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Quality Initiatives Undertaken by the Veterans Health Administration

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August 2009

Notes

The Department of Veterans Affairs photograph on the cover was taken by Warren Park.

Unless otherwise indicated, all years referred to in this report are federal fiscal years, and all dollar amounts are in nominal dollars.

Numbers in the text and tables may not add up to totals because of rounding.
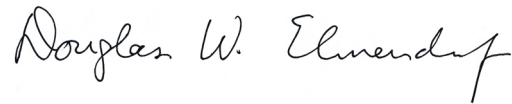
Preface

With the return of veterans who have served in the conflicts in Iraq and Afghanistan and with a much larger number of veterans from earlier eras who are turning to the Department of Veterans Affairs for at least a portion of their health care, the department is now treating more than 5 million veterans each year. Many observers have suggested that the quality of care in the veterans' health system has been bolstered by concerted efforts to track performance measures, expand the use of health information technology, manage chronic diseases, coordinate care by different providers, and enhance the provision of evidence-based medical practices. The lessons learned by the Veterans Health Administration (VHA) may have implications for other components of the nation's health care system.

In response to requests from the Chairmen of the House Committee on Veterans' Affairs and the Subcommittee on Military Construction, Veterans Affairs, and Related Agencies of the House Committee on Appropriations, the Congressional Budget Office (CBO) has prepared this assessment of quality improvement, cost and utilization of services, and health information technology in the Veterans Health Administration. It examines VHA's experience with quality improvement and health information technology. The assessment also aims to improve understanding of how VHA's system serves its patients. That information may prove useful as decisionmakers consider how veterans' health care might be affected by proposals for health care reform. In keeping with CBO's mandate to provide impartial analysis, this paper makes no recommendations.
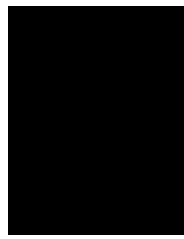
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Summary and Introduction

The Department of Veterans Affairs (VA), through the Veterans Health Administration (VHA), provides primary care, specialized care, and related medical and social support services to enrolled veterans. VHA provides medical services through an integrated delivery system that includes roughly 150 medical centers, more than 900 outpatient clinics, and other facilities offering readjustment counseling, long-term care, and other services. In 2008, VHA's medical facilities treated 5.1 million veterans, or about 22 percent of the nation's population of veterans, at a cost of more than $40 billion.[1]

VHA uses an enrollment system to keep track of veterans who plan to use the department's care. As part of the enrollment process, applicants must document their status as veterans and are assigned to one of eight priority groups on the basis of their service-connected disabilities, service-related exposures, income, assets, and other factors (see Box 1). Veterans in the highest priority groups, 1 through 3, have service-connected disabilities of varying degrees, whereas veterans in priority group 4 have serious disabilities that are not connected to their military service. Priority group 5 consists of low-income veterans, and priority group 6 includes veterans with environmental exposures (to Agent Orange, for instance) as well as

many veterans of the recent conflicts in Iraq and Afghanistan. The veterans in priority groups 7 and 8 have no compensable service-connected disabilities and have higher income than those in priority group 5.

As of 2009, veterans with 10 percent or greater service-connected disabilities (those in priority groups 1 through 3) constitute about one-third of VHA's enrolled population, and veterans with very low income (priority group 5) make up about another one-third. Recent combat veterans account for about 5 percent of VHA's enrollees.[2]

Nearly 80 percent of enrolled veterans have access to other health care coverage, and data from VHA indicate that most enrollees with other coverage rely on VHA for only part of their medical care. Veterans are particularly likely to turn to VHA for outpatient care and for certain services—such as mental health and substance abuse counseling—on which VHA has put particular emphasis and for which many veterans may not have private coverage. Most enrollees rely on other providers for emergency services and inpatient hospital care. Enrollees may choose one provider over another for various reasons, including travel time, out-of-pocket costs, and perceived quality of care for a particular type of service.

Dual use of VHA and non-VHA care improves access and choice for veterans, but some observers have raised concerns that such use may interfere with efforts to coordinate care. VHA uses a primary care model that stresses adherence to clinical guidelines and sharing of information between providers. VHA relies on a suite of health

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1. Those facilities also provided some treatment to about 500,000 patients who are not veterans, including employees receiving tests and vaccinations required for employment at VA's facilities; dependents and survivors of disabled veterans who are eligible for VA's Civilian Health and Medical Program; and patients seen through sharing agreements with other providers, including the Department of Defense's TRICARE program (the medical plan provided to military service members, retirees, and their dependents).

2. Those recent combat veterans are initially assigned to priority group 6 unless they demonstrate a service-connected disability or low income, thus qualifying for a higher priority group.

Box 1.

The Veterans Health Administration's Health Care Priority Groups and Cost-Sharing Rules

The Veterans Health Administration (VHA) assigns veterans seeking health care services to one of eight priority groups on the basis of their service-connected disabilities (SCDs), service-related exposures, income, assets, and other factors. VHA's enrollment system began in 1999 in accordance with provisions of the Veterans' Health Care Eligibility Reform Act of 1996 (Public Law 104-262; 110 Stat. 3177).

Veterans in **priority group 1** (the highest group) have service-connected disabilities rated 50 percent or more disabling. Veterans in **priority group 2** have SCDs rated 30 percent or 40 percent disabling. **Priority group 3** comprises veterans who are former prisoners of war, were awarded the Purple Heart, were discharged for SCDs, have SCDs rated 10 percent or 20 percent disabling, or were disabled by treatment or vocational rehabilitation provided by the Department of Veterans Affairs (VA). Veterans in **priority group 4** are receiving aid and attendance benefits (cash payments from VA to eligible individuals who need assistance with daily activities because of

a disability), are housebound, or have been determined by VA to be catastrophically disabled. **Priority group 5** comprises veterans without SCDs or with noncompensable SCDs rated zero percent disabling who are living below VA's means-tested thresholds, veterans who are receiving pension benefits from VA, and veterans who are eligible for Medicaid. Veterans in **priority group 6** served in World War I or the Mexican Border War, are seeking care solely for disorders associated with exposure in the line of duty to chemical, nuclear, or biological agents (including, for example, Agent Orange), have compensable SCDs rated zero percent disabling,[1] or are within a five-year period of special eligibility for recent combat

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1. A limited number of veterans whose conditions are rated zero percent disabling receive small monetary payments related to tuberculosis, special monthly compensation under 38 U.S.C. 1114 (k), or other disabilities. Those veterans are categorized as having "compensable service-connected disabilities rated zero percent disabling" and are distinguished from veterans with a zero percent rating who are receiving no compensation payments from the Veterans Benefits Administration.

information software known as VistA (the Veterans Health Information System and Technology Architecture) to document and coordinate care received by veterans within the system. Although VHA has made some progress in exchanging patients' health care information with the military health system of the Department of Defense (DoD), the exchange of data between VHA and private providers lags behind because of incompatible data structures and a lack of data-sharing agreements—problems faced by most providers nationwide.

Two decades ago, VHA had a poor reputation for quality. Beginning in the mid-1990s, however, VHA underwent what the agency characterizes as a major transformation aimed at improving the quality and efficiency of care it provides to its patients. That transformation included

eliminating underutilized inpatient beds and facilities, expanding outpatient clinics, and restructuring eligibility rules. A major focus of the transformation was the tracking of a number of performance indicators—including quality-of-care measures—and holding senior managers accountable for improvements in those measures.

In examining the quality of care, researchers have noted that the care provided to VHA patients compares favorably with that provided to non-VHA patients in terms of compliance with widely recognized clinical guidelines—particularly those that VHA has emphasized in its internal performance measurement system. Such research is complicated by the fact that most users of VHA's services receive at least part of their care from outside providers, however.

The Veterans Health Administration's Health Care Priority Groups and Cost-Sharing Rules

veterans. Veterans in **priority group** 7 do not have SCDs or have noncompensable SCDs rated zero percent disabling and have income or net worth above VA's means-tested thresholds but below a geographic index defined by the Department of Housing and Urban Development (HUD). **Priority group 8** (the lowest group) comprises veterans without SCDs or with noncompensable SCDs rated zero percent disabling who have income or net worth above both VA's means-tested thresholds and HUD's geographic index. (New enrollment has been closed for that group since January 2003, although regulations went into effect in June 2009 that allow enrollment by veterans whose income exceeds by 10 percent or less either VA's means-tested thresholds or the applicable HUD geographic index.)

VA provides treatment for service-connected conditions free of charge to all enrolled veterans. Those in the highest priority groups generally do not pay inpatient or outpatient copayments even for care unrelated to their military service. Copayments for outpatient services for veterans in the lower priority

groups are $15 for a primary care visit or $50 for a visit to a specialist. The copayment for inpatient services for the first 90 days of care during a 365-day period is $1,068; each additional 90 days of care during that period costs $534. The per diem charge for inpatient services is $10. Those inpatient copayment rates are reduced by 80 percent for veterans with income or net worth below HUD's geographic index.

Copayments for medications (currently $8 per medication for a 30-day supply) are waived for veterans with very low income and those with SCD ratings of 50 percent or higher. Copayments are also waived for veterans in priority groups 2 through 6 after they reach an annual cap of $960. Veterans in priority group 6 pay copayments only for services that are not related to their exposures or experience. Veterans in the lowest priority groups—7 and 8—pay copayments for all care that is not related to a service-connected condition. Even under the various circumstances in which copayments are waived, a veteran's third-party insurer may be billed for treatment for conditions unrelated to his or her service.

VHA has various programs designed to study and improve the quality of care at its facilities, including:

■ An internal clinical peer review program in each hospital;

■ An External Peer Review Program (EPRP), which extracts data from patient care records in VHA's clinical systems and compares the information with evidence-based performance criteria;

■ A National Surgical Quality Improvement Program (NSQIP), which makes risk-adjusted comparisons of surgical outcomes to identify surgical units with unexpectedly high or low rates of morbidity or mortality;

■ An Inpatient Evaluation Center (IPEC) designed to improve outcomes in the acute care hospital setting by examining data from electronic health records (EHRs);

■ A set of programs in the Quality Enhancement Research Initiative (QUERI) that aims to put clinical research findings and evidence-based recommendations into clinical practice; and

■ An Evidence-based Synthesis Program (ESP), which systematically reviews published research on medical issues of particular importance to VHA's user population.

VistA plays a key role in the agency's efforts to measure its performance and improve its quality. Researchers have used clinical data in VistA's electronic health records to study the effects of various quality improvement strategies. VHA's experience with EHRs may provide useful lessons for other health care providers on the ways in which such records can support the provision of coordinated, evidence-based medical care. Some outside providers have even adapted and installed versions of VistA within their own facilities. (See Appendix A for a description of a few such adaptations.) Some VistA adaptations are available as open source software, and several for-profit companies and not-for-profit organizations offer assistance in deploying those systems in hospitals, outpatient clinics, and elsewhere.

Some proponents of the veterans' health system have suggested that VistA has helped the Veterans Health Administration hold down cost growth when compared with other federal health programs, such as Medicare. But such comparisons are difficult to make. The substantial changes in VHA's structure and in eligibility for care make it particularly difficult to interpret such metrics as cost per enrollee when enrollment was rising dramatically from 1999 through 2002. In this assessment, the Congressional Budget Office (CBO) adjusted enrollment data to account for changes in the mix of enrollees and found that VHA's spending per enrollee was relatively flat from 1999 through 2002, but since that date it has risen about as rapidly as spending per enrollee in the Medicare program. It is likely that rapid increases in annual appropriations for VHA, efforts to reduce waiting lists within the system, and expansion of mental health and other specialized services have contributed to the recent growth in spending per enrollee (see Appendix B).

The Health Care System for Veterans

The Veterans Health Administration provides health care services to eligible veterans of the U.S. military. To be eligible to enroll, veterans must have received a qualifying discharge or deactivation after meeting certain minimum-service requirements.[3] Because VHA has limited resources, new enrollment is closed for many veterans without service-connected conditions whose income exceeds certain thresholds (see Box 1 on page 2).

Delivery System

VHA operates a system comprising 153 medical centers, 931 ambulatory care and community-based outpatient clinics, 232 readjustment counseling and outreach centers, 134 nursing homes, 50 residential rehabilitation treatment programs, and 108 comprehensive home-based care programs—all providing medical and related services to eligible veterans. The facilities provide inpatient hospital care, outpatient care, laboratory services, pharmaceuticals, rehabilitation for a variety of disabilities and conditions, mental health counseling, and custodial care. VHA facilities employ over 200,000 full-time-equivalent employees, including more than 14,500 physicians and over 60,000 nurses and nursing assistants.

VHA's Medical Benefits Package includes these services:

■ Outpatient care, inpatient services, and emergency services;

■ Prescription drugs, over-the-counter medications, medical supplies, and durable medical equipment;

■ Medical, surgical, and mental health care, including care for substance abuse;

■ Preventive care, health education, and immunizations;

■ Vision and hearing care, including eyeglasses and hearing aids under certain circumstances;

■ Counseling, home health services, and hospice care; and

■ Reimbursement for travel to VHA facilities to receive care (only for veterans who meet certain service-connection or income-eligibility criteria).[4]

Services are mainly provided at VHA's facilities. Under certain circumstances, VHA may send enrolled veterans

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3. Detailed information about eligibility for VHA's health care benefits can be found at www.va.gov/healtheligibility/eligibility/DetermineEligibility.asp.

4. The Medical Benefits Package is defined in 38 C.F.R. § 17.38, available at www.warms.vba.va.gov/regs/38cfr/booki/part17/s17_38.doc.

to outside providers at VHA's expense.[5] Enrolled veterans also may be reimbursed for emergency care received elsewhere when specific eligibility requirements are met.

Population of Patients

VHA's enrolled population includes 2.6 million veterans with compensable service-connected conditions, 2.3 million veterans with low income, nearly a quarter million veterans with significant disabilities not related to their military service, and several hundred thousand veterans whose service may have exposed them to potentially harmful chemical or radiological substances. Of those veterans enrolled for care, more than 138,000 are documented recipients of Purple Heart awards (indicating injuries received in combat).

Military service can be rigorous and, at times, traumatic. Whether in combat or in training, service members face physical and mental challenges that sometimes leave them with lasting conditions. VHA's providers regularly treat patients suffering from musculoskeletal injuries, loss of one or more limbs, spinal cord injuries, sensory loss, burns, chronic pain, brain injuries, and mental health issues such as post-traumatic stress disorder and major depression related to experiences in military service.

Many veterans seeking care from VHA are older, as the larger cohorts of veterans who served in World War II, Korea, and Vietnam have aged. Currently, about 45 percent of VHA's enrollees are 65 or older, and approximately another 40 percent are between the ages of 45 and 64. In general, aging is associated with an increase in medical care needs, among both veterans and others. Conditions such as hypertension and diabetes are prevalent in those age groups. Such conditions often respond best to regular monitoring, periodic diagnostic testing, and regular use of pharmaceuticals or other medical services.

In some ways, VHA serves as a safety net provider for veterans who might not otherwise have access to regular medical care, particularly veterans with low income or inadequate insurance coverage. VHA may treat a disproportionate number of veterans suffering from mental health conditions, including schizophrenia and bipolar disorder, for at least two reasons. First, mental health conditions are not always covered by private insurance. Second, some conditions may keep affected individuals from participating in full-time employment, reducing their access to other health insurance options.

