

Effect of a VA Chronic Disease Management Initiative on Hospitalizations for Ambulatory Care Sensitive Conditions

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Does a major chronic disease management (CDM) initiative improve the quality of care provided to veterans with ambulatory care sensitive conditions (ACSCs)? These investigators examined the effect of CDM programs on hospitalization rates for ACSCs in 2010 vs 2006.

Hospitalization rates for ambulatory care sensitive conditions (ACSCs), such as diabetes, heart failure, and chronic obstructive pulmonary disease (COPD) are inversely related to access and effectiveness of ambulatory care.¹⁻⁷ For example, people living in rural areas often have more difficulty accessing ambulatory care and have higher rates of hospitalizations for ACSCs. Hospitalizations for ACSCs also increase with the number, type, and severity of chronic conditions.⁸⁻¹¹ Thus, health care systems that provide broad-based, effective ambulatory care may be able to re-

duce hospitalizations for ACSCs.

In 1995, the VA began to reorganize its health care system from a focus on facilities providing inpatient care to 21 broad veterans integrated service networks (VISNs) providing patient-centered ambulatory care. The number of VA beds available for acute, inpatient care was reduced by more than 50%. In addition, a system-wide electronic medical record (EMR) and a performance improvement program were implemented. These changes corresponded with a substantial reduction in the national average rate of hospitalizations for ACSCs from fiscal year 1997 to 2003, which remained stable through 2007.¹² Implementation of a national VA Care Coordination Home Telehealth program has also been associated with fewer hospitalizations for ACSCs.¹³

In April 2006, the VA Midwest Health Care Network (VISN 23) began to implement a strategic plan to improve management of veterans with chronic disease. This health care network currently serves approximately 309,000 veterans living in the north central region of the United States. The network has 8 hospitals and 52

community-based outpatient clinics in 8 states, including several that are located in rural areas. Each hospital and affiliated outpatient clinics are considered to be a health care system.

The chronic disease management (CDM) initiative in VISN 23 was based on Wagner's Chronic Care Model.¹⁴⁻¹⁶ This model of care has 6 interrelated components: clinical information systems, delivery system redesign, decision support, support of patient self-management, health care organization, and community resources. This model of chronic care strives to foster productive interactions between well-prepared, proactive, interdisciplinary health care teams and informed, motivated patients.

Briefly, VISN 23 developed registries to identify patients with diabetes, heart failure, or COPD and classify them according to their high, moderate, or low risk for hospitalization. To help implement the programs, registered nurses, a few advanced practice nurses, and a respiratory therapist were hired, trained, and distributed throughout the network. Working with inter-

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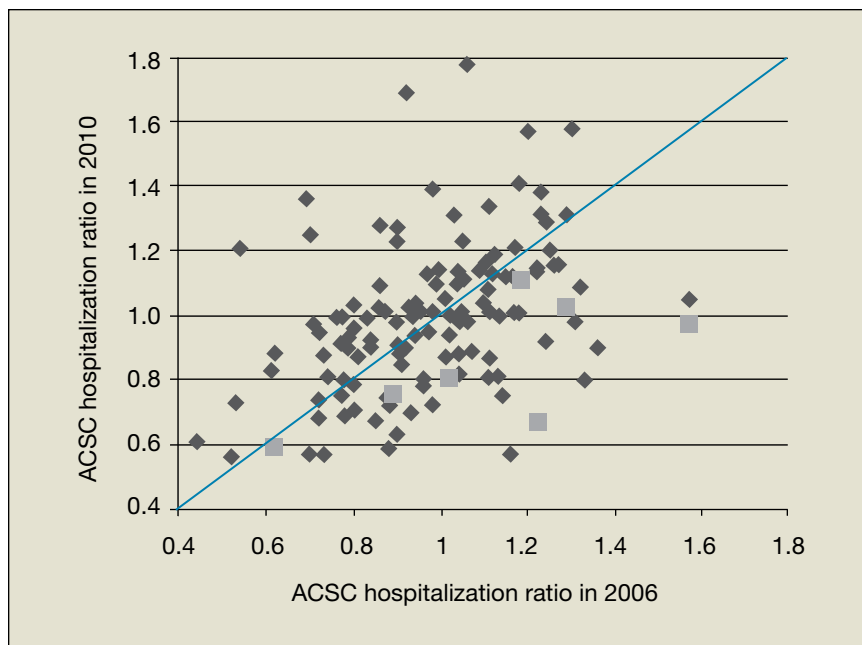


