Veteran’s Health Administration: The management of chronic conditions using care co-ordination and home telehealth

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Summary information

Target population
Patients at risk of requiring long-term institutional care due to diabetes, chronic heart failure, post-traumatic stress disorder, depression, chronic obstructive pulmonary disease and spinal cord injury.

Eligibility requirements
Utilisation and disease-specific criteria. Cost of more than $25,000 per patient per annum, a glycosylated haemoglobin assay (HbA1c) of more than 8 per cent.

Size of the programme and persons served
National across USA in all 50 states plus Puerto Rico. Currently serving 11,400 patients and a projected 21,000 by October 2006 and 50,000 by 2009.

Enrolment strategies
- Services linked to specific organisational performance measures and monitors for non-institutional care and patient census in this programme.
- Organisational targets are set for enrolment into the programme.
- Patients are recruited by care coordinators who support primary care physicians.

Services included within the programme
Care management, case management

Payment structure
Capitated payment for patients within the pre-existing resource allocation system

General structure of the programme
Care coordinators use home telehealth technologies to enhance and extend care and case management and maintain patients with chronic diseases in their own homes. A major tenet of the programme involves patient self-management.
Length of operation

Programme description
In July 2003 the Veterans Health Administration (VHA) established a national care coordination programme: ‘Care coordination in VHA involves the use of health informatics, telehealth and disease management to enhance and extend care and case management activities to facilitate access to care and improve the health of designated individuals and populations with the specific intent of providing the right care in the right place at the right time.’

Major care coordination programmes being instituted by VHA include:
- retinopathy screening for 170,000 veterans with diabetes
- remote consultation services for 30,000 patients with mental health disorders in community-based outpatient clinics
- supporting the care of combat wounded with amputation, head injury, blast injury and post-traumatic stress disorder
- implementing home telehealth to care for 65,000 veteran patients with chronic diseases who are at risk of requiring long-term institutional care.

This paper highlights VHA’s implementation of home telehealth within the framework of VHA’s national care coordination/home telehealth (CCHT) programme.

Following the success of an initial pilot programme between 2000 and 2003, VHA began implementing a national CCHT programme in July 2003. CCHT programmes are designed to change the location and resulting emphasis of how care is provided to veteran patients with chronic diseases. They make the home the preferred place of care, are patient-centred, predicated upon the Wagner model of chronic care (Wagner et al 2001) and encourage self-management (Warsi et al 2004).

Between July 2003 and July 2005, CCHT programmes have been developed in all 21 veterans integrated services networks (VISNs). VISNs are regional administrative units in the US Department of Veterans Affairs (VA). As of 22 February 2006 these VISN CCHT programmes are supporting the care of 11,400 veteran patients with chronic conditions in their homes. These patients would otherwise need long-term institutional care to manage their chronic disease/s. CCHT programmes reduce inpatient stay and emergency room visits by 30 per cent in the population subset of veteran patients that they are designed to support. Satisfaction levels in CCHT patients have been above 90 per cent and not associated with a measurable deterioration in the health status. VHA is introducing CCHT in a systematic way and working with VISN CCHT programmes to establish standardised processes for clinical, business, technology and management support.

VHA plans to expand its CCHT-based services to provide non-institutional care for 65,000 veteran patients with chronic diseases/conditions who would otherwise require long-term institutional care to manage bio-psychosocial problems associated with their chronic disease. VHA’s current trajectory for CCHT expansion was based upon a needs assessment (Darkins 2002) undertaken in April 2002 that showed how non-institutional care delivery to this population could be accomplished using home telehealth technologies. Its recommendations were for short, medium and long-term implementations of home telehealth. The short-term implementation target was the 0.4 per cent of the veteran patient population with chronic heart failure (CHF) chronic obstructive pulmonary disease (COPD), diabetes and post-traumatic stress disorder (PTSD) in which the costs of care for individual patients exceed $25,000 per annum. The medium term implementation group targeted 1.6 per cent of the veteran patient population by adding enrolment of high cost spinal cord injury (SCI), depression, mild dementia, multiple sclerosis (MS) and Parkinson’s disease (PD) patients to those of the short-term group. The long-term implementation group consists of the 41 per cent of the chronic disease population who have low or limited activities of daily living. This group, if not managed early on in their disease state will progress to become the high-cost, high-risk, high-use chronic care patients of the future. Home telehealth was proposed to delay this debilitating deterioration and enable patients who want to remain living independently in their home to do so. Table 1 provides numbers of veteran patients for whom CCHT would be applicable in the three proposed implementation phases.
Table 1: Number of patients in the Department of Veterans Affairs suitable for home telehealth, projected in April 2002

<table>
<thead>
<tr>
<th>Implementation</th>
<th>Number of patients</th>
<th>Condition/problem</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short-term</td>
<td>16,400</td>
<td>Diabetes, CHF1, COPD2, PTSD3</td>
</tr>
<tr>
<td>Medium-term</td>
<td>65,500</td>
<td>Depression, mild dementia, multiple sclerosis, Parkinson’s disease</td>
</tr>
<tr>
<td>Long-term</td>
<td>1,109,460</td>
<td>Difficulties with activities of daily living (ADLs)</td>
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1 chronic heart failure  
2 chronic obstructive pulmonary disease  
3 post-traumatic stress disorder

Currently the enrolment of individual patients into one of VHA’s 21 VISN CCHT programmes is based upon specific disease and health care utilisation criteria, for example, a glycosylated haemoglobin assay (HbA1c) of more than 9 per cent and annual costs to VHA in excess of $25,000 per patient. Potential candidate are then screened using VHA’s geriatrics and extended care referral assessment to verify their candidacy for non-institutional care services.