Veterans in some priority groups rely more heavily on VHA for their care; other veterans receive the majority of their medical services from sources such as Medicare, Medicaid, private health insurance, the military health system, or public hospitals. In addition, veterans in some priority groups use more health care services from all sources than those in certain other categories. Veterans enrolled in priority group 1 (those with a service-connected disability rated 50 percent or more disabling) and in priority group 4 (most of whom are housebound with catastrophic disabilities not related to their military service) face the highest overall health care costs and rely on VHA for a greater percentage of their medical care than veterans in other priority groups.

According to VA, there were more than 23 million veterans of the U.S. military alive in 2008. Using data provided by VHA, CBO estimates that in addition to the nearly 8 million veterans enrolled in VA's health system in that year, over 5 million veterans who were not enrolled would have been eligible to receive medical care from VA if they had applied. However, another 10 million would have been classified in priority group 8, the group for which new enrollment had been frozen since January 2003.[6] (Recent combat veterans may enroll regardless of

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5. Health care provided by outside providers at VHA's expense is known as "fee-basis care." It may be authorized when direct VHA services are geographically inaccessible or when VHA facilities are not available to meet a veteran's needs. In 2008, VHA paid for approximately $3 billion in fee-basis care for veterans. Additional information on VHA's fee-basis care is available at www.nonvacare.va.gov.

6. New regulations went into effect in June 2009 that allow the enrollment of veterans in priority group 8 if their income exceeds either VA's means-tested threshold or the applicable HUD geographic income index by 10 percent or less. VA estimates that the change will affect more than 880,000 veterans in 2009, nearly 260,000 of whom are likely to enroll in the department's health system. Had the policy been in place for the entire fiscal year, VA estimates that the cost of those additional enrollees would have been about $500 million.

Table 1.

Health Insurance Coverage Reported by Veterans Enrolled in VHA, by Priority Group, Fiscal Year 2007

(Percent)

Priority Group	Any Medicare	Medicare Part B	Medicare Part D	Medigap	Medicaid	TRICARE/ TFL	Private Insurance or HMO	Any Non-VHA Coverage
P1	52	35	13	13	6	38	24	79
P2	35	24	11	11	5	37	39	82
P3	39	26	13	14	6	31	38	81
P4	67	42	26	19	19	5	12	72
P5	56	34	21	17	12	4	20	68
P6	22	15	7	7	4	18	56	79
P7/P8	70	50	24	39	7	9	39	90
Total	**55**	**37**	**19**	**22**	**8**	**17**	**31**	**79**

Source: Congressional Budget Office based on data from Department of Veterans Affairs, Veterans Health Administration, *2007 Survey of Veteran Enrollees' Health and Reliance Upon VA* (May 2008).

Notes: Medicare Part B refers to Medicare's Supplementary Medical Insurance, which covers services provided by physicians and other practitioners, hospitals' outpatient departments, and suppliers of medical equipment. Medicare Part D refers to Medicare's outpatient drug coverage program. Medigap refers to a private supplemental insurance plan that provides additional coverage for Medicare beneficiaries. Medigap plans may be purchased individually or provided by former employers as part of a retirement plan.

   VHA = Veterans Health Administration; TFL = TRICARE For Life (a Department of Defense program that provides supplemental coverage for military retirees and dependents who are eligible for Medicare); HMO = health maintenance organization (a type of managed care plan).

   Priority groups are defined in Box 1.

disability or income status during a five-year special eligibility period.)[7]

To serve the population of eligible veterans, the Veterans Health Administration received $46.6 billion in budget authority in 2009 (including revenue from copayments and third-party reimbursements collected from veterans and insurers). The agency's budget has grown rapidly in the past decade, in part because of a substantial increase in the number of veterans using the system.

Dual Use of Care
Most of the nearly 8 million veterans enrolled in VA's health care system have other coverage options available to them (see Table 1). Veterans who are age 65 or older and some disabled veterans have access to Medicare coverage, and low-income veterans may be eligible for Medicaid coverage. Those working in the private or public sectors often have access to employment-based health insurance. Veterans who are also military retirees have access to TRICARE, the Department of Defense's health plan that includes both access to the military health system and coverage from network and non-network civilian providers.[8]

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7. Title I, section 102(a) of the Veterans Programs Enhancement Act of 1998 (Public Law 105-368, 38 U.S.C. § 1710(e)(1)(D)) gave veterans and demobilized reservists returning from combat operations a special period of eligibility in which to receive health care from VHA, waiving any requirements for them to satisfy a means test or to demonstrate a service-connected disability. Under that authority, VHA provides health care for free for medical conditions potentially related to military service in combat operations. Initially set at two years, that special eligibility period was extended to five years by title XVII, section 1707 of the National Defense Authorization Act for Fiscal Year 2008 (P.L. 110-181, 38 U.S.C. § 1710(e)(3)). Additional information is available at www.va.gov/healtheligibility/Library/pubs/CombatVet/CombatVet.pdf.

8. Military retirees are people who served 20 or more years in uniform or who received a disability retirement from the military.

Veterans can and do seek care from multiple sources. VHA is a provider of care, not a payer, and thus even enrolled veterans often receive a number of services from outside providers. Many enrollees seek certain types of care from VHA's facilities and others from non-VHA providers. The decision about which source of care to use may involve issues such as distance, out-of-pocket costs, preferred doctors, perceived quality of care for a particular type of service, waiting times for appointments, and so on.

A study published by Denise Hynes and others examined dual use of Medicare and VHA care using data from VHA and the Centers for Medicare and Medicaid Services (CMS) for calendar year 1999.[9] The authors found that patients who lived farther from VHA facilities were less likely to rely on VHA as a provider, particularly for inpatient care. In addition, they found that veterans in higher priority groups were most likely to rely on VHA for some or all of their care, perhaps because such veterans face very low out-of-pocket costs when seeking care from VHA.

Medicare is a common source of dual coverage among VHA's older enrollees. To discern patterns of utilization among enrollees with both types of coverage, at CBO's request VHA's actuarial contractor matched VHA data with Medicare data for a population of enrollees age 66 and older in all priority groups who had been enrolled in VHA and eligible for Medicare for at least 12 months. Enrollees were divided into four subgroups on the basis of their utilization of services in fiscal year 2005:

■ Nonusers: Those who used neither Medicare-funded nor VHA services;

■ Nonreliant: Those who used only Medicare-funded services;

■ Partially reliant: Those who used both Medicare-funded and VHA services; and

■ Fully reliant: Those who used only VHA services.[10]

Overall, only 3 percent of that population used no health services from either VHA or Medicare-funded providers in 2005 (see Table 2). More than 28 percent of enrollees used Medicare-funded services only; nearly 54 percent used a combination of VHA and Medicare-funded services, and 15 percent used only VHA care. Although the analysis excludes information about services paid for purely out of pocket or covered by other insurance plans, the impact of that exclusion for this group of enrollees is small because most of their medical services are paid for by Medicare or VHA.

The Veterans' Health Care Eligibility Reform Act of 1996 substantially expanded access to VHA's services for many veterans. A group of VHA researchers led by Yvonne Jonk examined the impact of that wider eligibility on utilization of VHA's services by veterans who are also eligible for Medicare.[11] Before that law was implemented, higher-income veterans without service-connected conditions were eligible for only a limited set of medical services that generally did not include outpatient care.[12] After eligibility was expanded, any veteran who enrolled was eligible for the full range of benefits offered by VHA (although veterans with income above VA's means-tested threshold have to pay copayments for most services that are not related to a service-connected condition).

Jonk's study found a significant increase in the use of VHA's outpatient care and pharmaceuticals by veterans who became eligible for the more complete package of services.[13] In addition, that study identified a slight decrease in the use of Medicare-funded outpatient care by

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9. Denise M. Hynes and others, "Veterans' Access to and Use of Medicare and Veterans Affairs Health Care," *Medical Care*, vol. 45, no. 3 (March 2007), pp. 214–223.

10. Individuals were put in the "partially reliant" category even if they received care through one program only once while relying on the other program for all other services during the year.

11. Yvonne Jonk and others, "Impact of Eligibility Reform on the Demand for VHA Services by Medicare Eligible Veterans," VA Health Services Research and Development Cyberseminar, April 25, 2007, www.hsrd.research.va.gov/for_researchers/cyber_seminars/catalog.cfm.

12. Statement of David P. Baine, Director, Federal Health Care Delivery Issues, Health, Education, and Human Services Division, Government Accountability Office, before the House Committee on Veterans' Affairs, published as Government Accountability Office, *VA Health Care: Issues Affecting Eligibility Reform,* GAO/T-HEHS-95-213 (July 19, 1995), http://archive.gao.gov/t2pbat1/154748.pdf.

13. Medicare did not provide outpatient prescription drug benefits during the period covered by the study.

Table 2.

Health Care Use by Veterans Enrolled in Both VHA and Medicare, by Type of Service, Fiscal Year 2005

(Percent)

Type of Service	No Use	Medicare Use Only	Both VHA and Medicare Use	VHA Use Only
Inpatient Hospital Care	76.2	19.2	1.2	3.4
Ambulatory Care	3.1	28.0	53.6	15.3
All Categories	3.0	28.1	53.9	15.0

Source: Congressional Budget Office based on data from the Department of Veterans Affairs.

Note: Data reflect the use of health care services by Medicare-eligible enrollees age 66 and older who have also been enrolled in the Veterans Health Administration (VHA) for one year or more.

veterans who became eligible for VHA's outpatient care. However, the reduction in Medicare outpatient care seemed to be less than the increase in VHA's outpatient care. Thus, VHA's care may be substituting for some Medicare services, but there was also an overall increase in outpatient services received.

Impact of Dual Use on Veterans' Health and the Delivery of Care

The degree to which patients who are enrolled in both Medicare and VHA rely on each program for care depends on the type of medical service they seek (see Table 3). Relatively few enrollees rely on VHA for outpatient surgery services, for example, whereas a large fraction of those seeking outpatient substance abuse treatment turn to VHA for some or all of that type of care. Some of those differences stem from the availability of coverage for services in each category. For example, very few VHA facilities offered chiropractic services in 2005, but some chiropractic coverage was available under Medicare. As a result, nearly all enrollees who received chiropractic care in 2005 did so using Medicare coverage only.[14] In addition, enrollees are more likely to receive emergency care from non-VHA hospitals than from VHA facilities, which may be too distant to be reached by a veteran in immediate medical need. By comparison, VHA has put a strong emphasis on improving access to mental health services for veterans, and enrollees rely

heavily on VHA for some or all of their outpatient psychiatric and substance abuse services.

The fact that veterans seek care from multiple sources has the potential for both positive and negative effects on their health. On the positive side, having more than one source of health coverage may improve access to care because veterans with other coverage who live some distance from a VHA facility can choose to see non-VHA providers closer to home. Expanded access allows patients greater choice of providers, and some patients may prefer to use VHA for certain types of services or to see certain providers while relying on outside coverage for other types of services. Thus, receiving some care from non-VHA providers may make it more convenient for patients to receive medical services at whichever facility is closest, less expensive, or perceived to have higher quality.

On the negative side, care received from other sources is not necessarily known to VHA. For that reason, concerns arise that dual use of VHA and non-VHA care may interfere with VHA's efforts to follow a primary care model to

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14. VHA began offering chiropractic spinal manipulative therapy for spinal problems at 26 facilities in late 2004 in accordance with the stipulations of the Department of Veterans Affairs Health Care Programs Enhancement Act of 2001 (Public Law 107-135; 115 Stat. 2446). As of mid-2009, the number of VHA chiropractic clinics has increased to 36, and more than 13,000 veterans receive chiropractic services from VHA annually.

Table 3.

Health Care Use by Veterans Seeking Care from VHA, Medicare, or Both, by Detailed Health Service Category, Fiscal Year 2005

(Percent)

Type of Service	Medicare Use Only	Both Medicare and VHA Use	VHA Use Only	Probability of Use In Health Service Category (Percentage of Dual Enrollees)
Inpatient Hospital Care				
Medical	79	4	17	17
Surgical	87	1	13	11
Psychiatric	67	3	30	1
Substance abuse	63	4	34	*
Skilled nursing facility/ extended care facility (nonacute)	96	1	4	4
Overall Inpatient Hospital Care	**81**	**5**	**14**	**24**
Ambulatory Care				
Allergy immunotherapy	94	1	6	1
Allergy testing	91	*	9	*
Anesthesia	92	*	8	15
Cardiovascular	72	8	20	52
Chiropractic	100	*	*	7
Consultations	72	5	23	37
Emergency room visits	77	5	17	30
Hearing/speech exams	26	3	71	11
Immunizations	48	4	49	56
Miscellaneous medical	67	12	21	71
Office/home/urgent care visits	30	48	23	94
Outpatient psychiatric	27	4	69	8
Outpatient substance abuse	10	1	89	*
Pathology	35	31	34	88
Physical exams	22	1	77	11
Physical medicine	39	3	58	14
Radiology	67	12	21	68
Surgery	73	8	19	65
Therapeutic injections	74	3	23	25
Vision exams	68	4	27	49
Overall Ambulatory Care	**29**	**55**	**16**	**97**
All Health Service Categories	**29**	**56**	**16**	**97**

Source: Congressional Budget Office based on data from the Department of Veterans Affairs.

Notes: * = less than 0.5 percent.

Probability of use in each category indicates the probability that an enrolled veteran had any health care use at the Veterans Health Administration (VHA) or paid for by Medicare during 2005.

direct the delivery of care to its patients.[15] Under that model, a primary care team coordinates services received from all sources so that overall care received by the patient meets established clinical guidelines. VHA uses health information technology (health IT) extensively to implement the primary care model. Medical services received within VHA are automatically entered into the patient's electronic health record, and information about test results, procedures performed, and other issues is available to the patient's primary care physician as well as to other providers who might see that patient.

VHA's suite of health information systems—known as VistA—includes electronic medical records, computerized physician order entry, medical image viewing, diagnostic test results, pharmaceutical management, medical staffing, and a wide variety of other applications that support VHA's hospitals, clinics, nursing homes, and other functions. VistA allows (and VHA's management encourages) providers to ask patients about services or medications received outside VHA and to follow up with outside providers to obtain medical information and enter it into the patient's electronic health record in VistA. That process is not automatic, however, and some information can fall through the cracks. (Private-sector providers face the same issue because patients often seek care from various sources, and the flow of information from one provider to another is slow and incomplete.)

In part because of Congressional mandates, a primary focus of VHA has been on the coordination of care and the exchange of health records between VHA and the Department of Defense. Some progress has been made in sending health data on newly separated veterans from

DoD to VHA and in sharing data in both directions between the two systems for shared patients, most importantly seriously injured service members who are being treated in one of VHA's four polytrauma centers.[16] The President recently announced that the two departments are collaborating on the development of a joint virtual lifetime electronic record that will include administrative and medical information collected during and after an individual's military service.[17] However, more work remains to be done before the two systems achieve the level of interoperability envisioned by lawmakers. Moreover, even though the exchange of data between DoD and VHA is relevant for newly separated veterans and shared patients, those patients make up only a small portion of VHA's total population of patients. Most veterans using VHA have not received care from military treatment facilities in decades. Both VHA and DoD share more patients with private-sector providers than they do with each other.[18]

VHA has made less progress on sharing data with providers besides DoD, even though most of VHA's patients who seek some of their care from another source are seeing private providers (often paid for by Medicare, Medicaid, or private insurance). Progress on the development of a National Health Information Network (NHIN) was cited by VA leadership as key to making improvements in

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15. See Chuan-Fen Liu and others, "Dual Use of VA and Non-VA Services Among Primary Care Patients with Depression," *Journal of General Internal Medicine*, vol. 24, no. 3 (March 2009), pp.305–311; Chuan-Fen Liu and others, "Opting Out of an Integrated Healthcare System: Dual-System Use Is Associated with Poorer Glycemic Control in Veterans with Diabetes," *Primary Care Diabetes*, vol. 2, no. 2 (June 2008), pp. 73–80; Steven J. Borowsky and Diane C. Cowper, "Dual Use of VA and Non-VA Primary Care," *Journal of General Internal Medicine*, vol. 14, no. 5 (May 1999), pp. 274–280; and Laura A. Petersen and Steven Wright, "Does the VA Provide 'Primary' Primary Care?" *Journal of General Internal Medicine*, vol. 14, no. 5 (May 1999), pp. 318–319.