Figure 1. Observed-to-expected hospitalization ratios for ACSCs in 2010 vs 2006. Squares represent the 8 health care systems in the VA Midwest Health Care Network (VISN 23), and diamonds represent 126 health care systems in other VA networks (VISNs). Five other health care systems with extremely high ratios were omitted for clarity. The line denotes equal hospitalization ratios in 2010 and 2006, and points below the line indicate health care systems with lower ratios in 2010 compared with 2006.

disciplinary health care teams, provider roles, standards of care, and evidence-based treatments were clearly defined. Teams were encouraged to make changes using rapid Plan-Do-Check-Act cycles. The previously implemented Care Coordination Home Telehealth program was increasingly used for case management.¹³ Periodic learning sessions were convened to support the teams by sharing experiences and learning how they might improve care at their local sites. Monthly telephone conferences provided additional information and opportunities for questions and feedback. Electronic repositories were developed to share practice protocols, forms, reports, and so forth. Patient education programs focused on enhancing patients' understanding of their disease and self-management,

including written goals, self-care plans, and use of community resources. Team members were trained in the use of Stanford's Chronic Disease Patient Self-Management Program.¹⁷ Annual contracts held health care system executives accountable for clinical performance targets, which were aligned with the initiative, to improve management of patients with chronic disease.

Since CDM programs in VISN 23 focused on improving access and effectiveness of ambulatory care for 3 key ACSCs and could conceivably impact hospitalizations due to several other common concurrent ACSCs, including bacterial pneumonia, angina, hypertension, and dehydration, we were interested in estimating the effect of the CDM programs on hospitalizations for ACSCs.

METHODS

Publicly reported aggregate data from the VA Hospital Compare Web site representing each VA health care system were used to estimate the effect of the CDM initiative on hospitalizations for ACSCs.¹⁸ Archived data from fiscal year 2006 (October 2005 through September 2006) obtained from the VA Inpatient Evaluation Center, Office of Quality and Safety, served as the baseline. Fiscal year 2010 data were used to compare changes after the CDM programs had been operational. Hospitalizations for ACSCs were identified using algorithms available from the Agency for Healthcare Research and Quality.¹⁹ The VA data were based on principal diagnosis codes for 13 types of hospital admissions for ACSCs: 4 related to diabetes and 1 each for heart failure, COPD, bacterial pneumonia, adult asthma, angina without a revascularization procedure, hypertension, dehydration, urinary tract infection, and perforated appendix.

Hospitalizations for ACSCs were reported as observed-to-expected ratios. The numerator was observed number of hospitalizations per 1,000 veterans with an ACSC who were assigned to a VA health care system based on their main site of primary care. The expected number of admissions was estimated by a regression equation fit to the national VA data.¹² In 2010, the risk model for ACSCs included a Diagnostic Cost Group™ (DCG) risk score for each patient calculated from his or her recorded diagnoses, age, and gender, and several characteristics of the health care system, including the number of patients with an ACSC, inpatient deaths, emergency department visits, nursing home beds, and medical residents. In addition, the size of the facility, its research and development funding, and whether it

was located in a rural area were used to estimate each health care system's expected number of hospitalizations for ACSCs.

A difference of the differences analysis compared the changes in health care systems in VISN 23 to changes in health care systems in all other VISNs. Changes (differences) from 2006 to 2010 in hospitalizations for ACSCs in each group of health care systems were regressed on indicator variables representing the 2 groups of health care systems and the level of complexity of care provided at each health care system. In 2008, the complexity of care provided by each health care system was rated by the VA as level 1 (most complex services) or 2 or 3 (least complex services). Health care systems that provided the least complex care tended to serve a smaller number of veterans, such as those in rural areas, have higher ACSC hospitalization rates, on average, and greater variation among their rates of hospitalization. The unit of analysis is the VA health care system clustered within VISNs. Robust standard errors were estimated to account for the heteroscedasticity of hospitalization rates across levels of care and clustering of health care systems within VISNs. Data were analyzed using Stata software, version 10.1 (StataCorp, College Station, Texas).

