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Using Home Telehealth to Manage Chronic Disease

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In the Sunshine Network, providers using telecommunications technology to monitor at-home patients with chronic disease have found that it fosters more effective care management while cutting costs. Here's how it works.

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The increasing prevalence of chronic disease is a growing concern throughout the national health care system. According to a report prepared by the Institute for Health and Aging at the University of California, San Francisco, in 1995, chronic illness affected approximately 99 million Americans—41 million of whom had conditions serious enough to limit daily activities and 12 million of whom were unable to attend school, work, or live independently.[1] The CDC estimates that such chronic conditions account for 75% of the $1 trillion spent annually on health care in the United States.[2] Since, as the Veterans Health Study confirms, the average veteran is sicker than the average American,[3] the VA shoulders a disproportionate share of this cost burden.

In order to address both the resource consumption associated with chronic disease and the unique needs of affected patients, the VHA has spearheaded various field initiatives, thereby becoming an acknowledged leader in chronic disease management. One such initiative is the Community Care

Coordination Service (CCCS), a new population model developed and deployed in April 2000 by a concept design team of health care providers in Veterans Integrated Service Network (VISN) 8. This model uses both the care coordinator role and innovative home telehealth technology to manage clinically complex conditions of patients who live at home and are at high risk for

institutionalization. The purpose of this model is to improve patient function, indepen-dence, and health while increasing staff efficiency and reducing health care resource use. To date, available data show improvements in all target areas: utilization data, standard form 36 adapted for veterans (SF36V) data,[3] clinical outcomes, and performance improvement. Since the 16 CCCS programs currently serve over 2,000 patients with chronic disease across VISN 8, these positive findings have significant implications for the entire VHA.

In this article, we'll describe the development of this model, explain how we applied it to our patient population, and discuss some of the lessons we learned in the process of implementation. These lessons point to key administrative issues that must change if the evolution toward quality at-home care is to continue throughout the VHA.

Building the CCCS

Between 1995 and 2000, the number of patients seeking care from the VHA doubled. In 2002, there were over six million enrolled veterans consuming $23 billion in annual VHA resources.[4] Although the Millennium Bill (passed by Congress in 1999) doesn't require the VHA to provide nursing home care for all enrolled veterans, the growing incidence of chronic disease and CDC estimates of its cost are of national concern. The VHA has determined that 75% of long-term care provided to enrolled veterans is institutional and, by 2005, it's projected that veterans' need for long-term care will have risen 20% from the year 2000.[5]

In 1998, VISN 8—which provides care for veterans in South Georgia, Florida, Puerto Rico, and the U.S. Virgin Islands—responded to these projections by launching a vigorous investigation into new health care models and new strategies to prepare for current demand and future growth. At that time, over 1.5 million veterans (45% of whom were age 65 or older) resided within the VISN boundaries and 300,000 of them were receiving care. During fiscal year 2000, the number of enrollees increased by nearly 45,000. By fiscal year 2001, there was a total of 405,245 veterans enrolled in the network,[6] distinguishing VISN 8 as having one of the highest growth patterns nationwide.

To meet this growing demand, VISN 8's network director envisioned a shift from institutional care to care in the community. To accomplish such a transformation, in which the home would serve as the primary site of care, and to determine how best to maintain the health of at-home patients, clinicians in the North Florida/South Georgia Veterans Health System conducted numerous needs assessments, surveys, and focus groups that ultimately led to the development of the CCCS model.

Nearly 4,000 patients, caregivers, providers, and Veteran Service Organization officers were involved in this research. As a result, program development was sensitive to considerations of identified needs. For at-home patients, the most significant of these fell within the following areas: homemaker services, home health aide services, respite, rehabilitation, intravenous antibiotic administration, and pain management.