16. For more details on the status of health data sharing between the two agencies, see Government Accountability Office, *Electronic Health Records: DOD and VA Efforts to Achieve Full Interoperability Are Ongoing; Program Office Management Needs Improvement*, GAO-09-775 (July 2009), www.gao.gov/new.items/d09775.pdf.

17. See www.whitehouse.gov/the_press_office/President-Obama-Announces-the-Creation-of-a-Joint-Virtual-Lifetime-Electronic-Reco/.

18. Other types of coverage available to enrolled veterans are detailed in Table 1. In the case of DoD, the patients are shared with civilian TRICARE providers. Data from DoD indicate that, depending on the type of service, from 51 percent to 82 percent of services provided to TRICARE beneficiaries are provided in the private sector through network or nonnetwork medical providers. (Those calculations by CBO are based on Department of Defense, *Evaluation of the TRICARE Program: Fiscal Year 2009 Report to Congress*, February 28, 2009, pp. 30–31, www.tricare.mil/hpae/studies/reports.cfm.)

sharing information between VHA and other providers.[19] VHA Deputy Secretary W. Scott Gould noted in a June 2009 speech that VA and DoD are moving toward an open-architecture design philosophy to lay the groundwork for public/private interoperability through the NHIN.[20] In the past year, the Federal Health Architecture within the Office of the National Coordinator for Health Information Technology has developed a shared software solution to help both federal and nonfederal providers exchange data using the NHIN. The code for that software, called CONNECT, has been released for public use at no charge under an open source software license in hopes that other providers will use and enhance the software, thus increasing the exchange of data between providers via the NHIN.[21] VHA has participated actively in the development of the NHIN and reports that it will be exchanging data on shared patients with Kaiser Permanente (a private-sector managed care organization) in fall 2009 using CONNECT.[22]

To date, there have been few examples of successful data sharing between VHA and private-sector providers. VHA relies heavily on its clinicians to seek out information about services and medications patients receive elsewhere. For research purposes, VHA sometimes merges its clinical data with Medicare claims data provided by CMS; however, information about services paid for by Medicare is not routinely available in an individual veteran's VistA health record unless a VHA provider seeks information from the veteran's Medicare-funded providers.

Many VHA studies hypothesize that as an integrated health care system that makes extensive use of electronic health records, VHA is particularly well suited to pursuing quality improvement efforts. Not all of those studies distinguish clearly between veterans who receive some of their care from VHA and those who use VHA exclusively, however. One study by Joseph Ross and others at VHA questioned whether "[q]uality improvement that involves the separate implementation of initiatives within a fragmented, nonintegrated, health care system without complete adoption of an interoperable medical record" could equal VHA's own quality track record.[23] The Ross study found that, compared with non-VHA users, individuals who received at least some of their care from a VHA medical center were more likely to report having received 17 recommended ambulatory care services. (That study did not distinguish between veterans who used VHA partially or exclusively.)

Ross and others also examined the question of how dual use of VHA and non-VHA providers affected patients' receipt of recommended health care.[24] The researchers compared two groups of VHA users—one partially reliant on VHA and one exclusively reliant. In unadjusted comparisons, dual users were more likely to receive recommended ambulatory care services. When results were adjusted for differences in users' age, sex, income, education, and insurance status, the researchers found "largely similar" use of recommended services for the two groups. Exclusive VHA users had higher rates of breast cancer screening and cholesterol monitoring but lower rates of prostate cancer screening and influenza vaccination. The study did not identify either a particular advantage or disadvantage of using VHA exclusively versus relying on outside providers as well.

Even if one or more of the providers is an integrated health care system (like VHA), the way in which patients seek care may be fragmented. A third study, by Chin-Lin Tseng and others, raised the methodological challenges of evaluating variation in outcomes and

19. Comment by VHA's then-Under Secretary for Health Michael Kussman, 4th Annual Government Health IT Conference & Exhibition, June 12, 2008, www.govhealthit.com/newsitem. aspx?tid=69&nid=69767. Similarly, the importance of developing the National Health Information Network was also cited by DoD officials in testimony on March 24, 2009, as key to improving the sharing of health data between internal and external providers for that department; see www.armedservices.house.gov/hearing_ information.shtml.

20. Remarks by VHA Deputy Secretary W. Scott Gould, CONNECT Seminar '09, Washington, D.C., June 30, 2009, www1.va.gov/ opa/speeches/2009/09_0630_gould.asp.

21. Department of Health and Human Services, "Federal Health Architecture Delivers Free, Scalable Solution Helping Organizations Tie Health IT Systems into the NHIN" (press release, April 6, 2009, www.connectopensource.org/display/Gateway/ 2009/04).

22. Personal communication with VHA staff, July 22, 2009.

23. Joseph S. Ross and others, "Use of Recommended Ambulatory Care Services: Is the Veterans Affairs Quality Gap Narrowing?" *Archives of Internal Medicine*, vol. 168, no. 9 (May 12, 2008), pp. 950–958.

24. Joseph S. Ross and others, "Dual Use of Veterans Affairs Services and Use of Recommended Ambulatory Care," *Medical Care*, vol. 46, no. 3 (March 2008), pp. 309–316.

quality indicators across health care providers.[25] The study combined data from the Centers for Medicare and Medicaid Services and VHA to examine whether better information on dual use of both Medicare-funded providers and VHA affected risk-adjusted estimates of the rate of lower extremity amputations among diabetes patients. Because amputation rates are used as quality indicators within VHA and elsewhere, all health providers may benefit from more accurate information about which patients might be at risk for such amputations (and thus should be referred for preventive services, such as regular foot exams). Tseng and her colleagues found that by including CMS data, they were able to identify a substantially higher number of risk factors (for example, foot deformities), medical comorbidities (such as cardiovascular problems), and amputations than by using VHA data alone. Relying on only one source of data can lead to a significantly biased estimate of the quality of care provided by VHA or by Medicare-funded providers. Improved information sharing between VHA and other systems of care could help identify patients at risk for complications and target appropriate preventive care to those patients.

VHA's reports and documents often examine the advantages the agency has as a large integrated delivery system with a comprehensive electronic health record. Advocates have claimed that because VHA is free from concerns about generating profits from medical services and faces at least part of the long-term costs associated with chronic diseases, the agency has an incentive to invest in preventive care, coordination of services, and quality improvement.[26] However, data on the way in which veterans use the system make it clear that most enrollees also rely on other sources of care for a significant portion of their health care needs.

Data sharing between VHA and other providers faces many challenges. Although DoD and VHA have made progress on sharing data, substantial stumbling blocks remain for the sharing of data between VHA and other outside providers. VHA's clinicians must proactively follow up with each veteran to inquire about outside services, and even if the records of those services are obtained from outside providers, they often must be entered into VHA's patient records systems by hand. Equally importantly, outside providers—some of whom provide a substantial amount of care to veterans—have expressed an interest in getting data from VHA on shared patients, although issues have arisen regarding how to identify those shared patients while safeguarding privacy. As more providers find themselves held accountable for quality measures such as Health Plan Employer Data and Information Set (HEDIS) scores, the exchange of data on shared patients will become increasingly important for both VHA and outside providers.

The new Web-based personal health record (PHR) portion of VHA's system—MyHealth*e*Vet—could serve as a conduit for improved communication between VHA and non-VHA providers.[27] A personal health record is a record of health and personal data that a patient can access, maintain, and share with providers and other individuals that he or she authorizes. Given the appropriate authentication, a patient can incorporate information about medical services provided within VHA and from outside providers into his or her MyHealth*e*Vet record and share that data with both sets of medical providers. Similarly, PHRs elsewhere have that same potential to facilitate the secure storage and exchange of health information. DoD has been developing its own PHR system, MiCare, by partnering with Microsoft and Google. VHA may benefit from watching the development of other PHRs to ensure that its system has the maximum capacity to exchange information and that its users (patients, providers, and so forth) are able to switch from one PHR to another relatively easily.

25. Chin-Lin Tseng and others, "Dual-System Utilization Affects Regional Variation in Prevention Quality Indicators: The Case of Amputations Among Veterans with Diabetes," *American Journal of Managed Care*, vol. 10, no. 11 (November 2004), pp. 886–892, www.ajmc.com/files/articlefiles/AJMC_04novPrt2Tseng886.pdf.

26. See, for example, Phillip Longman, *Best Care Anywhere: Why VA Health Care Is Better Than Yours* (Sausalito, Calif.: PoliPointPress, 2007).

27. Joel Kupersmith and others, "Advancing Evidence-Based Care for Diabetes: Lessons from the Veterans Health Administration," *Health Affairs,* Web Exclusive, vol. 26 (January 26, 2007), pp. w156–w168, http://content.healthaffairs.org/cgi/reprint/26/2/w156.

Quality Improvements Within VHA

The Institute of Medicine noted in 1999 that tens of thousands of Americans die from medical errors and hundreds of thousands suffer medical injuries each year.[28] In 2001, the institute called national attention to the issue of health care quality, noting that the nation's highly fragmented health care delivery system uses resources in ways that are often inefficient, ineffective, and inadequately grounded in clinical evidence.[29] The institute highlighted the need to redesign systems of care to support the provision of safe, effective, patient-centered, timely, efficient, and equitable health care and argued that health care quality is a function not just of skill or effort but of the nature of the health care system, saying "Trying harder will not work. Changing the systems of care will."[30] The experience of the health care system for veterans can shed some light on that issue and provide useful lessons for people interested in improving the quality of health care throughout the United States.

In the 1980s and early 1990s, VHA had a reputation for poor quality. The Joint Commission on Accreditation of Healthcare Organizations (recently renamed The Joint Commission) reported that VHA's hospitals were at least 20 percent more likely than others to fall below quality standards.[31] In the mid-1990s, VHA undertook what the agency calls a transformation effort designed to improve the system's efficiency, accountability, responsiveness, and quality of care. That transformation included decentralization of the system into 22 (later reduced to 21) Veterans Integrated Service Networks (VISNs), each with a budget determined by the number and mix of veterans enrolled for care within that network. VISN directors were given performance contracts contingent on meeting certain operational goals as well as targets for improving specified indicators of quality of care, access to services, and patients' satisfaction.[32]

As part of that transformation effort, VHA substantially reduced its number of inpatient beds, decreased administrative costs, opened hundreds of outpatient clinics, and undertook other operational improvements. The system refocused its services on the outpatient setting, stressing patients' primary care, especially preventive care and chronic disease management—two areas that are of particular importance to many of the older veterans in VHA's population.

A performance management program was implemented to improve quality systemwide by instituting evidence-based performance measures and accountability standards for an array of clinical and administrative procedures. Throughout VHA, performance measures were tracked and VISN directors and other senior managers held accountable for results. VHA's Office of Quality and Performance oversees the agency's national performance measurement system.

Initially, VHA used several internally chosen indexes composed of quality indicators its leaders identified as key for the health care needs of the veterans in its population of patients. VHA's improvements in those quality measures were described in a CBO report published in December 2007.[33] In that report, CBO noted that VHA had increased its scores and exceeded its own targets for the Clinical Practice Guidelines Index and the Prevention Index II. Those two composite measures play a key role in VHA's performance measurement system and are composed of evidence-based measures drawn from nationally recognized clinical practice guidelines for important medical concerns ranging from heart disease to influenza vaccination.

By tracking progress for those and other internally developed indicators, VHA is able to observe changes in its own practices over time. Still, comparisons of VHA's performance with that of non-VHA providers are problematic. VHA and its patients might benefit from aligning the agency's quality measures with standard measures

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28. Institute of Medicine, Committee on Quality of Health Care in America, *To Err Is Human: Building a Safer Health System* (Washington, D.C.: National Academies Press, 2000).

29. Institute of Medicine, Committee on Quality of Health Care in America, *Crossing the Quality Chasm: A New Health System for the 21st Century* (Washington, D.C.: National Academies Press, 2001).

30. Ibid., pp. 4–6.

31. Maureen Glabman, "Health Plans Can Learn from VHA Turnaround," *Managed Care Magazine*, February 2007, www.managedcaremag.com/archives/0702/0702.veterans.html.

32. For more information about how the system for VISN budgeting was developed, see W. Paul Kearns III and others, "Resource Allocation Dilemmas in Large Federal Healthcare Systems," in Peter Ramsaroop and others, eds., *Advancing Federal Sector Health Care: A Model for Technology Transfer* (New York: Springer Verlag, 2001).

33. Congressional Budget Office, *The Health Care System for Veterans: An Interim Report* (December 2007).

used elsewhere so that it would be easier to compare VHA's performance with that of other providers. However, much work remains to be done both inside and outside VHA before clear comparisons could be made across providers that take into consideration the risk factors affecting each group of patients.

VistA has been a key tool in VHA's quality improvement efforts. That health information system is actually a suite of more than 100 applications, including electronic medical records, computerized physician order entry, medical image viewing, diagnostic test results, pharmaceutical management, medical staffing, and a wide variety of other applications that support VHA's various functions.[34]

Results of the VHA's Transformation

The results of VHA's quality improvement efforts have been documented in peer-reviewed journals and other publications. Interpreting the results of those evaluations correctly is important so as to put VHA's achievements in context and to draw useful lessons for other health systems.

In one study, Ashish Jha and others examined the care received by patients in VHA in 1994 and 2000 (before and after the reengineering of the system) and compared that care with that received by patients in Medicare's fee-for-service program, in which patients can seek care from a wide variety of outpatient and inpatient providers.[35] The study found statistically significant improvements in quality after VHA's reengineering. Moreover, it found that VHA patients were more likely to have received "appropriate care," as defined by adherence to certain clinical guidelines. The medical care received by VHA patients rated significantly better on nearly all quality-of-care indicators than that received by patients covered by the Medicare fee-for-service program. For some settings and conditions, between 93 percent and 98 percent of VHA patients were found to have received appropriate care in 2000, while the highest score for Medicare patients was 84 percent.

