1-1-2010

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Journal of the American College of Surgeons, Volume 211, Issue 6, December 2010, Pages 823-832

Comparisons of Quality of Surgical Care between the US Department of Veterans Affairs and the Private Sector

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The Department of Veterans Affairs (VA) is the largest integrated health system in the United States. Since its establishment in 1930, the VA has provided medical and surgical care to veterans of US military service. VA services are provided primarily by salaried federal employees working in government-operated facilities.[1,2]

By the 1990s, the VA had developed a negative reputation, with widespread concerns about poor quality of care and systematic inefficiencies.[1-3] An overhaul of the organization took place in the mid-1990s to improve both clinical care and the greater VA health system. With regard to quality of surgical care in the VA, changes began as early as 1986, when Congress passed Public Law 99-166 mandating that the VA compare its postoperative morbidity and mortality rates with the national average. Efforts to fulfill this mandate led to the establishment of the National Surgical Quality Improvement Program (VA NSQIP) in 1994, a comprehensive program based on prospective data collection that provides hospital systems with reports of their-risk adjusted outcomes, benchmark data, and consultation services in an effort to inform and empower local quality improvement initiatives. The VA NSQIP has been attributed with substantial reductions in postoperative morbidity and mortality.[2,4,5] In 2001, the American College of Surgeons (ACS) partnered with the VA on the Patient Safety in Surgery Study, which ultimately led to development of the ACS NSQIP for private-sector hospitals.[6,7]

Despite the profound organizational transformation that began in the VA in the 1990s, it remains unclear where the VA is in the spectrum of care currently available in the United States. During the past 2 decades, reports in the peer-reviewed literature[4,8,9] and in the lay press[10,11] have continued to provide both favorable and unfavorable perspectives on the quality of VA care. In order to gain a better understanding of the evidence, we performed a systematic review of studies that compared the quality of surgical care provided by the VA with that provided by relevant non-VA health care facilities and systems.

METHODS

Data sources/study selection

We completed a Medline search of published studies between January 1990 and August 2009 using the following search terms: *hospitals, veterans, hospitals, veterans/standards, hospitals, veterans/statistics and numerical data, united states department of veterans affairs, united states department of veterans affairs/standards, united states department of veterans affairs/statistics and numerical data*, and *united states department of veterans affairs/utilization*. Because of the focus on US health care, we searched Medline only.

We included articles that presented a comparison of quality of care for surgical conditions in VA and US non-VA settings. Quality of care was defined using the standard Donabedian framework of quality (ie, structure, process, and outcomes)[12]; studies focusing solely on patient satisfaction were excluded. A bibliographic search performed on all included articles identified additional studies.

Two physicians trained in the critical analysis of literature (SM, AT) screened all articles. Basic information about the articles was collected on initial screening and included study years, data sources, geographic areas, clinical conditions or interventions studied, feature of quality

This research was supported by the VA Health Services Research and Development Evidence Synthesis Program, Los Angeles, CA (Miake-Lye, Glassman, Shekelle, and Asch), Career Development Award (CDA-2) from the Department of Veterans Affairs Veterans Health Administration, Office of Research and Development, Health Services Research and Development (HSR&D) Service to Dr Trivedi, Robert Wood Johnson Physician VA Faculty Scholar Award to Dr Trivedi, Center on Systems, Outcomes and Quality in Chronic Disease and Rehabilitation, Research Enhancement Award Program (HSR&D REA 08-263) (Dr Trivedi); and the Robert Wood Johnson Clinical Scholars Program (Dr Matula).

Disclosure information: All authors are employed by and receive a salary from the Department of Veterans Affairs.

Received June 28, 2010; Accepted September 1, 2010.

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Published by Elsevier Inc.

ISSN 1072-7515/10/$36.00
doi:10.1016/j.jamcollsurg.2010.09.001

Abbreviations and Acronyms

ACS NSQIP	=	American College of Surgeons National Surgical Quality Improvement Program
CI	=	confidence interval
OR	=	odds ratio
VA	=	US Department of Veterans Affairs

assessed, and similarity of assessments among VA and non-VA samples. Differences in inclusion or exclusion of articles were discussed with all other members of the review team (SA, PG, and PS) to reach consensus.