RESULTS

Distributions of the observed-to-expected ACSCs' hospitalization ratios for health care systems in VISN 23 and other VISNs in 2006 and 2010 are shown in Figure 1. To varying degrees, all the hospitalization ratios in VISN 23 fell below the line that represents having identical ratios in 2010 and 2006, indicating their hospitalization ratios were lower in 2010 compared with 2006. The hospitalization

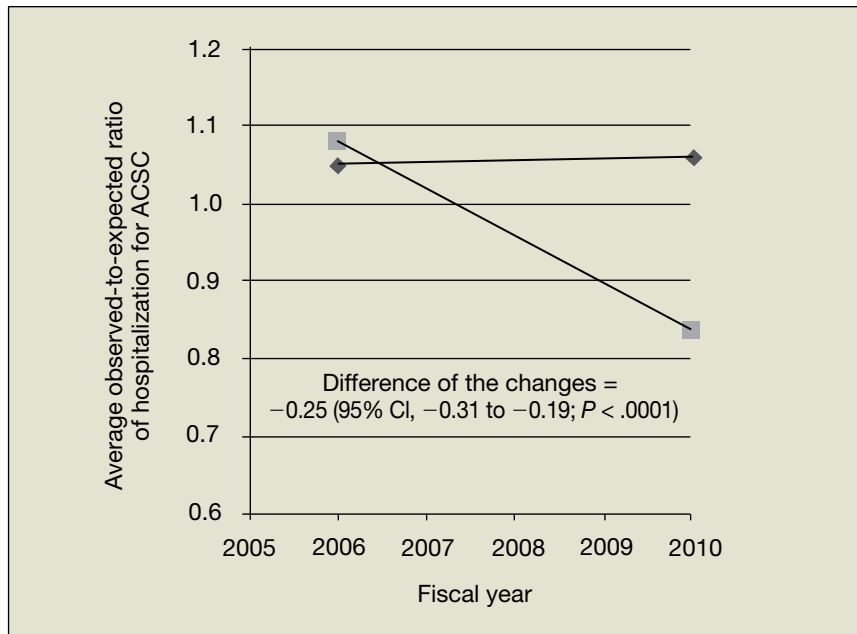


Figure 2. Average observed-to-expected hospitalization ratios for ACSCs in the VA Midwest Health Care Network VISN 23 (squares) and all other VA networks (diamonds) in 2006 and 2010.

ratios for other health care systems were widely distributed above and below the line of identity. On average, the hospitalization ratios for ACSCs, shown in Figure 2, were very similar in 2006 (1.08 VISN 23 vs 1.05 in other VISNs). Thereafter, the average hospitalization ratios decreased in VISN 23 to 0.84 in 2010 and did not change in the other networks. The estimated reduction in the average ACSCs' hospitalization ratio among health care systems in VISN 23 compared with the changes in other VA health care systems adjusted for the complexity of care provided at each health care system was -0.25 (95% CI, -0.31 to -0.19; $P < .0001$).

Average admission rates for ACSCs are shown in Figure 3. In 2006, the average admission rates were 25.3 vs 31.6 per 1,000 patients with an ACSC in VISN 23 and other VISNs, respectively. The mean admission rate decreased to 21.6/1,000 in VISN 23 and

decreased slightly to 30.8/1,000 in the other networks. Thus, the difference between VISN 23 and other VISNs increased from 2006 to 2010. The estimated difference of the changes in observed ACSCs' hospitalization rates adjusted for the complexity of care provided at each health care system was -2.9/1,000 (95% CI, -4.3 to -1.6; $P < .0001$).

DISCUSSION

This analysis of readily available information for comparing the quality of ambulatory care provided within health care systems indicates that a CDM initiative that began in the VA Midwest Health Care Network (VISN 23) in 2006 is associated with a significant reduction in hospitalizations for ACSCs in 2010 compared with other VA health care systems in other networks.