In another study, Stephen Asch and others found that the quality of care received by patients in VHA in the late 1990s was superior to that received by a nationally representative sample of the population.[36] The authors looked at 348 indicators used to assess the treatment of 26 conditions and determined that best-practices care was provided for 67 percent of VHA patients compared with 51 percent of non-VHA patients. Particularly large differences between the two kinds of patients were seen in quality measurements of chronic disease care and preventive care. The VHA practitioners' adherence to recommended-care guidelines was greatest for indicators of quality care that were associated with a performance measurement program in which the care that practitioners provide is tracked and monitored and feedback is given to each practitioner about his or her performance. The findings need to be interpreted with caution, however. As CBO's 2008 report on geographic variation in health care spending noted, VHA's medical system varies substantially across the nation in patterns of clinical practice, despite the fact that managers track providers' compliance with national guidelines for the treatment of many medical conditions.[37]

In a third study, Eve Kerr and her colleagues compared diabetes care in VHA with that provided by commercial managed care organizations. They found that VHA's patients scored better on all process measures (including hemoglobin A1C testing and receipt of an annual eye exam) and in two of three intermediate measures (cholesterol levels and hemoglobin A1C levels; the two groups were similar on the third measure, blood pressure control).[38] The researchers noted that the differences could result in part from better documentation rather than better performance. Because VHA's facilities are rated in part on diabetes care indicators, providers have a strong incentive to document such items in the electronic medical record. (The same may be true of some commercial

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34. Kupersmith and others, "Advancing Evidence-Based Care for Diabetes."

35. Ashish K. Jha and others, "Effect of the Transformation of the Veterans Affairs Health Care System on the Quality of Care," *New England Journal of Medicine*, vol. 348, no. 22 (May 29, 2003), pp. 2218–2227.

36. Steven M. Asch and others, "Comparison of Quality of Care for Patients in the Veterans Health Administration and Patients in a National Sample," *Annals of Internal Medicine*, vol. 141, no. 12 (December 21, 2004), pp. 938–945.

37. Congressional Budget Office, *Geographic Variation in Health Care Spending* (February 2008).

38. Eve A. Kerr and others, "Diabetes Care Quality in the Veterans Affairs Health Care System and Commercial Managed Care: The TRIAD Study," *Annals of Internal Medicine,* vol. 141, no. 4 (August 17, 2004), pp. 272–281, www.annals.org/cgi/reprint/141/4/272.

managed care organizations as well, but it is unclear how many managed care providers are rated on the basis of diabetes care performance indicators.)

Quality Improvement Programs Within VHA's Patient Care Services

Quality improvement has been integrated into VHA's processes and organizational structure in many ways, from clinical units up to national programs. Those efforts include formal peer review programs (both internal and external) and more data-driven efforts to make risk-adjusted comparisons across facilities in order to identify outliers.

Internal Peer Review Program. Internal peer review is defined by VHA as a protected, nonpunitive medical center process to evaluate care at the medical provider level.[39] That type of clinical peer review is designed for quality management rather than for malpractice or other purposes, and it is intended to be a learning process. (If substantial issues arose in a peer review, a separate procedure would be initiated to review credentials or address major lapses in care.)

Rather than reviewing all cases (or a sample of all cases), internal peer review focuses on cases that end in death or significant complications. For those cases, an individual professional peer from within the facility reviews the case and concludes whether, in his or her opinion, most experienced practitioners would have managed the case in a similar fashion (Level 1), might have managed one or more aspects of the case differently (Level 2), or would have managed the case differently (Level 3). As a matter of policy, most internal peer reviews should be completed within a relatively short time after the case is referred for review, while the events are still fresh in the providers' minds.

External Peer Review Program. VHA established the External Peer Review Program in 1992 as a component of its quality measurement program. The EPRP is designed to collect data on clinical and structural performance, compare the data with evidence-based performance criteria, and feed that information back to each VISN and facility to spur improvements in performance and quality of care.[40]

Under the program, an independently contracted agency extracts specified data related to clinical care and structural features (such as waiting times) for each VHA facility. The data are extracted monthly from a random sample of both paper records and electronic medical records in VistA. The EPRP allows managers and clinicians to see how their performance compares with that of other VHA facilities and to benchmark their performance against external organizations.

Quarterly reports produced under the EPRP are subject to management's review and released to outside entities such as the Congress. The performance contracts of VHA's managers and clinicians depend in part on outputs from the EPRP. Researchers studying the implementation of electronic health records have noted that health conditions included in the EPRP are more likely to be incorporated into computerized clinical reminders than conditions not included in the EPRP, highlighting the links between VHA's performance contracts and its computerized hospital information systems.[41]

National Surgical Quality Improvement Program. In the 1980s, the quality of surgical care provided by VHA came under intense scrutiny following concerns that VHA's operative mortality rates might be significantly higher than private-sector norms. In response, lawmakers enacted The Veterans Administration Health Care

39. Statement of John D. Daigh, Jr., M.D., Assistant Inspector General for Healthcare Inspections, Office of Inspector General, Department of Veterans Affairs, before the Subcommittee on Oversight and Investigations of the House Committee on Veterans' Affairs, published as Department of Veterans Affairs, *VA Credentialing and Privileging: A Patient Safety Issue* (January 29, 2008), www.va.gov/oig/pubs/VAOIG-statement-20080129-daigh.pdf; and Department of Veterans Affairs, "Peer Review for Quality Management" VHA Directive 2008-004 (January 28, 2008), www1.va.gov/vhapublications/ViewPublication.asp?pub_ID=1638.

40. See Ashish K. Jha, "What Can the Rest of the Health Care System Learn from the VA's Quality and Safety Transformation?" *Perspectives on Safety* (Agency for Healthcare Research and Quality, September 2006), www.webmm.ahrq.gov/perspective.aspx?perspectiveID=31; and Department of Veterans Affairs, "External Peer Review Program (EPRP)," VHA Directive 2008-032 (June 23, 2008), www1.va.gov/VHAPUBLICATIONS/ViewPublication.asp?pub_ID=1708.

41. Constance H. Fung and others, "Variation in Implementation and Use of Computerized Clinical Reminders in an Integrated Healthcare System," *American Journal of Managed Care,* vol. 10, no. 11 (November 2004), pp. 878–885, www.hcplive.com/_micro/ajmc/_picture/folder_12/AJMC_04novPrt2VA_Fung878.pdf.

Amendments of 1985 (Public Law 99-166), which mandated that VHA report its surgical outcomes, making adjustments for the severity of illness of its patients. At the time, such risk-adjusted national averages did not exist, so VHA's surgeons collaborated to develop data models that would allow such comparisons. VHA's National Surgical Quality Improvement Program grew out of those efforts to compare surgical outcomes and to use that information to improve the quality of surgical care.[42] VHA has incorporated NSQIP into its Office of Patient Care Services, thus making it an integral part of the health care delivery system rather than a stand-alone program.

Since its launch in the early 1990s, NSQIP has evaluated surgical outcomes at VHA's hospitals, maintaining a database of approximately 100 variables with enough detail to allow outcomes to be adjusted for risk. Results are compared across VHA's hospitals and used to identify areas of poor performance and unacceptably high rates of adverse events. Benchmark reports allow hospitals to compare factors such as surgical volume, patients' risk profiles, outcomes, and length of stay with averages for all hospitals or for those in a specified peer group.[43] A key output of the NSQIP data is the observed-to-expected ratio—the observed deaths and complications divided by the expected number, given the risk-adjusted mix of patients for that institution as compared with VHA's national norms and the average for their peer group of hospitals within VHA.

NSQIP provides feedback in a variety of ways: individualized reports that compare risk-adjusted outcomes at each site, performance assessments and self-assessment tools, and site visits to hospitals whose data indicate problems. NSQIP asks hospitals with consistently low (in other words, favorable) risk-adjusted ratios to provide information on the methods and procedures they follow to achieve those results so that such best practices can be identified and disseminated more broadly.[44]

The American College of Surgeons implemented a private-sector version of NSQIP in 2002. Although that version and VHA's collect very similar data, they remain two distinct programs under separate leadership. In particular, the programs differ in areas of emphasis and in the definitions used for analyzing surgical outcomes. Nevertheless, published comparisons between VHA facilities' NSQIP results and those of the American College of Surgeons' NSQIP participants may finally enable fulfillment of the intent of the 1985 legal requirement that VHA compare its risk-adjusted surgical outcomes with national averages.

Evidence suggests that NSQIP has had a positive impact on surgical outcomes at VHA's facilities since the program's inception. According to the 2002 study by Shukri Khuri, Jennifer Daley, and William Henderson, 30-day postoperative mortality declined by 27 percent between 1994 and 2000, and postoperative morbidity (including complications, injuries, and infections) fell by 45 percent.[45] Data provided to CBO by VHA clearly show the decline in postoperative mortality and morbidity for noncardiac surgery (see Figure 1).[46] Because those results were not drawn from a controlled trial, it is difficult to identify the most important factors explaining the declines in postoperative mortality and morbidity; however, it is likely that NSQIP has helped VHA's facilities benchmark their performance and identify surgical units in need of attention.

In 2008, the VA's Office of Inspector General released two reports examining substandard care at the VHA hospital in Marion, Illinois, noting that problems with the

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42. See American College of Surgeons, National Surgical Quality Improvement Program, "About ACS NSQIP" (2006), http://acsnsqip.org/main/about_history.asp; and Shukri F. Khuri and others, "The Department of Veterans Affairs' NSQIP: The First National, Validated, Outcome-Based, Risk-Adjusted, and Peer-Controlled Program for the Measurement and Enhancement of the Quality of Surgical Care," *Annals of Surgery*, vol. 228, no. 4 (October 1998), pp. 491–507.

43. Shukri F. Khuri, Jennifer Daley, and William G. Henderson, "The Comparative Assessment and Improvement of Quality of Surgical Care in the Department of Veterans Affairs," *Archives of Surgery*, vol. 137, no. 1 (January 2002), pp. 20–27, http://archsurg. ama-assn.org/cgi/content/full/137/1/20. Benchmark reports are available internally to help VHA's facilities compare their performance but are not available to the general public.

44. Ibid., p. 23.

45. Ibid., p. 20.

46. VHA excludes cardiac surgery when producing those national mortality and morbidity rates because separate data collection and storage systems were developed for cardiac and noncardiac surgery. VHA states that it is actively engaged in incorporating cardiac surgery procedures into the existing NSQIP data. NSQIP examines 110,000 noncardiac surgeries per year; incorporating cardiac cases will add approximately 6,500 cases per year. (Personal communication with VHA staff, June 2, 2009.)

Figure 1.

Rates of Mortality and Morbidity After Major Noncardiac Surgery at Veterans Affairs Medical Centers

(Percent)
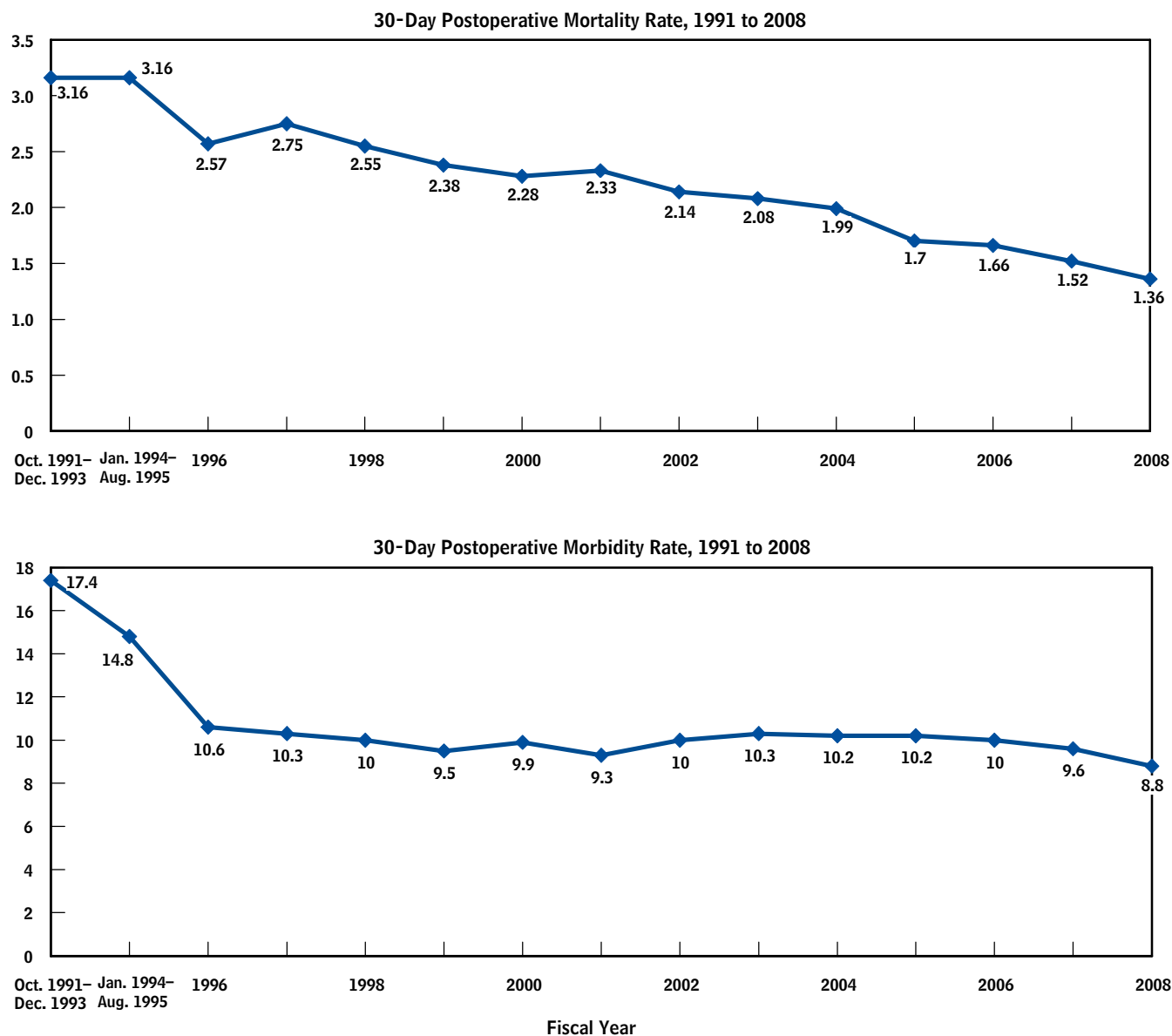
30-Day Postoperative Mortality Rate, 1991 to 2008

30-Day Postoperative Morbidity Rate, 1991 to 2008

Fiscal Year

Source: Congressional Budget Office based on data from the Veterans Health Administration (VHA).