All articles meeting initial inclusion criteria then underwent a secondary screening. During this screening, we abstracted the following data: sample size for both VA and non-VA sources, years of data collection covered for both sources; control variables; primary outcomes; and secondary or associated findings.

Conceptual framework

Our conceptual framework used 6 domains to determine the level of quality of the comparison studies: (1) similarity of performance measures, looking for comparable assessments across VA and non-VA samples; (2) use of similar time frames for quality comparisons; (3) use of representative or national study populations; (4) whether the assessments focused on well-established clinical outcomes or processes that are strongly associated with improved clinical outcomes; (5) whether quality was measured with indicators of high clinical or public health significance; and (6) if the methods used sufficient sample size and appropriate statistical techniques for the stated study hypothesis(es).

Assessment of data quality

Each article was then graded using the conceptual framework. Grades of A, B, or C were assigned to each domain; however, the overall grade of an article was predicated on a global assessment allowing for articles with a single yet critical flaw to be designated a "C," even if other factors were satisfactory. Differences of opinions about grading were resolved by consensus.

Data synthesis

Articles were categorized by clinical content area (eg, general surgery or vascular surgery). The evidence synthesis is narrative because of the heterogeneity of studies, which precluded meta-analysis.

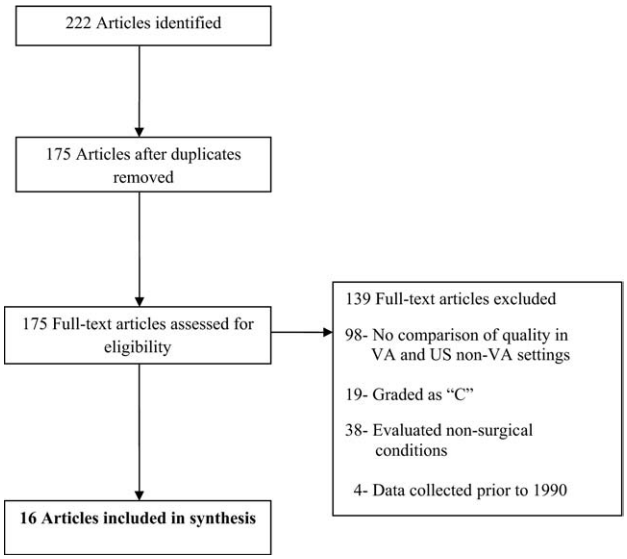

Figure 1. Literature search flow diagram.

RESULTS

Description of studies identified by the literature search

Our search identified 175 unique articles (Fig. 1). Of these, full-text articles were rejected for the following reasons: no comparison of quality in VA and US non-VA settings (n = 98); collection of study data before the cutoff date of 1990 (n = 4); receipt of an overall grade of C (n = 19); and exclusive focus on patient satisfaction (n = 2) or nonsurgical care (n = 36). Therefore, 16 studies formed the basis of our analysis (Table 1). (The nonsurgical articles were reviewed by our team, as well, and are presented in a companion article.[13])

The following clinical content areas were addressed: general surgery (4 articles),[14-17] vascular surgery (3 articles),[18-20] solid organ transplantation (3 articles),[21-23] surgical oncology (3 articles),[24-26] cardiac surgery (1 article),[27] and endocrine surgery (2 articles).[28,29] Ten of the 16 articles reported results from the Patient Safety in Surgery Study, which was conducted between October 1, 2001 and September 30, 2004. The Patient Safety in Surgery Study grew out of collaboration between the ACS and the VA, and aimed to determine if implementation of the NSQIP in the private sector could reduce postoperative mortality and morbidity in non-VA settings. This study compared risk-adjusted postoperative morbidity and mortality for a number of general and vascular surgical conditions between the VA system and 14 university medical centers that volunteered to be early non-VA adopters of the NSQIP.[6,30]