The CCCS leadership team also reviewed the VISN 8 administrative database and conducted data runs on the segment of the patient population that

utilized $25,000 or more in health care resources per year. The 1998 data revealed that 40% of total annual medical care expenditures in VISN 8 ($448,528,275) could be attributed to less than 3% of the patient population (8,704 individuals). Based on our data and a review of then current medical literature, we determined that patients with specific chronic diagnoses—such as heart failure, chronic obstructive pulmonary disease, diabetes, hypertension, and mental illness—would benefit most from interactive telecommunication technology in the home. This group consisted of 1,313 (0.4%) of the patients in VISN 8 and consumed $79,071,926 (6.9%) of the VISN's annual health care resources. It represented about 15% of the identified high cost patients in VISN 8—the others weren't living at home and were therefore ineligible.

VISN 8 provided funding for the CCCS in January 2000, and all projects were fully operational by July of the same year. In order to test care management principles, the new role of the care coordinator, and the efficiency of technology used in the patient's home, eight demonstration projects were implemented rapidly across VISN 8. These CCCS projects, which have become the foundation of the CCCS, enrolled the 1,313 patients who were identified during our review. Technologies selected for use in the demonstration models included traditional telemonitors with vital sign peripherals, videophones, in-home messaging disease management tools, computers with internet chat rooms, and instant film photography.

Care Coordination

Care coordination, one of the central components of the CCCS, involves assessing and monitoring patients in their residence and giving health care providers appropriate feedback to ensure that patients receive the right care at the right time and place. Traditionally, VHA patients with multiple complex health problems are seen by primary and multiple specialty providers and are assigned to several case managers. While communication exists across service lines, it can become fragmented when patients require a wide variety of specialized services. For such complex patient care, we saw that a new role—one that would cross services and communicate throughout the continuum of care—was needed.

Care coordinators, who are licensed professionals with the appropriate clinical assessment skills and decision making competencies, fill that need. The role of care coordinator was assigned to registered nurses, nurse practitioners, social workers, and a dietitian. The care coordinator makes an initial visit to the patient's home and sets up the telecommunications devices so that clinical data, outcomes, and quality of life can be monitored. (The telecommunications equipment is checked anually as part of a maintenance program.) The care coordinator can then collaborate with the other providers in assessing the patient's functional status and clinical, social, and environmental needs (Figure 1).

By assessing the patient in his or her residence and disseminating the health data to the various health care teams with whom the patient is involved, the care coordinator is able to optimize use of the system and recommend alterations to

treatment as necessary—promoting effective self-care on the part of the patient. The care coordinator returns to the patient's home only when clinical changes warrant another visit.

The care coordinator assesses not only the patient's ability to manage his or her own disease through the use of monitoring tools but also the patient's adherence to medication regimens and response to treatment. Since care coordinators inform providers of patients' response to treatment in a timely manner, the system facilitates early intervention. Care coordination reduces clinical complications and the resources that these complications consume.

The care coordinator, however, provides little or no direct care. Although this professional is empowered to make decisions across department lines, the emphasis is on collaboration with the patient's health care team. The success of the CCCS is contingent upon the care coordinator's effective collaboration with the provider teams and use of technology.

The Role of Telehealth

Telehealth—the other major component of the CCCS—is the exchange of health information through telecommunications for the purpose of improving patient health, patient or provider education, and overall patient care.[7] This delivery approach has the potential to make a significant difference in the lives of many Americans in both urban and rural communities. Home telehealth has been found to be very effective in managing chronic health conditions.[8–10]

Telehealth technology is assigned to each patient using an algorithm that takes into account such factors as the literacy of the patient or caregiver, clinical need (based on severity of illness), residence (home or congregate living), program assignment (for example, patients with diabetes under the care of a primary care provider or an endocrinologist and older patients under the care of a gerontologist), level of care, and frequency of communication needed.[11] The assessment process and the algorithm are designed to be vendor neutral—focusing first on the clinical need and benefit to the patient. This sets our program apart from other telemedicine programs that purchase the technology first and then enroll applicants.

The care coordinators use telecommunications technology to improve efficiency and expand their ability to enroll highly complex patients into the CCCS. This technology eliminates or greatly reduces travel time; distance is no longer a barrier to care. Efficient use of technology, personnel, and resources allows care coordinators to help more patients each day than was ever before possible.