Note: Data include a sample of all patients who underwent general, orthopedic, urologic, vascular, neurologic, otolaryngologic, thoracic, or plastic surgery at a VHA facility in that year. The two initial data points include more than one year of data. Morbidity reflects an extensive list of conditions, including pneumonia, respiratory failure, stroke, renal failure, surgical site infections (superficial, deep, organ space), and myocardial infarction. Thirty-day mortality is defined as any patient who died within 30 days of undergoing surgery, either inside or outside the hospital. Under the National Surgical Quality Improvement Program's methodology, mortality and morbidity rates observed at individual facilities or regional networks are compared with the expected rates (adjusted for the risk factors of patients at that facility or in that network). Because those facility- and network-level results are defined in comparison with the national averages, the observed death rate and the expected death rate are identical at the national level. To date, insufficient data are available at the national level to make reliable risk-adjusted comparisons of VHA and non-VHA facilities.

quality of surgical care there may have contributed to an unusually high number of postoperative deaths over the previous two years.[47] NSQIP data initially alerted the facility's managers and national officials to the problems at the Illinois facility. However, because of delays inherent in the NSQIP quarterly reporting schedule in use at the time, there was a substantial delay before the unexpectedly high postsurgical mortality data showed up in two consecutive NSQIP reports, triggering a site visit.[48] The Office of Inspector General also identified several issues with NSQIP documentation and analytical methods. In response, the VHA's Office of Patient Care Services commissioned a Data Validation Subgroup to evaluate the NSQIP sampling and modeling procedures. A report released in July 2008 by the group noted that although NSQIP's current model was accurately identifying VHA facilities with higher than normal adjusted death rates, there was potential for improvement in the models. The report provided detailed suggestions for changes in NSQIP's methodologies, including modifications to statistical analysis programming code, improvements in data collection, and revisions in statistical models.[49]

Inpatient Evaluation Center. VHA's Inpatient Evaluation Center is designed to improve outcomes for patients in the acute care hospital setting by measuring and reporting those outcomes, developing new quality metrics, and identifying evidence-based practices. The national program, created in 2005 and based in Cincinnati, Ohio, uses data extracted from VHA's computerized electronic health records to measure and report risk-adjusted outcomes for hospital patients. Initially designed to focus on patients in intensive care units, IPEC is expanding to look more broadly at all acute care hospital patients. By relying only on computerized data, rather than data that

has to be extracted manually from patients' charts, the program allows many more records to be examined at much lower cost.[50]

IPEC analyzes data from each medical center and generates reports comparing risk-adjusted mortality, length of stay, and adherence to process measures. In addition to ranking average and best performers, the program tracks hospital-acquired infections in intensive care units (ICUs). VHA's Office of Quality and Safety reports that since IPEC was initiated, there has been a significant drop in both unadjusted and risk-adjusted mortality in ICUs as well as in the unadjusted mortality of patients transferred from wards to ICUs.[51]

Other Quality Improvement Programs in VHA
VHA's Office of Research and Development administers several quality improvement programs that combine research and clinical care. The focus is on health topics likely to have a significant impact on quality improvement efforts and from which researchers and clinicians can identify and disseminate best practices. These hybrid research-operations partnership programs include the Quality Enhancement Research Initiative and the Evidence-based Synthesis Program.

Quality Enhancement Research Initiative. Developed in 1998 as part of VHA's transformation, the Quality Enhancement Research Initiative focuses on the imple-

47. Department of Veterans Affairs, Office of Inspector General, *Quality of Care Issues, VA Medical Center, Marion, Illinois*, Report No. 07-03386-65 (January 28, 2008), and *Additional Quality of Care Issues, Marion VA Medical Center, Marion, Illinois*, Report No. 08-00869-102 (March 26, 2008).

48. In response to concerns raised by some clinicians and others about delays in viewing results from the NSQIP analysis, NSQIP is moving to producing results more rapidly, using a rolling average rather than waiting until the end of a reporting period to assemble results.

49. Xiao-Hua Andrew Zhou and others, *Report of the Data Validation Subgroup of the National Surgical Quality Workgroup*, Department of Veterans Affairs (July 30, 2008).

50. See Department of Veterans Affairs, *Getting at Patient Safety (GAPS) Center,* www.gapscenter.va.gov/ipec.asp. Also see Marta Render and others, "Variation in Outcomes in Veterans Affairs Intensive Care Units with a Computerized Severity Measure," *Critical Care Medicine*, vol. 33, no. 5 (2005), pp. 930–939, and "Veterans Affairs Intensive Care Unit Risk Adjustment Model: Validation, Updating, Recalibration," *Critical Care Medicine*, vol. 36, no. 4 (2008), pp. 1031–1042.

51. Veterans Health Administration, Office of Quality and Safety, "VA Inpatient Evaluation Center (IPEC)," *Veterans Health Administration's Clinical Quality and Patient Safety Programs* (April 2009). VHA reports significant declines in unadjusted mortality in ICUs at hospital discharge (from 10.4 percent to 8.2 percent); unadjusted mortality at 30 days (from 11 percent to 9.9 percent); risk-adjusted mortality at hospital discharge (from 1.2 percent to 0.92 percent) and at 30 days (from 1.10 percent to 0.94 percent); and unadjusted mortality of patients transferred from ward to ICU (from 20.5 percent to 16.4 percent), perhaps as a result of the implementation of rapid response teams.

mentation end of health services research.[52] QUERI aims to put clinical research findings and evidence-based recommendations into practice in the clinical setting. QUERI was designed to target high-priority diseases and health care delivery issues. Its efforts focus on nine conditions: chronic heart failure, diabetes, HIV/hepatitis C, ischemic heart disease, mental health, polytrauma, spinal cord injury, stroke, and substance use disorders.

QUERI's programs use a six-step process to help turn research into practice:

■ Identify high-risk/high-volume diseases or problems;

■ Identify best practices;

■ Define existing practice patterns and outcomes across VHA and current variation from best practices;

■ Identify and implement interventions to promote best practices;

■ Document the extent to which best practices improve outcomes; and

■ Document the relationship between outcomes and improved health-related quality of life.

VHA's researchers produced a series of articles that describe the QUERI program and document some of its accomplishments and challenges.[53] Although VHA and QUERI are not unique in their efforts to promote evidence-based practices in health care, the size and scope of the program have allowed those involved in QUERI to identify a number of useful lessons for other organizations. Researchers involved in that effort have been candid in sharing both their successes and failures, and that

experience may help other organizations in their own efforts to improve quality.

One study in the QUERI series examined how VHA implemented electronic clinical reminders for cholesterol testing among patients with heart disease. The introduction of electronic reminders apparently improved lipid measurement rates, particularly at one facility, but the study was unable to identify an overall improvement in hyperlipidemia (high cholesterol), a key indicator for patients with ischemic heart disease.[54] Another study demonstrated how the QUERI process helped VHA identify problems with eye screening among diabetic veterans and change performance measures to address those problems. Researchers involved in that effort had difficulty developing a scheduling system that would fully address the problems identified by the QUERI process, however.[55]

At its inception, QUERI was designed to identify and roll out a single treatment model at the national level for each clinical area targeted. But even within an integrated health care system such as VHA's, there is considerable variation in populations of patients, facility staffing, and clinical practices. For that reason, QUERI has reoriented its focus to developing a menu of approaches that have worked in different settings. That adjustment has allowed each region or facility to choose an approach that is supported by evidence and that fits its own institutional needs.[56]

David Atkins, the director of QUERI, has argued that "QUERI provides a compelling model for the potential provided when you embed the research within a health system that faces a continual array of challenging clinical and policy decisions—decisions that should be informed

52. Veterans Health Administration, Office of Quality and Safety, "Quality Enhancement Research Initiative," *Veterans Health Administration's Clinical Quality and Patient Safety Programs* (April 2009). Also see Department of Veterans Affairs, *QUERI Program Description,* www.queri.research.va.gov/about/default.cfm.

53. See Cheryl B. Stetler, Brian S. Mittman, and Joseph Francis, "Overview of the VA Quality Enhancement Research Initiative (QUERI) and QUERI Theme Articles: QUERI Series," *Implementation Science,* vol. 3 no. 8 (February 15, 2008), www.implementationscience.com/content/pdf/1748-5908-3-8.pdf. A number of additional articles in the series have been published in the same online journal and can be found at www.implementationscience.com/series/1748-5908-Que.

54. Anne Sales and others, "Implementing Electronic Clinical Reminders for Lipid Management in Patients with Ischemic Heart Disease in the Veterans Health Administration: QUERI Series," *Implementation Science,* vol. 3, no. 28 (May 29, 2008), www.implementationscience.com/content/pdf/1748-5908-3-28.pdf.

55. Sarah L. Krein and others, "Improving Eye Care for Veterans with Diabetes: An Example of Using the QUERI Steps to Move from Evidence to Implementation: QUERI Series," *Implementation Science,* vol. 3, no. 18 (March 19, 2008), www.implementationscience.com/content/pdf/1748-5908-3-18.pdf.

56. Personal communication from David Atkins, QUERI Director, to the Congressional Budget Office, May 29, 2009.

by science."[57] VHA's experience with QUERI may help other providers determine what factors lead to problems with quality and how to design interventions that are both feasible and appropriate to the problems each provider faces.

Evidence-based Synthesis Program. VHA's Evidence-based Synthesis Program produces analyses of published research on health care issues of particular importance to the agency. The goal of the program is to target specific aspects of important health care topics for VHA's managers and policymakers and disseminate ensuing reviews broadly throughout the agency. As part of the program, representatives from various offices within VHA examine the published literature and produce overview reports that help the agency's clinicians, managers, and policymakers make decisions about preferred treatments and processes. As of mid-2009, the ESP has produced nine reports covering topics from hyperglycemia management to racial and ethnic disparities in medical treatment and outcomes.[58] (The reports are available free of charge on VHA's Web site.)

ESP reports may be relevant for other federal and nonfederal providers and insurers. In addition, other large health care providers and insurers might benefit from VHA's experience in putting together teams and sifting through published research to identify relevant, high-quality studies on which policies might be based. One advantage of VHA's investment in an in-house capability in this area is that it enables VHA to tailor the reviews so that they focus on research done on relevant populations of patients and address medical issues that are of particular concern to the agency and its enrollees. Other providers might focus on different populations or issues. A broad federal effort to assess the comparative effectiveness of different health care interventions would most likely focus on a broader population of patients and may not be relevant for certain subpopulations.

Integrating Key Performance Measures and Output from Quality Improvement Programs

A key feature of VHA's quality improvement strategy is that the results of NSQIP, IPEC, and other programs are not just used for research but also are integrated into the management process at the facility, network, and national levels. To assist senior managers—who must monitor hundreds of performance measures and output from those and other programs—VHA has developed a computerized summary display called the LinKS Dashboard. The dashboard is new (first available in mid-2008) and is reviewed and updated periodically as users and VHA's leaders provide feedback on the system. The dashboard for each of VA's medical centers displays four pages of data (updated quarterly) such as unadjusted and adjusted hospital and 30-day mortality rates for acute care and ICU patients, NSQIP observed-to-expected mortality ratios, hypoglycemic rates, infection rates for certain common hospital-associated infections, and readmission rates for patients with congestive heart failure. Users in each VISN see data only for that region, but results are benchmarked against data aggregated at the national level, with particularly bad or good results (higher than the 85th percentile or lower than the 15th percentile) highlighted in red or green, respectively.[59] (An illustrative LinKS Dashboard for a hypothetical "VISN 97" can be found in Appendix C.)

Lessons from VHA's Experience with Quality Improvement

Ashish Jha, a Harvard professor who has worked with and studied VHA extensively, has highlighted four key factors that enabled VHA's transformation:[60]

■ *Decentralization*, notably the reorganization of VHA from a centralized system to a set of regional networks funded on a capitated basis—that is, based on the number and type of patients each network serves, rather than on the number of medical procedures performed or on historical budgets;

■ *Data collection and feedback*, including VHA's External Peer Review Program;

57. Veterans Health Administration, *HSR&D Research Briefs*, vol. 6, no. 1 (March 2008), www.hsrd.research.va.gov/publications/research_briefs/mar08/default.cfm.

58. Publications from VA's Evidence-based Synthesis Program can be found at www.hsrd.research.va.gov/publications/esp.

59. Veterans Health Administration, Office of Quality and Safety, "LINKS Dashboard," *Veterans Health Administration's Clinical Quality and Patient Safety Programs* (April 2009).

60. Jha, "What Can the Rest of the Health Care System Learn from the VA's Quality and Safety Transformation?"

■ *Performance contracts and incentives* with specific goals for both clinical performance and structural features; and

■ *Information systems* (health IT), including the launch of VistA and its graphical user interface, the Computerized Patient Record System (CPRS), which was available to clinicians throughout the agency by the late 1990s.

Other observers have made similar assessments about factors that played important roles in shaping VHA's transformation efforts. For example, Adam Oliver stated in 2007 that:

> "… [T]here is no single explanation, as a multitude of factors have probably contributed in a variety of complex ways, including good national and local leadership with a clear vision and a compelling case for change, the transformation of the VHA from a hospital system to a broader health care system, the development of regionally financed and planned integrated health care networks, the introduction of performance management and its associated financial and nonfinancial incentives for competition, the gradual development and eventual implementation of a sophisticated electronic health record and, preceding the reforms, two decades of VHA-funded health services research and technical and human capacity development." [61]

VHA's experience does appear to indicate that a strong focus by management on key quality indicators can substantially improve performance, at least in terms of process indicators such as the administration of recommended laboratory tests or vaccinations. However, the effect on outcomes—morbidity and mortality of the target population—has sometimes proven difficult to establish. (Agencies outside VHA face that same challenge in monitoring quality.) The link between process and outcomes is sometimes elusive.

Programs such as IPEC and NSQIP use clinical data to measure risk-adjusted health outcomes. Measuring such outcomes and benchmarking facilities' performance against peers may have helped VHA reduce mortality and morbidity in its surgical units, its intensive care units, and its acute-care wards. Expanding VHA's benchmarking efforts to encompass more non-VHA providers and including VHA facilities in quality measurement and performance efforts at state and federal levels may encourage additional improvements both for VHA and for outside providers.

Until recently, patient safety issues received less focus than overall quality improvement; as a result, some researchers have argued that VHA should increase its efforts in that area.[62] VHA's experience in Marion, Illinois, brought that issue into sharp focus as news stories highlighted unexpectedly high death rates in some surgical units. A December 2004 report by the Government Accountability Office on VHA's patient safety program found progress implementing the program but noted substantial variation among VHA's facilities in familiarity with the program and in cultural support for reporting adverse events and close calls in an environment of mutual trust—key ingredients for a successful program.[63] A more comprehensive study of 30 VHA hospitals funded by VHA and the Agency for Healthcare Research and Quality found a positive safety climate in VHA overall but significant differences among workgroups. That study also noted variations in responses across levels and

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61. Adam Oliver, "The Veterans Health Administration: An American Success Story?" *The Milbank Quarterly*, vol. 85, no. 1 (January 2007), pp. 5–35, www.milbank.org/quarterly/8501feat.html.

62. In one study of VHA and non-VHA hospitals, researchers expressed surprise that most VHA facilities did not use computerized clinical reminders to prompt clinicians to remove urinary catheters after they were no longer medically necessary in order to reduce hospital-acquired urinary tract infections. See Sanjay Saint and others, "Preventing Hospital-Acquired Urinary Tract Infection in the United States: A National Study," *Clinical Infectious Diseases,* vol. 46, no. 2 (January 15, 2008), pp. 243–250, www.journals.uchicago.edu/doi/pdf/10.1086/524662. In addition, incidents such as improper sterilization of colonoscopy equipment at several VA facilities have raised questions about patient safety issues. See Fred Tasker, "Colonoscopies Suspended at Miami VA Hospital as Investigation Opens," *Miami Herald,* March 28, 2009, www.miamiherald.com/news/5min/story/971896.html.

63. Government Accountability Office, *VA Patient Safety Program: A Cultural Perspective at Four Medical Facilities*, GAO-05-83 (December 2004).

types of staff. For example, senior managers and nonclinicians were more likely to indicate that a positive safety climate existed than were lower-level staff and clinicians.[64]

Addressing concerns about patient safety is an issue for all health care providers in the United States. One of VHA's main tools for quality improvement—its electronic health records system—has helped improve patient safety in some areas. Computerized physician order entry, for example, has been found to reduce adverse drug events in a number of peer-reviewed studies.[65] However, electronic health records may not be able to address many other patient safety issues. A recent study by two University of Minnesota professors found insufficient evidence to link electronic medical records with improved patient safety, although they did note a small significant decrease in infections from medical care at hospitals with such systems.[66] In another study (using data from 2000), researchers found that adverse drug events continued to occur at relatively high rates at one VHA hospital even after implementation of computerized physician order entry, computerized medication ordering, and bar code medication administration systems. The researchers noted that the system did not yet offer computerized decision support for drug selection, dosing, and monitoring—capabilities that might enhance the system's ability to reduce adverse drug events and thus improve patient safety.[67] VHA is currently engaged in a multiyear reengineering of its pharmacy decision support. Drug dosing monitors (which VHA indicates are the most critical piece, on the basis of the analysis of adverse drug events) are projected to be in place by November 2010.[68] Other researchers have found poor or inverse relation-

ships between patient safety indicators and other measures of health care quality, perhaps indicating that strategies to improve overall health care quality may not address many crucial concerns about patient safety.[69]

VHA also provides a useful model for how an organization can use research to improve its processes. VHA has several programs—some quite extensive—that review current literature and conduct in-house research to evaluate medical treatments, establish clinical guidelines, develop process indicators and track progress in improving those indicators, and assess the relationship between processes and outcomes. All of that information is then fed back into patient care services in an effort to improve compliance with guidelines and, ultimately, health care outcomes.