Table 1. Evidence Table of Surgical Studies

			VA sample			Non-VA sample						
First author	Year	Category	Data level	Sample size	Years collected	Data level	Sample size	Years collected	Conditions	Outcomes	Primary findings	Final grade
Austin[21]	2004	Solid organ transplantation	Single center	149	1991−2000	Single medical center	285	1991−2000	Other surgical	Mortality at 1, 3, 5 years	VA patients had increased mortality rates as assessed by Kaplan-Meier curves. However, after adjusting for sex, donor age, recipient age, cause of liver disease and MELD score, hospital status was not a significant predictor of mortality; RR = 1.15 (95% CI, 0.94−1.43)	A
Bilimoria[24]	2008	Oncology	National	513	1985−2004	National	12,756/18,299	1985−2004	General surgical, surgical oncology	60-day and 3-year mortality	Unadjusted and adjusted mortality rates at 60 days and 3 years were comparable between VA, academic, and community hospital settings for resection of stage I and II pancreatic cancer	B
Fink[14]	2007	General	National	5157	2001−2004	Multiple center	27,467	2001−2004	General surgical	30-day postoperative morbidity and mortality	Risk-adjusted mortality rates are comparable between VA and non-VA patients, although setting of care did not enter the mortality regression model. Risk-adjusted morbidity was higher in the private sector compared with the VA (OR = 0.8; 95% CI, 0.71−0.90)	B
Gill[22]	2007	Solid organ transplantation	National	7395	1995−2004	National	144,651/357,345	1995−2004	Other surgical	Time to treatment	Both VA-insured and Medicare/Medicaid-insured patients were less likely to receive transplants than patients with private insurance (HR = 0.65; 95% CI, 0.60−0.70; $p < 0.0001$). Most of this difference was explained by the fact that VA patients were less likely to be placed on the wait-list (HR = 0.71; 95% CI, 0.67−0.76), however, once listed, VA patients received transplants less frequently than those insured privately (HR = 0.89; 95% CI, 0.82−0.96)	A
Glasgow[25]	2007	Oncology	National	377	2001−2004	Multiple centers	692	2001−2004	Other surgical	Postoperative outcomes (primarily morbidity and mortality)	Adjusting for case-mix differences, postoperative morbidity and mortality rates for pancreatectomy were higher in the VA compared with the private sector (OR = 1.581, 95% CI, 1.084−2.307 and 2.533 95% CI, 1.020−6.290, respectively)	A/B
Hall[28]	2007	Endocrine	National	2814	2001−2004	Multiple centers	4,268	2001−2004	General surgical, head and neck	30-day morbidity and mortality; specific adverse event rates, length of stay	Morbidity and mortality rates were very low; combined variable built for an outcome of "any adverse event"; there was no significant difference in the VA versus non-VA in risk-adjusted adverse event rate (OR = 1.25; 95% CI, 0.87−1.78)	B
Henderson[15]	2007	General	National	94098	2001−2004	Multiple centers	18,399	2001−2004	General surgical	30-day postoperative morbidity and mortality	After risk adjustment for patient comorbidities and severity of illness, the odds of mortality at 30 days were higher in the VA compared with the private sector (OR = 1.23; 95% CI, 1.08–1.41). There was no significant difference in 30-day morbidity	A/B