Evaluating the Program

To assess the effectiveness of the CCCS model, a program evaluation methodology was designed by health economists from the University of Maryland in Baltimore. Using survey tools and an intranet database, the evaluation addressed both clinical and usage outcomes. A group of 4,100 "like care" patients from VISN 8 who mirrored the 1,100 patients in the CCCS study group with regard to chronic disease diagnoses, comorbidities, age, and sex was

selected to serve as the control group. The control group received usual care, with little or no care coordination or telehealth technology. Additionally, evaluators surveyed CCCS patients in order to compare their health status before and after enrollment. For the first year, there were significant reductions in health care resource utilization among the program's medically complex chronic disease group.[12] Overall, the CCCS group demonstrated greater improvements in all outcomes measured than did the control group (Table 1).

The CCCS leaders believed that the veteran patient population targeted by the program was at high risk for premature institutionalization and, therefore, could be helped by the care coordination process. The Michigan Choice Instrument (MI Choice), a tool for determining risk for nursing home placement, was completed on a convenience sample of patients enrolled in the three hospital-based demonstration projects.[12] The results showed that 41% of the sample was at risk for institutionalization. In addition, we conducted an odds ratio analysis, which showed that, after enrollment, patients in the CCCS program were 77.7% less likely than those in the nonenrolled comparison group to be admitted to a nursing home (Table 2).

Clinic visits showed an increase of 14% among CCCS patients. The CCCS leadership team reviewed this trend, and noted that staff members who had been empowered to make assessments had scheduled clinic appointments during the first few months of enrollment to ensure all clinical needs were met in a timely fashion. After the first three months, the number of clinic visits declined steadily (Figure 2). The evaluation showed that usage in the control group rose 40% over six months.

A performance improvement plan was implemented throughout the eight demonstration projects in October 2000. The plan included strategies for improving medication adherence, perceived functional status, patient satisfaction, and provider satisfaction. All performance improvement outcomes within the CCCS programs met or exceeded the target goals. A functional assessment using the SF36V3 revealed significant improvements in five domains (role physical, bodily pain, general health, social functioning, and role emotional) out of ten (the others being physical functioning, vitality, mental health, physical composite, and mental health composite).

Lessons Learned

Traditionally, disease management has been the focus of home telehealth programs. Although patients' diagnoses were considered in determining CCCS eligibility, no one diagnosis was a prerequisite for program inclusion. The patient population identified by the CCCS had multiple comorbidities that would make traditional disease management difficult at best. Targeting the high risk, high use, and high cost patients—and monitoring them holistically—was vital to the success of the CCCS model.

We came to recognize that, as was once said by Dr. Adam Darkins, chief consultant for the VHA's Telemedicine Strategic Health Care Group, while "telehealth acts as a communications tool to facilitate health care delivery…its intrinsic strength lies in building clinical bridges between many different health

care applications."[13] We learned from the initial evaluation of our CCCS program that many advances in technology are needed, but none are more important than a concentrated focus on hardware usability by patients (such as the readability of screens and simplicity of buttons).[13]

The technology market is forever changing. It's important to seek out new devices and keep options open to meet the needs of the population being served. Restricting the technology choices of health care providers can impede innovation and hinder the type of corporate competition that spurs research and development. Although centralized technology contracts tend to increase purchasing power, this practice should be limited in the interest of health care advancement.

We realized too the importance of developing a set of standard telehealth guidelines within the VHA. The two largest telehealth organizations in the United States are the American Telemedicine Association (ATA) and the Association of Telemedicine Service Providers (ATSP). The ATA has been a leader in developing clinical guidelines for practicing home telehealth.[14] Standardized guidelines are a must for determining best practices. The VHA is developing remote telemedicine practice guidelines that address problematic issues and offer a systematic, standardized approach for the clinician delivering home telehealth. The ATSP's annual report on U.S. telemedicine discusses the increase in telemedicine programs across the country, specifically in the area of home telehealth.[15]

Despite this overall growth, a number of telemedicine programs have failed over the past year. Some of these failures may be attributed to a lack of sufficient information in medical literature. Sample sizes in studies are very small, and therefore not as widely applicable as once hoped.[16] (Our group, however, published a study last year that included 791 patients enrolled in the CCCS. Since the study demonstrated positive outcomes, we're hopeful that other health care systems will find it useful.[17])

Some commercial home telehealth programs that failed in 2002 did so in part because of reimbursement issues. Although a concern for the VHA, reimbursement isn't the sizeable problem it appears to be in the private sector. At present, however, there's no link between the telehealth process and system resource allocation in the VHA. Coding and reimbursement must be revamped to account for telehealth and care coordination services. The VHA's National Leadership Board must recognize the benefit of telehealth innovation and adjust the Veterans Equitable Resource Allocation (VERA) system accordingly.

