stay and outcomes in the Veterans Affairs and non-Veterans Affairs health care system. *Med Care*. 2001;39:123–137.
 29. Stremple JF, Bross DS, Davis CL, McDonald GO. Comparison of postoperative mortality and morbidity in VA and nonfederal hospitals. *J Surg Res*. 1994;56:405–416.
 30. Wakefield BJ, Tripp-Reimer T, Rosenbaum ME, Rosenthal GE. Veterans' use of Department of Veterans Affairs care and perceptions of outsourcing inpatient care. *Mil Med*. 2007;172:565–571.
 31. Wallace AE, Weeks WB, Wang S, Lee AF, Kazis LE. Rural and urban disparities in health-related quality of life among veterans with psychiatric disorders. *Psychiatr Serv*. 2006;57:851–856.
 32. Wallace AE, West AN, Booth BM, Weeks WB. Unintended consequences of regionalizing specialized VA addiction services. *Psychiatr Serv*. 2007;58:668–674.
 33. Waterstraat F, Barlow J, Newman F. Diagnostic coding quality and its impact on healthcare reimbursement: research perspectives. *J Am Med Rec Assoc*. 1990;61:52–59.
 34. Weeks WB, Wallace AE, Wallace TA, Gottlieb DJ. Does the VA offer good health care value? *J Health Care Finance*. 2009;35:1–12.
 35. Weeks WB, Wallace AE, West AN, Heady HR, Hawthorne K. Research on rural veterans: an analysis of the literature. *J Rural Health*. 2008;24:337–344.
 36. West AN, Weeks WB. Health care expenditures for urban and rural veterans in Veterans Health Administration care. *Health Serv Res*. 2009;44:1718–1734.
 37. Wilson RT, Chase GA, Chrischilles EA, Wallace RB. Hip fracture risk among community-dwelling elderly people in the United States: a prospective study of physical, cognitive, and socioeconomic indicators. *Am J Public Health*. 2006;96:1210–1218.
 38. Wright SM, Petersen LA, Lamkin RP, Daley J. Increasing use of Medicare services by veterans with acute myocardial infarction. *Med Care*. 1999;37:529–537.
 39. Wright SM, Daley J, Fisher ES, Thibault GE. Where do elderly veterans obtain care for acute myocardial infarction: Department of Veterans Affairs or Medicare? *Health Serv Res*. 1997;31:739–754.