Table 1. Continued

First author	Year	Category	VA sample			Non-VA sample			Conditions	Outcomes	Primary findings	Final grade
			Data level	Sample size	Years collected	Data level	Sample size	Years collected				
Hutter[18]	2007	Vascular	National	30,058	2001−2004	Multiple centers	5174	2001−2004	Vascular	30-day postoperative morbidity and mortality	Risk-adjusted mortality was comparable between the 2 groups. Accounting for comorbidities and severity of illness, postoperative morbidity rates were lower in the VA population (OR = 0.84; 95% CI, 0.78−0.92)	A/B
Johnson[19]	2007	Vascular	National	458	2001−2004	Multiple centers	3,535	2001−2004	Vascular	30-day postoperative morbidity and mortality	After risk adjustment, no significant difference in 30-day mortality rates among VA and non-VA female vascular patients. After adjusting for severity of illness, 30-day morbidity rates were significantly lower in the VA compared with non-VA (OR = 0.60; 95% CI, 0.44−0.81)	B
Lancaster[16]	2007	General	National	237	2001−2004	Multiple centers	783	2001−2004	General surgical	Postoperative morbidity and mortality at 30 days; also evaluated length of stay, need for reoperation and occurrence of 18 specific postoperative events	There were no significant differences in risk-adjusted outcomes between the VA compared with the private sector for hepatic resections (VA morbidity: OR = 0.94; 95% CI, 0.62−1.42; VA mortality: OR = 1.623; 95% CI, 0.61−4.32)	A/B
Lautz[17]	2007	General	National	374	2001−2004	Multiple centers	2,064	2001−2004	Other surgical	30-day postoperative outcomes: morbidity (overall, specific adverse events, no. of complications), mortality, length of stay	No significant difference in postoperative morbidity among women in the VA versus non-VA settings (OR = 1.14; 95% CI, 0.63−2.05). Adjusted morbidity rates were higher among men treated at the VA versus non-VA (OR = 2.29; 95% CI, 1.28−4.10). Mortality rates were too low for risk-adjusted analysis	A/B
Moore[23]	2003	Solid organ transplantation	Single center	380	1990−2002	Single medical center	1,429	1990−2002	Other surgical	Graft survival; patient survival, Karnofsky score, SF-36	No significant difference in graft or patient survival in liver, heart, or kidney between VA and non-VA patients	A
Neumayer[26]	2007	Oncology	National	644	2001−2004	Multiple centers	3,179	2001−2004	General surgical	30-day postoperative morbidity and mortality, length of stay	After adjusting for comorbidities and preoperative factors, there was no significant difference in 30-day morbidity or mortality in female patients at the VA compared with the private sector (OR = 1.404; 95% CI, 0.894−2.204)	B
Rosenthal[27]	2003	Cardiac	National	19266	1993−1996	Large geographical area	44,247/9,696	1993−1996	Cardiothoracic	In-hospital mortality	Adjusting for patient-level predictors and hospital volume, the odds of death was higher in VA patients, relative to private sector patients (OR = 1.34; 95% CI, 1.11−1.63; $p < 0.001$)	A
Turrentine[29]	2007	Endocrine	National	178	2001−2004	Multiple centers	371	2001−2004	Other surgical	30-day morbidity and mortality	Mortality event rate was too low for	B

Table 1. Continued

First author	Year	Category	VA sample			Non-VA sample			Conditions	Outcomes	Primary findings	Final grade
			Data level	Sample size	Years collected	Data level	Sample size	Years collected				
											adjustment. Adjusting for comorbidities, there was no significant difference in 30-day postoperative morbidity rates in the VA versus the private sector (OR = 1.33; 95% CI, 0.49−3.6)	
Weiss[20]	2006	Vascular	One VISN	140	1997−2002	Large geographic area	6,949	1997−2002	Vascular	Perioperative mortality, stroke, and cardiac complications	After risk adjustment, having surgery at the VA was not a significant predictor of death (OR = 2.98; 95% CI, 0.51−17.6), stroke (OR = .95; 95% CI, 0.3−3.4), or cardiac complications (OR = 1.07; 95% CI, 0.37−3.1)	B

CI, confidence interval; HR, hazard ratio; MELD, Model for End-Stage Liver Disease; OR, odds ratio; RR, relative risk; VA, US Department of Veterans Affairs; VISN, Veterans Integrated Service Network.

General surgery

We identified 4 articles that addressed general surgery, all of which used data from the Patient Safety in Surgery Study.[14-17]

Henderson and colleagues[15] evaluated outcomes in male patients, comparing 94,098 general surgery operations at 128 VA medical centers with 18,399 general surgery operations at 14 university hospitals. After adjusting for patient and disease characteristics in the morbidity model, site of care did not achieve significance (VA versus private sector [PS], $p = 0.0585$). There were, however, significantly greater risk adjusted odds of postoperative mortality in the VA (unadjusted mortality rate 2.62% in VA versus 2.03% in non-VA, $p = 0.0002$; adjusted odds ratio [OR] for VA versus PS = 1.23; 95% confidence interval [CI], 1.08−1.41).[15]

Fink and colleagues[14] reviewed 5,157 female VA patients and 27,367 female non-VA patients who underwent general surgery operations. After adjusting for patient and disease characteristics, the odds of developing a postoperative complication among the VA cohort were significantly lower compared with the private sector (unadjusted morbidity rate 8.49% in VA versus 10.94% in non-VA; $p < 0.0001$; adjusted OR = 0.80; 95% CI, 0.71−0.90). There was no significant difference in risk-adjusted postoperative mortality.