Finally, though a rigorous evaluation methodology was built into CCCS, it has become evident that some inconsistencies in coding, definitions, data collection, and data mapping remain. Such inconsistencies became particularly critical when we tried to compare CCCS programs for the purpose of establishing evidence-based best practices.

Telehealth across the nation

Based on the successful outcomes documented by the CCCS in VISN 8, we believe this model can be deployed nationwide. To facilitate this process, short-,

medium-, and long-term goals can be developed based on experiences within the VISN 8 CCCS and on national chronic disease data.

When looking outside of the VHA for leadership in home telehealth, the DoD comes to mind. Although the DoD's patient population is very different from that of the VHA, a partnership could spur research and development efforts among technology vendors, thereby improving telehealth technology for both groups of patients.

In matters of reimbursement and resource allocation, VERA must begin to recognize the remote home care visit. Coding that has been established for such programs as home-based primary care can be adapted to accommodate the various levels of telehealth care. Cross-VISN funding must acknowledge the mobility of the population. Patients living outside of usual service areas must be offered access to comparable care.

The VHA is recognized as a leader in the field of home telehealth. With this expertise, it makes sense to deploy a national model that uses home telehealth technology to manage high risk, high cost, and high use patients identified by each VISN. Technologic choices should remain flexible enough to support innovation and drive the market for better research and development.

VISN 8's successful CCCS program, which has enrolled patients from a wide variety of populations within the system, is a model for replication across the nation. By 2010, the veteran population over the age of 75 will have increased by 12%, and with it, the expected frailty and chronic conditions. The results of the CCCS evaluation demonstrate patient satisfaction, improved perception of functional status, and a reduction of resource utilization to levels lower than previously achieved in any other VHA network or station program. CCCS data clearly show that the model, technology algorithm, and care coordinator role demonstrate strong business tenets and are worth adapting on a national level.

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Figure 1. The care coordination process.

Care coordinator reviews referrals and identifies patients for panel

Care coordinator reviews clinical history, assessing use of clinical services (such as patient education or social service coordination) and resource use (such as admissions and pharmacy costs)

Care coordinator collaborates with primary provider to:
• Assess patient status
• Review treatment plans
• Establish communication plan

Collect baseline data quarterly:
• Clinical data
• Business data
• Resource consumption
• Patient and provider satisfaction
• Nursing home risk

Care coordinator actively participates in:
• Treatment and disposition meetings when needed
• Timely communication with patient and primary care provider
• Regular reviews of treatment plan needs

Figure 2. Clinic visits before and after enrollment in Community Care Coordination Service.

Number of clinic visits
10,000 9,000 8,000 7,000 6,000 5,000 4,000 3,000 2,000 1,000 0

Apr.–Jun. 1999
Jul.–Sep. 1999
Oct.–Dec. 1999
Jan.–Mar. 2000
Apr.–Jun. 2000
Jul.–Sep. 2000
Oct.–Dec. 2000
Jan.–Mar. 2001

Table 1. Percentage change in outcomes for Community Care Coordination Service (CCCS) and control group patients after one program year

Patient group	Clinic visits	Emergency department visits	Hospital admissions	Hospital bed days of care	Nursing home admissions	Nursing home bed days of care
CCCS	+14%	–40%	–63%	–60%	–64%	–88%
Control	+40%	–11%	–8%	–8%	+106%	–20%

Table 2. Number of nursing home admissions before and after Community Care Coordination Service (CCCS) enrollment

Time period	CCCS patients	Nonenrolled comparison group	Total
Preenrollment	24	18	42
Postenrollment	11*	37	48
Total	35	55	90

*Odds ratio = 0.223.