The CDM programs implemented in VISN 23 were multifaceted, includ-

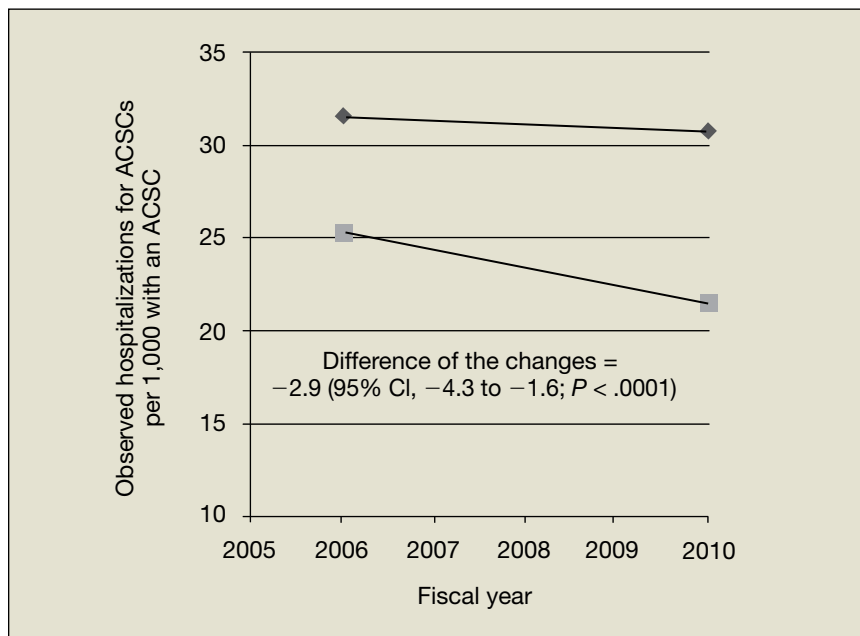


Figure 3. Average observed number of admissions for ACSCs per 1,000 cases with an ACSC in the VA Midwest Health Care Network (VISN 23) (squares) and all other VA networks (diamonds) in 2006 and 2010.

ing the formation and support of interdisciplinary health care teams to focus on the care of the patients at greatest risk identified in administrative registries as patients with 1 or more key ACSCs, case management via telehealth services that can reach out to rural areas, patient education and support to enhance self-care, and delivery of the most effective evidence-based care. The contributions of the various components of the CDM programs to the observed reduction in hospitalizations for ACSCs are not known. Similar programs, such as case management via telehealth, most likely were implemented to varying degrees by other VA health care systems. Therefore, some components of the CDM programs might not have contributed as much to the estimated differences between VA health care systems, and the effects of the VISN 23 CDM programs may be underestimated. Further evaluation

is needed to determine how differences in implementation of the CDM programs and other characteristics of the health care systems within VISN 23 relate to the observed variation in changes in hospitalizations for ACSCs.

Additional data and more complex analyses would be needed to determine the amount of improvement in hospitalizations for ACSCs attributable to each of the 3 targeted conditions (diabetes, heart failure, and COPD), including comorbidities that are also ACSCs. In 2010, separate data are available for 2 of the 13 ACSCs reported by the VA, heart failure and bacterial pneumonia. These are also frequent reasons for hospitalization of patients with COPD. The estimated mean differences in observed-to-expected hospitalization ratios were -0.12 and -0.19, respectively, in favor of health care systems in the VISN 23. The estimated difference for all ACSCs was -0.22.

Given that many high-risk patients have several ACSCs, it might not be possible to determine the effects of programs to manage each condition separately. Indeed, programs that integrate and coordinate the care of several ACSCs may be more effective.

The estimated annual effect of the CDM programs is 2.9 fewer hospital admissions per 1,000 patients who have an ACSC (95% CI, 1.6-4.3 fewer admissions per 1,000 patients). This is nearly 10% of the average of 30.8 ACSCs admissions per 1,000 patients in the other networks in 2010. The avoided costs of these hospitalizations, other types of hospital admissions, and outcomes, such as patient and provider satisfaction, annual costs of operating the programs, and the overall marginal cost effectiveness have not been determined.

A number of sociodemographic, health care factors, and patient characteristics are associated with hospitalizations for ACSCs.^{2-10,12,13} The differences of the differences analysis is based on the assumption that whatever factors lead to the differences between the network health care systems in 2006 continued to have the same effects in 2010. It also assumes that any new influences other than the CDM programs during the period of analysis did not differ. Therefore, the effects of differences in mortality or hospitalizations outside the VA health care system or other factors might not be adequately controlled by the present analysis.²⁰ Analysis of the observed-to-expected hospitalization ratios standardizes the number of hospitalizations in each health care system to the number predicted based on data from all health care systems in the analysis. This facilitates comparisons of 1 health care system (or network average) to the average of all other health care systems. However, any differences between health

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care systems in the distribution of risk factors are not necessarily controlled when comparing health care systems with each other.²¹

In conclusion, a multifaceted, VISN CDM initiative was associated with a significant improvement in hospitalizations for ACSCs, an important indicator of access and effectiveness of ambulatory care. Further evaluation is needed to determine how various components of the program contributed to the observed effect and its overall cost-effectiveness. Nevertheless, this type of initiative may improve the care provided to veterans. ●

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