Two hundred and thirty-seven VA and 783 non-VA hepatectomies were examined by Lancaster and colleagues.[16] Adjusting for preoperative patient characteristics, lifestyle factors, and intraoperative characteristics, morbidity and mortality rates were not significantly different between the VA and private sector (morbidity OR = 0.940; 95% CI, 0.623−1.421 and mortality OR = 1.623; 95% CI, 0.609−4.324).[16]

Lautz and colleagues[17] evaluated 374 patients in 12 VA hospitals and 2,064 patients in 12 non-VA hospitals who underwent bariatric surgery. Adjusted morbidity rates were higher among men (unadjusted morbidity rates 1.91% in VA versus 0.25% in non-VA; $p = 0.03$; adjusted OR = 2.99; 95% CI, 1.28−4.10), but not among women treated at the VA compared with the private sector, but there were too few deaths to allow for determination of risk-adjusted rates.[17]

Overall, articles on general surgery addressed a variety of conditions and operative interventions. The findings were heterogeneous. In general, postoperative morbidity was found to be similar among populations[15-17] or reduced[14] among VA patients with one exception, a subset of male patients had higher adjusted rates of morbidity in the VA after bariatric surgery.[17] Similarly, most studies found comparable postoperative mortality rates among patients cared for in VA and

non-VA settings[14,16,18-20] with one exception, male VA patients undergoing general surgery operations had higher mortality rates. However, in the studies by Henderson[15] and Fink[14] and their colleagues, the types of surgery performed were different in VA and non-VA populations. In the Henderson and colleagues study, subanalysis revealed comparable unadjusted mortality rates among the five most common general surgical operations performed in both settings (ie, open inguinal hernia, partial colectomy, laparoscopic cholecystectomy, umbilical hernia, ventral hernia), and higher unadjusted mortality rates in the VA for less common, more complex operations (ie, pancreatectomy, adrenalectomy, bariatric operation, thyroidectomy/parathyroidectomy, and hepatectomy). Both the Fink and Henderson studies accounted for work relative value units in their multivariate analysis, but did not account for specific types of surgery making direct comparisons of risk-adjusted outcomes difficult.

Vascular surgery

Three studies compared quality of care in the VA and the private sector in vascular surgery.

Hutter and colleagues evaluated vascular surgery operations among 30,058 men in the VA and 5,174 men in the private sector as part of the Patient Safety in Surgery Study.[18] After adjusting for preoperative and intraoperative variables, the odds of developing postoperative complications were considerably lower in the VA (unadjusted postoperative morbidity rates 3.4% in VA versus 4.2% in non-VA; adjusted OR = 0.84; 95% CI, 0.78−0.92), but there was no significant difference in risk-adjusted mortality between the 2 populations ($p = 0.195$).

Using data from the Patient Safety in Surgery Study, Johnson and colleagues compared 458 female VA patients and 3,535 female private-sector patients who underwent vascular surgery.[19] After adjusting for patient and intraoperative characteristics, the odds of developing postoperative complications were significantly lower odds among VA patients compared with non-VA patients (unadjusted postoperative morbidity rates 13.3% in VA versus 23.4% in non-VA; adjusted OR = 0.60; 95% CI, 0.44−0.81); there was no significant difference in risk-adjusted 30-day mortality rates.

Weiss and colleagues evaluated perioperative mortality, stroke and cardiac complications in patients undergoing carotid endarterectomy in Connecticut from October 1997 through September 2002 using data from the Connecticut VA database (140 carotid endarterectomies) and the Connecticut Hospital Association database (6,949 carotid endarterectomies).[20] After adjusting for patient and disease characteristics, there were no significant differences in postoperative mortality, stroke, or rate of cardiac complications.

In summary, studies of vascular surgery suggest that postoperative morbidity is improved in the VA[18,19] or is at least comparable[20] across settings. Additionally, risk-adjusted mortality rates were comparable across populations in all included studies. As in the previous section, it is notable that the types and frequencies of vascular surgery operations differed considerably across hospital type in both the Hutter and Johnson studies. Although risk-adjusted outcomes accounted for work relative value units, they did not account for specific interventions.