The size of VHA's system and the number of cases treated provide sufficient data to find significant differences in the performance of specific service units. Smaller providers without an in-house research program would need to find ways to link outside research to their internal processes and practices. In turn, they could share the results of their quality improvement efforts with outside providers through peer-reviewed publications and other means.

Quality improvement efforts have also been a focus of many larger health care providers outside VHA. In a recent survey, nonfederal hospitals reported a high level of organizational commitment to quality improvement, and 87 percent of respondents felt that the care of patients at their hospital was better or much better than it had been three years earlier.[70] However, evidence-based practice guidelines were used widely by less than half of the hospitals in the survey. Moreover, the survey found that in most hospitals, physicians are not as involved in quality improvement efforts as are nurses and managers. That may result in part from the relationship that physicians have with hospitals—in most private hospitals in the United States, physicians are not employees of the

64. Christine W. Hartmann and others, "An Overview of Patient Safety Climate in the VA," *Health Services Research*, vol. 43, no. 4 (August 2008), pp. 1263–1284, www3.interscience.wiley.com/journal/120120481/abstract.

65. See Elske Ammenwerth and others, "The Effect of Electronic Prescribing on Medication Errors and Adverse Drug Events: A Systematic Review," *Journal of the American Medical Informatics Association*, vol. 15, no. 5 (September/October 2008), pp. 585–600, www.jamia.org/cgi/content/short/15/5/585.

66. Stephen T. Parente and Jeffrey S. McCullough, "Health Information Technology and Patient Safety: Evidence from Panel Data," *Health Affairs*, vol. 28, no. 2 (March/April 2009), pp. 357–360.

67. Jonathan R. Nebeker and others, "High Rates of Adverse Drug Events in a Highly Computerized Hospital," *Archives of Internal Medicine*, vol. 165, no. 10 (May 23, 2005), pp. 1111–1116.

68. Personal communication with VHA staff, July 24, 2009.

69. Thomas Isaac and Ashish K. Jha, "Are Patient Safety Indicators Related to Widely Used Measures of Hospital Quality?" *Journal of General Internal Medicine*, vol. 23, no. 9 (September 2008), pp. 1373–1378.

70. Alan B. Cohen and others, "A Survey of Hospital Quality Improvement Activities," *Medical Care Research and Review*, vol. 65, no. 5 (October 2008), pp. 571–595. That survey sampled only nonfederal general hospitals with 25 beds or more that provide short-term care.

hospitals (unlike other staff members), so hospital management may find it more difficult to get them to comply with quality improvement and other organizational goals. The survey also found that physicians were less likely than nurses and managers to receive formal training in quality improvement and less likely to receive compensation for meeting quality improvement goals. Although survey respondents felt that their quality improvement programs had a positive impact on care outcomes and patients' satisfaction, fewer than half reported positive impacts on factors such as inpatient volume (an important source of revenue) and the hospital's ability to recruit or retain physicians—both of which are key to a hospital's financial performance. As a result, the "business model" for quality improvement may remain somewhat elusive for many hospitals.

VHA's experience with performance measurement and accountability has parallels among private-sector providers as well. A study by University of Oregon researchers found that publicly reporting performance measures increases quality improvement efforts by lower performers.[71] In particular, hospitals that reported their results publicly and received worse-than-expected scores engaged in significantly more quality improvement activities after the reports were released than did similarly performing hospitals that reported their results only privately or that did not report any performance measures. Further analysis by the same researchers found that the public reporting of performance measures stimulates long-term improvements to a greater extent than those that arise from the private reporting of such measures.[72] In addition, hospitals were more likely to improve their performance if they initiated quality improvement activities immediately after the report's release. Concerns about a hospital's reputation appear to spur improvement efforts, in part because reputation drives other key factors, such as a hospital's ability to raise funds through charitable donations and to keep strong ties with physician groups that bring patients into the hospital.

VHA has acknowledged the key role played by measuring processes and outcomes of care, particularly when that information is used to make comparisons across facilities and networks.[73] Even though VHA collects such data within its own system, however, the agency does not often participate in state-level programs to collect and report risk-adjusted data on quality and patient safety. For example, the Pennsylvania Health Care Cost Containment Council puts out a report on hospital-associated infections in each hospital in the state.[74] Similarly, the state of New York requires hospitals licensed in that state to report risk-adjusted mortality data for adult cardiac surgery.[75] As federal facilities, VHA's hospitals are exempt from those state reporting requirements, and VHA does not choose to participate voluntarily.

Outside the organization, VHA often reports only aggregate measures. One downside of such reporting is that a veteran who is enrolled in both Medicare and VA's health system cannot currently use CMS's Hospital Compare (an online tool to find and compare hospitals) to choose between VHA and non-VHA facilities when seeking the best location at which to receive specific hospital services.[76] However, in 2008, VHA issued a report to the Congress that presented a national "hospital report card" with some facility-level quality measures for the entire agency.[77] That report card includes such measures as

71. Judith H. Hibbard, Jean Stockard, and Martin Tusler, "Does Publicizing Hospital Performance Stimulate Quality Improvement Efforts?" *Health Affairs*, vol. 22, no. 2 (March/April 2003), pp. 84–94.

72. Judith H. Hibbard, Jean Stockard, and Martin Tusler, "Hospital Performance Reports: Impact on Quality, Market Share, and Reputation," *Health Affairs*, vol. 24, no. 4 (July/August 2005), pp. 1150–1160.

73. Jonathan B. Perlin, Robert M. Kolodner, and Robert H. Roswell, "The Veterans Health Administration: Quality, Value, Accountability, and Information as Transforming Strategies for Patient-Centered Care," *The American Journal of Managed Care*, vol. 10, no. 11 (November 2004), pp. 828-836, www1.va.gov/cprsdemo/docs/AJMCnovPrt2Perlin828to836.pdf.

74. Pennsylvania Health Care Cost Containment Council, *Hospital-Acquired Infections in Pennsylvania 2007*, www.phc4.org/reports/hai/07/default.htm.

75. See New York State Department of Health, *Adult Cardiac Surgery in New York State, 2003–2005* (March 2008), www.health.state.ny.us/diseases/cardiovascular/heart_disease/docs/2003-2005_adult_cardiac_surgery.pdf.

76. See www.hospitalcompare.hhs.gov. VHA has begun working with CMS to enable VHA facilities to participate in Hospital Compare in the near future. (Personal communication with VHA, July 22, 2009.)

77. Department of Veterans Affairs, Veterans Health Administration, *Report to the Appropriations Committee of the U.S. House of Representatives in Response to House Appropriations Report No. 110-186, Accompanying Public Law 110-161, The Consolidated Appropriations Act* (June 2008), www.va.gov/health/docs/Hospital_Quality_Report.pdf.

waiting times, staffing levels, rates of infection, volume of procedures, availability of services, accreditations, and various index measures that VHA developed to compare the quality of care provided to certain subpopulations and in different settings. VHA summarized data from its medical records and created 18 clinical performance indicators designed to match the National Center for Quality Assurance's HEDIS measures. The report card includes national-level comparisons of VHA's measures to the average HEDIS measures for the commercial, Medicare, and Medicaid sectors. VHA plans to release an updated hospital report card in August 2009.[78]

Participation in more quality and patient safety reporting systems at the community, state, and national levels might give VHA additional incentives to improve its performance in areas included in those reports. However, given the particular needs of VHA's population of patients, the agency would probably argue that it needs to continue to develop and pursue its own performance measures as well.

Lessons from VHA's Experience with Health Information Technology

VHA has found that VistA, its health information system, can play a key role in its efforts to accurately measure performance and improve quality. VHA's researchers have used data from VistA's electronic health records and elsewhere to study the effects of various quality improvement strategies.

In one study, researchers examined audit and feedback strategies for improving providers' adherence to clinical practice guidelines.[79] They found that the VHA medical centers that were most successful were those that delivered timely, individualized, and nonpunitive feedback to providers about adherence to clinical practice guidelines. Facilities that relied on standardized reports or that were less consistent in providing feedback were less successful in improving adherence to the guidelines. The authors noted that VHA's Computerized Patient Record System (one component of VistA) can help provide the type of timely, individualized feedback that is helpful in improv-

ing clinicians' performance. At the time the study was conducted (2001), however, that capability of CPRS was not understood or used as widely as it could be. VHA has since undertaken efforts to improve the utility of CPRS for those purposes and to train more VHA personnel in the use of those tools.

Some outside organizations that have adopted (or are planning to adopt) versions of VistA for their own health care systems have pointed to those types of capabilities as key factors in their choice of VistA over alternative electronic health record systems. Clinica Adelante in Arizona and Prince Hamza Hospital in the Kingdom of Jordan have adapted VistA and cited those capabilities as key in their decisionmaking.[80] (See Appendix A for those and other efforts to adapt VistA for use outside the VHA.)

A number of lessons can be drawn from VHA's experience with health information technology. VHA developed its electronic medical records system and related software internally, with input over the years from clinicians and programmers working together. At least initially, there was a very tight link between developers and clinicians. Software enhancements were created at local facilities when a clinician asked a developer whether it was possible to add a new feature that he or she believed would be helpful. It is not clear how easily VistA as a package can be exported to diverse health providers that are not part of the VHA's system. Adaptations of VistA have been successfully installed by a few outside providers, however, and some observers have argued that the federal government should encourage and support broad adoption of VistA (or similar) software in the private sector.[81]

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78. Personal communication with VHA, July 29, 2009.

79. Sylvia J. Hysong, Richard G. Best, and Jacqueline A. Pugh, "Audit and Feedback and Clinical Practice Guideline Adherence: Making Feedback Actionable," *Implementation Science*, vol. 1, no. 9 (2006), www.implementationscience.com/content/1/1/9.

80. Personal communication from Matthew King, Chief Medical Officer of Clinica Adelante, and Manuel Ferreiro, Chief Financial Officer, to the Congressional Budget Office, November 6, 2008; statement of Matthew King, M.D., Chief Medical Officer, Clinica Adelante, Inc, Surprise, Arizona, before the Subcommittee on Health of the House Committee on Ways and Means, July 24, 2008, available at www.waysandmeans.house.gov/hearings.asp?formmode=view&id=7233; and Joseph Conn, "Jordan EHR Project Could Have Global Effect: Experts," *ModernHealthcare.com* (December 10, 2008), www.modernhealthcare.com/article/20081210/REG/312109996.

81. Statement of Matthew King (July 24, 2008); John Moore, "New Law Helps Open Source," GovHealthIT.com, March 30, 2009, www.govhealthit.com/articles/2009/03/30/arra-open-source.aspx.

One potential problem highlighted by many experts in the field of health IT is that providers—doctors, nurses, and others—have to "buy in" to the system and actually use it for the system to be successful. If VistA or any other package developed elsewhere is installed at another location without that buy-in from providers, they may feel that the system is being "foisted" on them and not use it properly or fully. One way to counter that potential problem might be to disseminate more widely information about the principles behind VistA and lessons learned from its development to improve other health IT systems. In addition, if adaptations of VistA meet providers' needs at an affordable cost, vendors offering to install those adaptations should be able to compete successfully in the marketplace with those offering other, proprietary software packages.

Although a properly designed electronic health records system can improve the quality of care, increase adherence to clinical guidelines, and reduce medical errors, the presence of such a system does not ensure those outcomes. One team of researchers used two national surveys to examine ambulatory care visits to providers who used electronic health records and those who did not.[82] The researchers considered 17 ambulatory quality-of-care indicators. They found no correlation between the use of electronic health records and the quality of ambulatory care for 14 of those indicators, better performance on 2 measures for practices using EHRs, and worse performance on 1 measure for practices using EHRs. Some

practices may be using EHRs that do not incorporate clinical decision support and quality reporting features. The authors conclude that the diffusion of electronic health records may not be associated with overall improvements in quality unless policymakers encourage the adoption of EHRs specifically designed to improve health care quality.

In addition, developers and users of electronic health records systems must remain vigilant for possible software errors and other problems that could have negative effects on the accuracy of the information presented to providers or patients through the various health IT components. Proper design and testing of health information technology is crucial—a poorly designed or inadequately tested electronic health record can lead to inappropriate drug treatment or even worse outcomes. For example, VHA rolled out an update to its VistA software in August 2008 that sometimes displayed medical information for a patient under another patient's name and sometimes failed to clearly display a doctor's order to stop administering a drug or other treatment. As a result, some patients were given incorrect doses of medications or were treated for longer periods than physicians had ordered. VHA instituted new safety measures until the errors were fixed. Although the potential for serious injury existed, there is no evidence that any patients were harmed.[83]

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82. Jeffrey A. Linder and others, "Electronic Health Record Use and the Quality of Ambulatory Care in the United States," *Archives of Internal Medicine,* vol. 167, no. 13 (July 9, 2007), pp. 1400–1405.

83. "Medical Glitches Plague VA, Probe Finds," CBS News, January 14, 2009, www.cbsnews.com/stories/2009/01/14/national/printable4720942.shtml; Department of Veterans Affairs, Office of Inspector General, *Review of Defects in VA's Computerized Patient Record System Version 27 and Associated Quality of Care Issues*, Report No. 09-01033-155 (June 29, 2009).

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VistA Outside the Veterans Health Administration

The Veterans Health Administration (VHA) created VistA—its suite of health information technology (IT) software—for its in-house use. Because VistA was developed with federal dollars, however, its source code is available for other organizations to adapt and install in their own hospitals and clinics. The software is available through either the Freedom of Information Act or directly from VHA. In addition, several different adaptations of VistA are available as "open source" software. Although there are no licensing fees involved, installation and customization of software designed for another setting is a major undertaking requiring expertise that most other providers do not have in-house.

Several companies and organizations offer assistance in installing, configuring, and maintaining VistA-based electronic health record systems. VistA derivatives include (among others) the Resource and Patient Management System (RPMS), adapted by the Indian Health Service (IHS); WorldVistA EHR, adapted by WorldVistA, a nonprofit corporation in California; OpenVistA, adapted by Medsphere; vxVistA, adapted by DSS; Hui Open-VistA, adapted by the Health Consortium in Hawaii; and Kabot International's VistA++.