Solid organ transplantation

We identified 3 articles that addressed solid organ transplantation in VA and non-VA patients.

Austin and colleagues evaluated 1-, 3-, and 5-year posttransplantation mortality rates among 149 VA patients and 285 non-VA patients who underwent orthotopic liver transplantation at a single medical center between September 1991 and December 2000.[21] Veterans received their pre- and posttransplantation care at the Portland Veterans Affairs Medical Center and non-Veterans received pre- and posttransplantation care at the Oregon Health and Science University hospital; all patients received transplants in the operating rooms of, and received initial postoperative intensive care at, the Portland Veterans Affairs Medical Center. Univariate analysis suggested greater mortality among veterans, however, after adjusting for sex, donor age, recipient age, cause of liver disease, and Model for End-Stage Liver Disease score, hospital site was not a significant predictor of mortality (relative risk = 1.15; 95%, CI 0.94−1.43).

Moore and colleagues studied graft and patient survival among all adult patients from Vanderbilt University Medical Center and the VA Tennessee Valley Healthcare System who underwent primary liver, kidney, heart, or lung transplantation between January 1990 and December 2002.[23] All patients received heart, liver, and lung transplants at Vanderbilt University Medical Center; renal transplantations were performed at both centers. VA patients received up to 3 months of postoperative care at Vanderbilt University Medical Center before transfer back to the VA setting. Three hundred and eighty VA patients (141 liver, 54 heart, 183 kidney, and 2 lung) were compared with 1,429 non-VA patients (280 liver, 246 heart, 749 kidney, and 154 lung). Comparisons of outcomes were not performed among lung transplant recipients because of small sample size. Cumulative patient and graft survival rates were comparable among the 2 populations.

Gill and colleagues used the US Renal Data System from April 1, 1995 through December 31, 2004 to compare the time to transplantation among 7,395 VA patients, 144,651 privately insured patients, and 357,345 Medicare- or

Medicaid-covered patients.[22] After adjusting for patient demographics, clinical characteristics, and state rates of transplantation, they found that VA-covered and Medicare/Medicaid-insured patients were less likely to receive transplants than patients with private insurance (hazard ratio = 0.65; 95% CI, 0.60−0.70; $p < 0.0001$). VA patients were less likely to be placed on the wait-list (hazard ratio = 0.71; 95% CI, 0.67−0.76) and, once on the list, they received transplants less frequently than privately insured patients (hazard ratio = 0.89; 95% CI, 0.82−0.96). VA patients with supplemental private insurance had the same likelihood of transplantation as non-VA patients with private insurance. This study was not able to determine which patients accessed transplantation within or outside the VA system or to determine specific reasons for veterans spending longer time on the waiting list.

In summary, the available evidence on solid organ transplantation found no significant differences in patient survival among VA and non-VA patients.[21,23] Compared with privately insured patients, VA patients with end-stage renal disease were both less likely to be listed for a kidney transplant and less likely to receive a transplant when listed.[22]

Surgical oncology

Of the 3 articles on surgical oncology,[24-26] 2 focused on pancreatic cancer[24,25] and 1 focused on breast cancer.[26]

Bilimoria and colleagues used the National Cancer Data Base to evaluate 60-day and 3-year mortality and stage-appropriate treatment among 513 VA patients, 12,756 academic hospital patients, and 18,299 community hospital patients who underwent treatment for stage I and II pancreatic cancer from 1985 through 2004.[24] After adjusting for patient, surgical, disease, and hospital characteristics, they found comparable mortality rates among the VA, academic, and community hospital settings for resection of stage I and II pancreatic cancer. There was no difference in risk-adjusted use of surgery or adjuvant chemotherapy between VA and academic hospitals ($p = 0.54$); however, VA hospitals were significantly more likely to use surgery (unadjusted use rate of surgery 33% in VA versus 19% in community; adjusted OR = 0.46, $p < 0.001$) and adjuvant chemotherapy than community hospitals (unadjusted use rates of chemotherapy 37% in VA versus 39% in community; adjusted OR = 0.56, $p < 0.001$).

Glasgow and colleagues used Patient Safety in Surgery Study data to compare postoperative morbidity and mortality after pancreatectomy for pancreatic cancer among 377 patients at 83 VA hospitals and 692 patients at 14 non-VA hospitals.[25] After adjusting for case-mix differences, patient characteristics, and intraoperative variables, VA patients had higher rates of both 30-day postoperative morbidity (unadjusted morbidity rates 42.4% in VA versus 29.1% in non-VA; $p < 0.0001$; adjusted OR = 1.58; 95% CI, 1.08−2.31) and mortality (unadjusted mortality rates 6.4% in VA versus 2.5% in non-VA; $p = 0.0015$; adjusted OR = 2.53; 95% CI, 1.02−2.38). These findings persisted after stratifying analyses by Whipple procedure or pancreaticoduodenectomy.

Neumayer and colleagues compared postoperative morbidity from breast cancer surgery in 644 VA patients and 3,179 non-VA patients as part of the Patient Safety in Surgery Study.[26] Results were primarily reported on the female patients (n = 3,634). After accounting for patient factors, disease characteristics, surgeon traits, and type of surgery, no significant difference in risk adjusted 30-day morbidity was found between female patients in the VA and private sector (OR = 1.40; 95% CI, 0.89−2.20).

Overall, findings from the surgical oncology literature were mixed. Although 1 article on pancreatic cancer demonstrated no significant difference in postoperative mortality between the 2 groups, another found a significant increase in risk-adjusted postoperative morbidity and mortality rates in the VA. The third article, examining breast cancer outcomes, found no significant difference in risk-adjusted postoperative morbidity among female patients.

Cardiac surgery

We identified one article for inclusion pertaining to cardiac surgery. Rosenthal and colleagues compared severity-adjusted mortality after coronary artery bypass graft among 19,266 patients from 43 VA hospitals, 44,247 patients from 32 New York state hospitals and 9,696 patients from 10 hospitals in northeast Ohio.[27] Data were derived from the VA Continuous Improvement in Cardiac Surgery Program, the New York State Cardiac Surgery Reporting System, and the Cleveland Health Quality Choice from October 1993 through December 1996. VA patients had higher unadjusted rates of in-hospital mortality (3.5%) compared with patients in New York state (2.0%) and northeast Ohio (2.2%). After adjusting for patient-level predictors and hospital volume, they found that odds of death were higher in VA patients than in private-sector patients (OR = 1.34; 95% CI, 1.11−1.63; $p < 0.001$).

Endocrine surgery

We identified 2 articles, both from the Patient Safety in Surgery Study, that addressed endocrine surgery.[28,29]

Turrentine and colleagues evaluated 178 patients in 81 VA hospitals and 371 patients in 14 private-sector hospitals who underwent adrenalectomy.[28,29] After adjusting for patient characteristics, provider characteristics, and wound class, there was no significant difference in postoperative morbidity among VA patients compared with private-

sector patients (OR = 1.55; 95% CI, 0.49−1.36). Mortality rate was too low for adjustment.

Hall and colleagues evaluated 2,814 VA patients and 4,268 non-VA patients who underwent thyroidectomy or parathyroidectomy. There were significantly different distributions of types of surgery at different sites with proportionally more parathyroid operations done at the VA. Because the event rates for morbidity and mortality were very low, a combined variable was built for "any adverse event." Risk-adjusted adverse event rates, accounting for disease type, surgical specialty, and patient characteristics did not differ significantly across sites (OR = 1.25; 95% CI, 0.87−1.78).

In sum, the available evidence on endocrine surgery found no significant differences in postoperative morbidity or adverse event rates.