Implementing VistA Outside VHA

Versions of VistA have been adapted and installed in a number of other facilities or networks of facilities outside VHA. Perhaps the oldest example of an adaptation of VHA's health IT software is the Resource and Patient Management System used by the Indian Health Service, a federal agency that provides health services to Native Americans. That version of VistA began development nearly 30 years ago for use in IHS health clinics throughout the United States, including clinics operated directly by IHS as well as contracted clinics owned and operated by tribal organizations. RPMS includes about 50 applica-

tions to handle various functions of particular use to the outpatient clinics of IHS and the populations they serve.[1]

A more recent case study of implementation of a VistA adaptation comes from Midland Hospital in Midland, Texas.[2] That 320-bed community hospital needed to update its information systems but had little cash on hand. The prices quoted by vendors of proprietary systems seemed out of reach financially, but Midland discovered that adaptations of VistA were being developed for use outside VHA. In 2004, Midland contracted with Medsphere, a private company that specializes in deploying and servicing open-source health IT systems. Medsphere had experience working with RPMS in the Indian Health Service and other adaptations of VistA outside VHA. To adapt the system for use outside a VHA setting, Medsphere added features to the original VistA software—for example, support for obstetrics and pediatrics services and capture of departmental charges for billing purposes—that were not necessary within VHA.

The implementation of OpenVistA at Midland Hospital took approximately three years. By early 2008, Midland Hospital had been recognized by a national health IT group as one of the first private hospitals in the country to achieve "Stage 6" adoption for electronic medical records—putting it in the top 1 percent of private hospitals nationwide at that time in terms of implementation of such features as laboratory, radiology, and pharmacy systems; a clinical data repository; clinical documentation; computerized physician order entry; clinical decision support; closed loop medication administration; and

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1. More information about the Resource and Patient Management System can be found on the IHS Web site, www.ihs.gov/Cio/RPMS/index.cfm?module=home&option=index.

2. See Bernie Monegain, "EDITH Gets Job Done at Midland," *Healthcare IT News* (August 31, 2007), www.healthcareitnews.com/news/edith-gets-job-done-midland.

physician documentation.[3] Medsphere also installed OpenVistA at several state-operated long-term care facilities in West Virginia and at Memorial Hospital of Sweetwater County in Wyoming, a 99-bed acute-care rural hospital.[4]

Medsphere's business model relies on monthly support fees for the work it does adapting, installing, and training staff to use the system. That type of "software as a service" approach has gained interest even among vendors of proprietary health IT systems, as the reduced up-front costs can lower barriers to adoption and thus expand the potential market to include providers who previously would not have considered an electronic medical record system.

Another illustration of a VistA adaptation outside VHA's network comes from Clinica Adelante, Inc. (CAI), a small community health network in Arizona. CAI serves about 32,000 patients annually, including many uninsured individuals and Medicaid beneficiaries. CAI wanted a low-cost electronic health record system with strong support for chronic disease management. To reduce data entry costs and limit errors, CAI sought a system that would allow the information entered by the provider at the point of care to be used in a chronic disease registry without having to be reentered. CAI brought WorldVistA EHR online at their clinics in August 2007.

Adaptations of VistA also have been implemented outside the United States. The Kingdom of Jordan recently contracted with Perot Systems to install WorldVistA EHR at Prince Hamza Hospital (a 488-bed teaching hospital), at the affiliated outpatient clinic, and at the King Hussein Cancer Center.[5] If those installations prove successful, the government plans to expand the system to cover all of Jordan's public hospitals and will offer the system to the country's private hospitals as well. (Because WorldVistA EHR is an open-source product, it does not require licensing fees.)[6]

The state of North Carolina has issued a request for proposals for deployment of a VistA adaptation in its mental health facilities.[7] Public health facilities may benefit in particular from VistA software (more than a private for-profit health facility might) because their organization and staff structure align more closely with VHA's structure.

Other Considerations in Implementing VistA

Although VistA is available free of charge and various open-source adaptations are available without any licensing fees, there are still substantial costs to adapt and install health IT systems. Installation, hardware, and training costs are significant barriers for health providers considering adoption of electronic medical records. The cost of adapting and installing versions of VistA in hospitals or clinics and training staff to use the systems appears to vary widely. Cost figures provided to the Congressional Budget Office for implementation of VistA adaptations ranged from $20,000 at one network of clinics to more than $6 million at one hospital. Those estimates may have excluded some training, hardware, and other costs, and costs may vary in part depending on the in-house technical capabilities of each facility and its staff.

Installation of VistA adaptations at various facilities does not imply that health information can be exchanged between those facilities and VHA, or among facilities operating different versions of VistA. To date, none of the facilities are exchanging electronic health record data with VHA. Doing so would require both parties to sign data-

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3. HIMSS Analytics, EMR Adoption Model, described in www.himssanalytics.org/docs/EMRAM.pdf; and Patty Enrado, "Nine Validated Stage 6 Hospitals Recognized at HIMSS08," *Destination HIMSS*, www.destinationhimss.com/archives/archives/nine-validated-stage-6-hospitals-recognized-at-himss08/.

4. See various press releases from Medsphere at www.medsphere.com/press/20080610, www.medsphere.com/press/20080422, and www.medsphere.com/press/20080318.

5. Joseph Conn, "Jordan EHR Project Could Have Global Effect," *Modern Healthcare Online* (December 10, 2008), www.modernhealthcare.com/article/20081210/REG/312109996; and Joseph Conn, "Open-Source Deal Causes Enthusiasm Outside of U.S.," *Modern Healthcare Online* (December 11, 2008), www.modernhealthcare.com/apps/pbcs.dll/article?AID=/20081211/REG/312119996.

6. WorldVistA EHR is an open-source adaptation of VHA's VistA software that is designed to run on GT.M, an open-source version of the Massachusetts General Hospital Utility Multi-Programming System (MUMPS) database and programming language. (By comparison, VHA runs VistA on Cache, which is a proprietary version of MUMPS.)

7. Joseph Conn, "Health Division Calls for Open-Source VistA Proposals," *Modern Healthcare Online* (August 12, 2008), www.modernhealthcare.com/apps/pbcs.dll/article?AID=/20080812/REG/356587229.

sharing agreements (including privacy rules to protect patients) and to develop an interface for data exchange. Just as problems exist in exchanging data between different proprietary electronic medical record systems, differences in nomenclature and other issues may complicate any exchange of data between facilities using various adaptations of VistA software. VHA plans to rely on the National Health Information Network (NHIN) for the exchange of data on shared patients with private providers. VistA adaptations outside VHA may be able to use the NHIN CONNECT software to share data with VHA and other participants in the NHIN.

B

Comparing the Cost of Care from the Veterans Health Administration and Alternative Sources

The Chairman of the Subcommittee on Military Construction, Veterans Affairs, and Related Agencies of the House Committee on Appropriations asked the Congressional Budget Office (CBO) to assess whether the Veterans Health Administration (VHA) is cost-effective relative to other potential sources of health care for veterans. To address that issue, CBO reviewed the literature on that topic and examined recent growth in spending by VHA compared with spending for Medicare, another federal health program.

Comparing Payments and Services

In 2003, a special supplement to the journal *Medical Care* published the results of an extensive effort by VHA to estimate hypothetical payments to the private sector for supplying the same services as those delivered by the VHA.[1] According to that study, if the federal government had tried to buy from providers in the private sector the same array of services and products delivered to veterans by the VHA in 1999, the cost to taxpayers would have been $3 billion more in that year. (That higher cost represents an increase of about 17 percent over VHA's total budget of $18 billion for that year.) However, if veterans' health care benefits were provided in a different way—for example, through vouchers or subsidized services from other providers—it is likely that the type and amount of services demanded by and provided to veterans would change substantially. That issue makes it difficult to directly compare the costs of the VHA's system with an alternative approach.

A second challenge is that adequate data are not available for a comprehensive comparison of the veterans' health

system and any other system (or collection of systems). Constructing an adequate analysis would require a great number of assumptions. Most of VHA's administrative data are not equivalent to similar data gathered in the private sector, for example, because VHA tracks costs and the private sector tends to report charges. (Charges are not always akin to costs, although Medicare tries to reimburse providers according to their use of resources.) In addition, calculating actual costs of care for particular diseases, conditions, or unique patients treated in any institution or system is arduous. Furthermore, unrecognized systemic differences are hard to capture. VHA provides a set of health benefits that differs from that offered by most health plans in the United States. VHA's benefits include comprehensive mental health care, employment counseling, readjustment assistance, and, for some veterans, access to long-term care.

Like many health care providers, VHA has advantages in particular areas. The agency has developed expertise in treating conditions arising from military service, such as spinal cord injury, blindness, post-traumatic stress disorder, and traumatic brain injury. Those chronic, debilitating conditions may involve lifelong rehabilitation and other care that can be extremely expensive to treat.

Comparing Measures of Cost Growth and Spending

Despite nationwide financial pressures on health care, VHA's expenditures per enrollee have grown relatively slowly in nominal terms since the mid-1990s. Some publications and testimony by VHA officials and supporters have highlighted that fact, comparing VHA's spending with the high rates of health care cost growth in the economy as a whole or with spending growth in the Medicare

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1. Gary Nugent and Ann Hendricks, "Estimating Private Sector Values for VA Health Care: An Overview," *Medical Care*, vol. 41, no. 6 (supplement), pp. II-2–II-10.

Figure B-1.

Medicare and VHA Spending per Enrollee

(Index of nominal spending per enrollee)
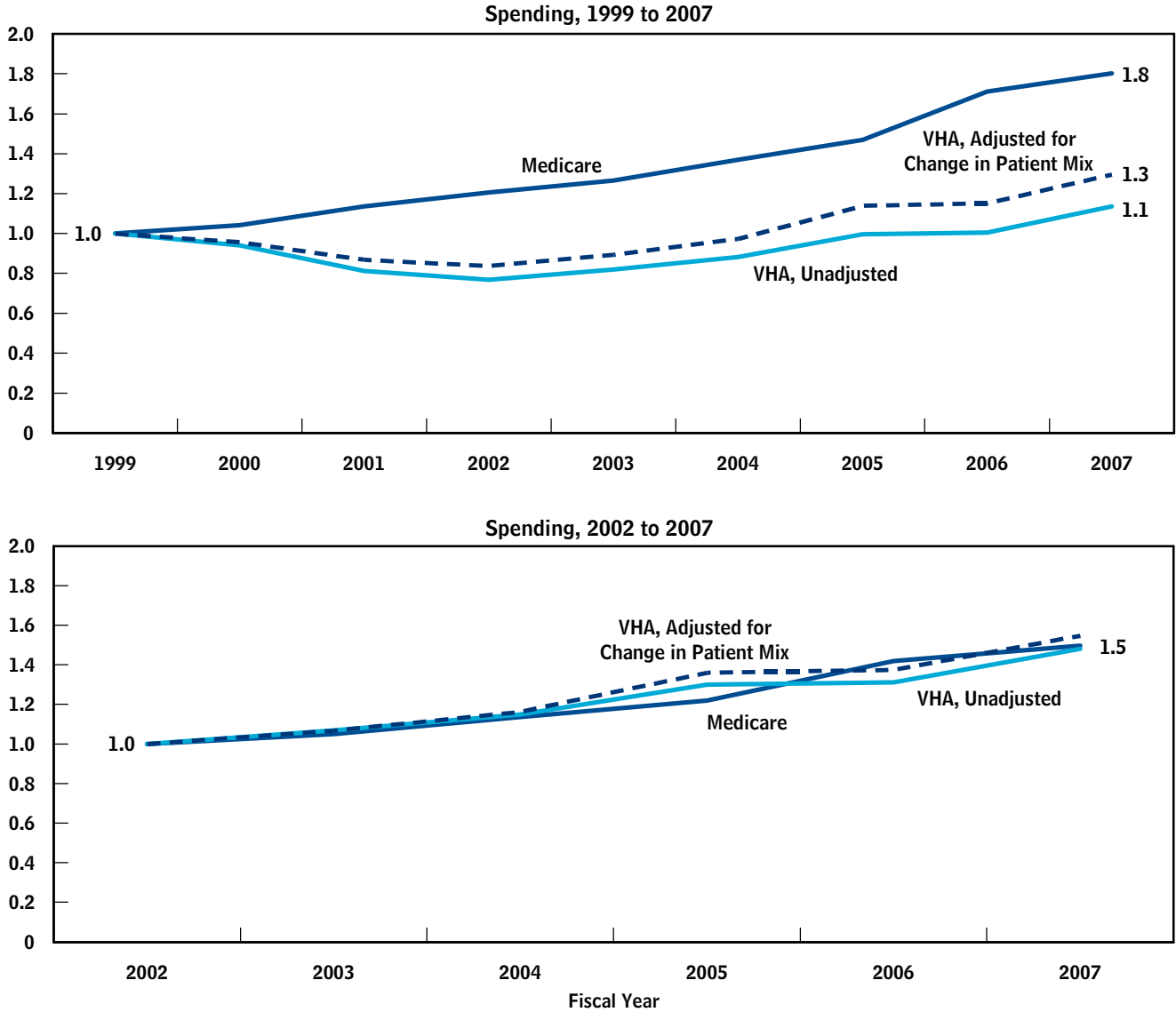
Spending, 1999 to 2007

Spending, 2002 to 2007

Fiscal Year

Source: Congressional Budget Office based on data from the Veterans Health Administration, the Centers for Medicare and Medicaid Services, and the Office of Management and Budget.

Note: VHA = Veterans Health Administration.

program.[2] In an analysis from 2006, VHA officials Dwight Evans, Paul Nichol, and Jonathan Perlin noted:

> "In 1996, the VHA spent US$5,058 per patient per year, while in 2004 it spent $5,048 (nominal) per patient, a decrease of US$10 per patient per year. The VHA's cost per patient in 1996 was similar to Medicare's annual spending per enrollee (US$5,000). By 2004, the VHA's unchanged cost per patient was nearly 26 per cent lower than Medicare's cost per patient (in 2004, Medicare spent US$6,800 annually per enrollee...)."[3]

CBO examined the growth in VHA's budget authority per enrollee since 1999.[4] That measure of VHA's spending per enrollee rose much more slowly than Medicare's spending per enrollee from 1999 through 2007 (see the solid lines in the top panel of Figure B-1). Although Medicare's spending per enrollee rose by 80 percent in nominal terms from 1999 to 2007, VHA's spending per enrollee rose by only 14 percent over that same period. However, a straight comparison of spending per enrollee does not take into account the changing mix of patients within the VHA system, which has seen rapid growth in the overall number of patients and particularly in enrollment by veterans whose care, on average, is less expensive

than that of previous patients. Those less costly enrollees include patients who are younger, who are less disabled, or who seek only a small portion of their care from VHA, as well as some enrollees who do not seek any care from the department in a given year. (Costs for care that VHA's enrollees seek from other providers are not generally included in VHA's per capita spending.)[5]

Adjusting for the changing mix of patients (using data on reliance and relative costs by priority group), CBO estimates that VHA's budget authority per enrollee grew by 30 percent in nominal terms from 1999 to 2007.[6] Although that estimate is not as low as the growth rate suggested by the unadjusted figures, it still indicates a substantial degree of cost control when compared with Medicare's nominal rate of growth in costs per capita over that same period.

VHA's enrollment system was new in 1999, and enrollment grew rapidly from 1999 through 2002. During that period, VHA's total budget authority grew by 8 percent annually in nominal terms, while enrollment grew by 18 percent each year. As a result, concerns arose about waiting times for many key services within VHA. From 2002 to 2007, VHA's budget authority grew somewhat faster at 10 percent per year, while enrollment growth slowed to about 2 percent per year, in part because eligibility for new enrollment by veterans in the lowest priority group was frozen in January 2003. If 2002 is used as the index year, growth in VHA's budget authority per enrollee through 2007 has been nearly identical to Medicare's spending per enrollee over that same period (see the bottom panel of Figure B-1).