DISCUSSION

In this systematic review of the literature, we identified 16 articles that compared the quality of surgical care in the VA with care quality in non-VA comparison groups. Overall, outcomes were generally similar between VA and non-VA settings for a spectrum of surgical conditions and interventions, although there were some exceptions. Specifically, postoperative morbidity was greater in the VA among male bariatric surgery patients[17] and in 1 of 2 studies evaluating surgery for pancreatic cancer[25] compared with their non-VA counterparts. Additionally, 3 studies revealed higher mortality rates in the VA for general surgery interventions in male patients,[14] surgery for pancreatic cancer[25] in 1 of 2 studies addressing this issue, and coronary artery bypass graft.[27] On the other hand, the VA outperformed the non-VA setting with significantly lower postoperative morbidity among women undergoing general surgical interventions[14] and among both men and women undergoing vascular surgery interventions.[18,19] With regard to transplantation referral, VA-covered patients were both significantly less likely to be put on the wait-list and to receive a renal transplant compared with privately insured patients.[22]

The Patient Safety in Surgery Study, with its basis in NSQIP data, accounted for 10 of the 16 articles in this review.[6,7] The NSQIP is the first validated, risk-adjusted program evaluating outcomes across surgical settings.[4] Although evaluations based on NSQIP tend to be robust, given the focus on comprehensive, prospective data collection, there are a number of recognized potential limitations to studies based on the Patient Safety in Surgery Study. The 14 private-sector hospitals in this study might not be generalizable to the private sector at large and probably represent quality leaders. Additional limitations to this study (and others) include omitted variable bias and the omission of cases. For example, risk-adjustment models were not able to account for stage of disease,[24-26] indications for surgery,[16,28,29] or specific type of surgery[14,15,18,19] in many studies; vascular surgery analyses did not account for endovascular procedures performed outside of the operating room, such as in a radiology suite.[18,19] Disease- and procedure-specific outcomes could not be assessed with these data in all instances (eg, leak rates after pancreatectomy or disease recurrence after oncologic surgery). Additional limitations of some included studies were small sample sizes, evaluation of few medical centers, or analysis within narrow geographic regions. Comparisons across the two systems of care (private and VA) are not always clear cut and it is difficult to put some of these outcomes measures and assessments in the proper context.

Our findings too should be viewed with limitations in mind. The majority of studies in our review are based on data that are at least 5 years old and might not represent contemporary practices. Most studies were VA-funded or were led by VA investigators and undetermined bias might have occurred because there could be a vested interest in the quality comparisons. We attempted to select only studies that we thought were sufficiently rigorous to produce valid results, however, we have no way of assessing the potential for publication bias.

Overall, we found the published literature shared few differences in morbidity or mortality between patients treated in VA or non-VA hospitals. What differences we did find favored VA care in 3 cases and non-VA care in 5 cases; compared with 15 cases where care was not different. Unadjusted results from one study suggested that disparities between VA and non-VA care can depend on procedure type, with more comparable outcomes for low-risk procedures and worse outcomes in the VA for more complex procedures. Although intriguing, these results were unadjusted and such a trend was not observed definitively in the general body of literature reviewed. A more contemporary look at the quality of VA and non-VA surgical care might be warranted, especially in light of the numerous quality assessment and improvement initiatives that have been instituted by insurers, regulators, and individual institutions in the years since the NSQIP was first established. Indeed, the ACS NSQIP has grown considerably, now including >180 non-VA hospitals, evaluating multiple surgical subspecialties, and using more advanced data management. It would be worthwhile to repeat or update some studies, with additional consideration given to merging the VA and ACS NSQIP systems for ongoing comparisons at the institutional and systems level. In addition, consideration might be given to reporting relevant outcomes within and across systems, in the way that some states report risk-adjusted

outcomes across hospitals for certain surgical procedures (eg, coronary artery bypass grafting in California hospitals[31]). Additionally, the studies reviewed here focused primarily on outcomes measures; future studies could address comparisons of processes of care to provide information to enhance the quality of care across settings.

CONCLUSIONS

Assessing quality of care is a focus of all health care systems today and has taken on new importance as the United States moves toward health system reform. Based on the existing data, we conclude that the VA and non-VA settings provide generally comparable care with regard to surgical outcomes. Future studies will provide important insights not only into the contemporary status of the quality of care in VA and non-VA settings, but will also provide insight on how quality might be maximized across care environments. Such systematic comparisons ultimately benefit VA and non-VA health care systems and the consumers who use them because the goal of such work is to discover relative strengths and weaknesses in quality and then address the weaknesses accordingly.

Author Contributions

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Analysis and interpretation of data: Matula, Trivedi, Glassman, Shekelle, Asch

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