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2. David Brown, "VA Takes the Lead in Paperless Care," *Washington Post* (April 10, 2007), p. HE01, www.washingtonpost.com/ wp-dyn/content/article/2007/04/06/AR2007040601911.html.

3. Dwight C. Evans, W. Paul Nichol, and Jonathan B. Perlin, "Effect of the Implementation of an Enterprise-wide Electronic Health Record on Productivity in the Veterans Health Administration," *Health Economics, Policy, and Law*, vol. 1, no. 2 (April 2006), pp. 163–169.

4. VHA's budget authority includes its appropriations plus the copayments and third-party reimbursements it has collected from veterans and insurers. CBO used the number of enrollees rather than patients as the denominator because factors were available to adjust enrollment for reliance and relative costs of care by priority group; similar factors were not available for the data on patients. Fiscal year 1999 was chosen as the starting point for this analysis because the enrollment system went into effect in that year. CBO added VA's medical IT spending of $876 million to the VHA's budget authority figure for 2007. Although that category of spending had been included in previous years' data, it was moved to a separate budget category beginning in 2007.

5. An exception would be situations in which a VHA facility is geographically inaccessible or lacks adequate facilities to treat a patient and authorizes treatment by an outside provider to be paid for by VHA. Spending for those contracted services (also known as "fee-basis care") is included in VHA's budget. VHA's payments for fee-basis care for veterans rose from $1.9 billion in 2006 to $3.1 billion in 2008. About half of the payments each year were for services provided to veterans in priority group 1 (those with service-connected disabilities rated 50 percent or higher).

6. See Congressional Budget Office, *The Health Care System for Veterans: An Interim Report* (December 2007), for more information on the methods CBO uses to adjust for changes in the mix of VHA's patients.

APPENDIX

C
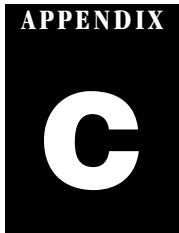
The LinKS Dashboard

The Veterans Health Administration (VHA) recently developed the LinKS Dashboard (Linking Knowledge & Systems) to consolidate critical data from multiple quality programs within the agency and to use automation to help identify issues that are most significant and may require attention from VHA's managers. The main sources of information distilled into the LinKS Dashboard are drawn from the performance goals of the agency's Office of Quality and Performance (OQP), National Surgical Quality Improvement Program (NSQIP), Inpatient Evaluation Center (IPEC), and Office of Productivity, Efficiency, and Staffing (OPES).

Table C-1 duplicates the four main pages of a LinKS Dashboard for a hypothetical regional network, Veterans Integrated Service Network (VISN) 97, with illustrative sites representing hospitals or other medical facilities within that network. VHA provided this version to the Congressional Budget Office in June 2009. Because the LinKS Dashboard is new and undergoing constant improvements, versions produced before or after that date may look different. New versions with the latest available data are posted quarterly on VHA's intranet for use by leaders and managers in individual facilities as well as key leadership at the network and national levels.

For most performance measures, a higher score is undesirable, as it indicates worse performance than a lower score. In the table, measures that fall into the best 15th percentile are highlighted in green to indicate performance that is well above average (in other words, sites with the lowest rates of morbidity, mortality, readmission, or other measures). Measures are highlighted in red if they exceed the 85th percentile—indicating that a site has particularly high rates of morbidity, mortality, readmission, or other measures. (For some process measures, such as prophylaxis to avoid deep vein thrombosis, a higher score is preferable. In that case, facilities scoring at or above the 85th percentile are shown in green, and

those scoring at or below the 15th percentile are displayed in red.) Yellow rows indicate that four or more mortality measures are greater than the 85th percentile. Because of the variability associated with a small sample size, interpretation of the standardized mortality rate (SMR) should be made with caution for facilities with small numbers of cases. For that reason, an X is displayed for the in-hospital SMR and the 30-day SMR when there were fewer than 20 cases and fewer than 5 expected deaths, and cells are shaded gray for the hospital SMR and the 30-day SMR when there were fewer than 200 cases. In an actual LinKS dashboard, hovering over a result would show the number of cases or deaths that produced that result—enabling managers to verify the sample size associated with the result.

In addition to comparing the performance of each facility against others within VHA, the latest LinKS Dashboard also incorporates some data from outside hospitals, allowing VHA facilities to see how their outcomes compare with those of their local peers. The LinKS Dashboard for each VISN compares each facility's risk-standardized mortality rates (RSMRs) for patients with congestive heart failure (CHF), pneumonia, and acute myocardial infarction (AMI) with average values for Medicare's service providers in the relevant hospital referral region. (IPEC uses VHA's clinical data to calculate the results for each facility.) However, that type of comparison is sometimes difficult to interpret because the values for Medicare's service providers are produced from administrative data and are normally about two years old before they become available to VHA for inclusion in the LinKS Dashboard. (Because VHA's information is updated quarterly using data extracted from clinical records and output produced by several of the agency's quality programs, its data are normally no more than a few months old.) Nonetheless, the comparisons do provide a rough external benchmark that can show underlying trends and improvement in outcomes.

Table C-1(A).

Illustrative LinKS Dashboard: Outcome Measures

	IPEC Acute Care						
	Hospital	30-Day			Case Severity Index		
	Unadjusted Mortality	Unadjusted Mortality	Rolling 6 Months SMR	Rolling 12 Months SMR	Weighted	Operative	Non-Operative
National Aggregates							
Facility Level 15th %tile	**1.50%**	**4.20%**	**0.77**	**0.77**	**0.78**	**0.70**	**0.75**
Facility Level Mean	**2.50%**	**5.60%**	**1.00**	**0.98**	**1.01**	**1.04**	**0.98**
Facility Level 85th %tile	**3.30%**	**6.70%**	**1.22**	**1.22**	**1.19**	**1.43**	**1.20**
National Aggregates							
Site 7 MICU/CCU SICU	2.60%	5.50%	1.03	1.00	1.00	**1.51**	0.90
Site 8 Mixed	**3.60%**	**6.90%**	1.08	1.11	1.07	0.71	1.16
Site 9 MICU CCU SICU	**4.80%**	**6.90%**	**1.37**	**1.38**	0.94	0.93	0.94
Site 10 MICU/CCU SICU	2.40%	5.20%	0.87	0.80	1.11	0.94	1.16
Site 11 MICU/CCU SICU	2.40%	4.20%	0.77	0.80	0.89	**0.54**	0.94
Site 12 Mixed	2.20%	**7.30%**	1.20	**1.30**	0.97	**0.63**	0.99
Site 13 Mixed	3.30%	4.70%	0.97	0.87	**0.75**	**0.53**	0.76

				IPEC ICU						NSQIP	
	Hospital			30-Day			Case Severity Index			(Rolling 6 Months to Q2 of FY09)	
Unadjusted Mortality	SMR	Rolling 6 Months SMR	Ward Transfer Mortality	Unadjusted Mortality	SMR	Rolling 6 Months SMR	Weighted	Operative	Non-Operative	OE Ratio	Unadjusted Mortality
5.70%	0.74	0.74	10.20%	7.50%	0.76	0.76	0.71	0.63	0.65		
8.50%	0.97	0.97	17.00%	10.60%	1.00	1.00	0.99	1.00	1.01		
12.00%	1.20	1.20	23.30%	14.00%	1.20	1.20	1.22	1.37	1.29		
7.20%	0.93	0.93	16.70%	8.60%	0.93	0.93	0.95	1.19	0.85	1.92	2.12%
10.20%	1.05	1.05	17.20%	13.40%	1.12	1.12	0.94	2.13	0.89		
3.70%	0.68	0.68	14.80%	3.30%	0.53	0.53	0.97	1.13	0.74		
9.10%	0.86	0.86	19.30%	10.80%	0.89	0.89	1.13	0.96	1.19	1.16	1.67%
9.10%	0.86	0.86	19.30%	10.80%	0.89	0.89	1.13	0.96	1.19		
9.30%	1.30	1.30	22.60%	10.20%	1.17	1.17	0.80	0.76	0.81	0.79	0.87%
15.80%	1.35	1.35	27.00%	16.90%	1.16	1.16	1.13	1.28	1.12		
8.70%	1.38	1.38	19.10%	9.60%	1.24	1.24	0.59	0.77	0.59		
2.90%	0.88	0.88	20.00%	3.90%	1.02	1.02	0.72	0.71	0.75		
5.50%	0.75	0.75	10.50%	7.30%	0.82	0.82	0.89	0.79	0.96	1.30	0.84%
8.10%	0.84	0.84	12.40%	10.90%	0.87	0.87	0.95	1.04	0.94		
2.20%	0.50	0.50	6.50%	3.20%	0.68	0.68	0.81	0.74	1.06		
6.50%	0.91	0.91	15.80%	7.80%	0.87	0.87	0.72	0.44	0.79	1.73	1.97%
8.90%	1.01	1.01	19.40%	10.00%	0.93	0.93	0.80	0.43	0.81		
3.20%	0.65	0.65	7.10%	4.70%	0.74	0.74	0.59	0.44	0.73		
3.60%	0.82	0.82	0.00%	8.10%	1.10	1.10	0.41	0.52	0.41	0	0.00%
3.60%	0.82	0.82	0.00%	8.10%	1.10	1.10	0.41	0.52	0.41		
1.60%	X	X	0.00%	4.80%	0.72	0.72	0.33	0.80	0.32	0	0.00%
1.60%	X	X	0.00%	4.80%	0.72	0.72	0.33	0.80	0.32		

Continued

Table C-1(B).

Illustrative LinKS Dashboard: Acute Care Process Measures

	DVT Prophylaxis	Throughput		Infection Data	OQP		
	High Risk Non-Op	OME LOS	LOS	MRSA Composite Screening Rate	CAP	SCIP	Heart Failure
National Aggregates							
Facility Level 15th %tile	51.6	-0.99	3.39	89			
Facility Level Mean	66.1	-0.25	4.32	92			
Facility Level 85th %tile	79.3	0.49	5.13	97			
VISN 97							
Site 7	82.4	-0.01	5.14	95	✔	✔	✔
Site 8	73.0	-0.27	4.57	89	✔	–	✔
Site 9	68.9	-0.66	4.36	94	✔	✔	★
Site 10	78.2	-0.52	4.29	93	✔	✔	✔
Site 11	75.9	0.08	4.72	94	✔	✔	★
Site 12	61.8	-0.78	4.04	97	★		✔
Site 13	58.9	3.23	7.43	94	✔		★

CHF				Pneumonia		
OPES (FY2008)	% CHF	RSMR (FY2008)		OPES (FY2008)	RSMR (FY2008)	
Ambulatory Care Sensitive Condition Hospitalization OE	Patients Readmitted	IPEC	Hospital Referral Region	Ambulatory Care Sensitive Condition Hospitalization OE	IPEC	Hospital Referral Region
0.76	13.79	8.38	10.56	0.76	10.73	10.94
1.03	19.48	9.90	11.10	1.14	12.60	11.45
1.31	25.00	11.26	11.53	1.31	14.19	11.94
0.98	12.74	9.49	10.97	1.25	13.76	11.77
1.07	19.15	10.43	11.91	1.39	18.48	13.13
0.77	20.00	10.05	11.18	0.92	14.38	11.78
1.02	20.22	9.10	11.21	1.12	13.14	11.09
0.98	24.63	10.00	11.39	1.08	12.77	11.94
1.40	16.07	12.03	11.48	1.36	12.66	11.94
0.95	3.13	10.65	11.23	1.11	12.61	12.24

CBO

Table C-1(C).

Illustrative LinKS Dashboard: ICU Process Measures

	% Gluc Days with Hypo Episode		%Patients w Mean Glucose >180	DVT Prophylaxis		
	<=45 mg dL	< 60 mg dL		Mech Vent	Non-Op	Op
National Aggregates						
Facility Level 15th %tile	0.5	1.6	10.7	63.1	62.5	61.8
Facility Level Mean	1.2	3.3	17.0	74.3	73.7	81.2
Facility Level 85th %tile	2.1	5.0	23.6	88.9	84.5	100.0
National Aggregates						
Site 7	2.1	5.0	9.8	60.3	78.7	81.3
Site 8	1.4	2.6	15.0	78.7	80.4	100.0
Site 9	2.5	4.8	17.5	71.1	64.7	80.0
Site 10	0.6	2.6	16.0	61.7	76.2	85.7
Site 11	1.9	5.1	22.4	78.6	77.0	90.0
Site 12	0	5.3	12.1	66.7	83.8	100.0
Site 13	1.6	1.6	5.1	100.0	100.0	

Throughput		IPEC Infection		OQP	AMI RSMR (FY2008)	
OME LOS	LOS	CLAB Rate	VAP Rate	AMI	IPEC Acute Care	Hospital Referral Region
-0.77	2.12	0	0		14.68	15.79
-0.08	2.84	1.54	2.78		14.91	16.12
0.54	3.57	3.19	5.78		15.13	16.46
0.57	3.76	3.97	1.61	✔	14.92	16.46
0.19	3.18	2.75	10.14	✔	15.25	16.77
0.32	3.09	1.39	2.53	✔	14.98	16.42
0.06	2.98	0.69	0	✔	15.00	15.47
0.49	3.16	1.36	4.77	✔	14.86	16.30
-0.62	1.84	0	0		14.91	16.27
2.04	4.26	0	0		14.97	16.32

Continued

Table C-1(D).

Illustrative LinKS Dashboard: Outpatient Process Measures

	OPES (FY2008) Ambulatory Care Sensitive Condition Hospitalizations OE	OQP							
		Diabetes	Ischemic Heart	Prevention	Behavioral Health Screening	Tobacco	Access Mental Health	Access Missed Appt	Access New Patient
National Aggregates									
Facility Level 15th %tile	**0.77**								
Facility Level Mean	**1.04**								
Facility Level 85th %tile	**1.23**								
National Aggregates									
Site 7	0.89	✔	✔	✔	✔	✔	✔	✔	✔
Site 8	0.88	✔	✔	✔	✔	✔	✔	✔	✔
Site 9	0.72	✔	✔	✔	✔	✔	✔	✔	✔
Site 10	0.86	✔	✔	✔	✔	✔	✔	✔	✔
Site 11	0.77	✔	–	✔	✔	★	✔	✔	✔
Site 12	1.13	✔	✔	✔	✔	✔	✔	✔	✔
Site 13	0.72	✔	✔	✔	✔	★	✔	✔	✔

Source: Veterans Health Administration.

Notes: CAP = community acquired pneumonia; CCU = cardiac care unit; CLAB = central line associated bloodstream infection; DVT = deep vein thrombosis; FY = fiscal year; Gluc = glucose; Hypo = hypoglycemic; ICU = intensive care unit; LOS = length of stay; Mech Vent = mechanical ventilator; mg dL = milligrams per deciliter; MICU = medical intensive care unit; MRSA = methicillin-resistant Staphylococcus aureus; Non-Op = nonoperative; OE = observed to expected; OME = observed minus expected; Op = operative; Q2 = second quarter of the fiscal year; SCIP = Surgical Care Improvement Project; SD = standard deviation; SICU = surgical intensive care unit; VAP = ventilator associated pneumonia.

A blank field indicates that there were not 30 opportunities available to calculate the measures during the relevant reporting period. A star represents 100 percent compliance. A check mark means that data are within two standard deviations of the mean. Data that are outside that range are indicated by a plus sign (if above) or a minus sign (if below).