Specific patient inclusion/exclusion criteria and a caregiver (carers) support assessment confirm a patient’s suitability for care provided using CCHT. At enrolment the care coordinator uses a technology algorithm to choose the most appropriate technology to manage a particular patient. Use of this algorithm in VHA’s patient population results in 75 per cent of patients using a home messaging/monitoring device, 15 percent of patients using a telemonitor and 10 per cent using a videophone. The technology selection is guided by the nature of the patient’s disease/condition, its severity and associated co-morbidities.

Messaging/monitoring devices collect routine vital sign data from patients at home. The process of acquiring, transmitting, storing and risk profiling physiological and biomedical data, which may include blood pressure, pulse, temperature, weight, pulse oximetry, blood glucose and anti-coagulation status, is automated. The same devices also administer disease management dialogues to patients that they can view on liquid crystal display (LCD) screens. These disease management dialogues are both disease-specific and co-morbid. The language for the dialogues is set at a grade level of 6 and they are available in Spanish. Care coordinators in VHA medical centres or community-based outpatient clinics manage the care of a panel of patients who are being supported by a variety of technologies. The care coordinator can view his/her panel of patients on an electronic ‘dashboard’ that displays the relative risk of each individual patient deteriorating with respect to the disease/condition for which they are being care co-ordinated, and the patient’s vital signs. These risk profiles are generated by automated analyses of the patient’s responses to the disease management dialogue questions and by receipt of vital sign data that is outside preset thresholds.

The risk profile that is generated from the patient’s response to the disease management dialogue questions is presented as the patient’s lack of knowledge, and manifestation of symptoms and/or specific behaviours in relation to the given disease or condition for which they are being care co-ordinated. Typically the disease management dialogues are administered to patients every day with variation of individual questions to obviate boredom from patients becoming habituated to the same material/s. Questions are downloaded/uploaded via the telephone. The patient’s responses to questions, together with vital sign data, are stored on databases that are contained on servers within the VHA telecommunications intranet and protected by a firewall.

Although they are administered at a VISN level, CCHT programmes are clinically based in individual VA medical centres (VAMCs). VAMC CCHT services are staffed by care coordinators and clerical/programme support staff. Typically the care coordinators are clinical nurse specialists or social workers. However, there are CCHT programmes with care coordinators whose backgrounds include dietetics, occupational therapy and chaplaincy. The vision of care coordination in VA is that this is a generic function all clinical staff can acquire, including physicians. CCHT is a patient-centred approach to care that enables the primary clinician who regularly sees a patient to co-ordinate their care. A care coordinator can usually co-ordinate care for a panel of 150 patients with general medical conditions or 90 with mental health problems. The risk stratified CCHT data from the monitoring/messaging devices are displayed to the care coordinator on a web browser that is accessible on a personal computer (PC) via the VHA intranet or from outside via a virtual private network (VPN).
VHA's computerised patient record system is a critical success factor that underpins VA ability to develop and implement CCHT. The subset of the veteran patient population in CCHT programmes are individuals who would previously have had a paper health record that would be difficult to find because of multiple unscheduled clinic visits and emergency room attendances. Should the paper health record have been available it would be very difficult to extract the relevant information from this in a timely way. A computerised patient record provides care coordinators in VHA with a structured electronic record from which all relevant information is readily available and accessible from over 1,100 sites of care. Veteran patients are a mobile population for reasons that may vary from being a ‘snowbird’ to homelessness, and the record is automatically forwarded to where the veteran patient is receiving their care. The ability of a care coordinator to manage the care of CCHT patients across the continuum of care is critically dependent upon access to progress notes, medications, past history, laboratory results, clinical imaging and orders.

Home telehealth data that relates to the knowledge/symptoms/behaviour of patients or abnormal vital signs is what brings patients to the attention of care coordinators for active care and case management. The status of each patient is provided as a colour-coded data array that allows for easy recognition of those patients who are at potential risk. When a patient is flagged up as being at risk, the care coordinator contacts the patient by telephone for further assessment and may act with delegated authority from the patient’s physician to provide information/advice, adjust medication, help the patient self-manage their condition, arrange a clinic visit or negotiate an urgent admission to institutional care. CCHT patients do not have their vital sign or disease management data monitored in ‘real time’. The care coordinator sees the home telehealth data 24 hours after it was generated. CCHT programmes do not manage patients with acute life problems associated with their diabetes, CHF, COPD etc. Should a CCHT patient suffer an acute health problem, then they access medical emergency services, for example, paramedics (ambulance service) in the usual way. CCHT is appropriate for patients with chronic conditions that are essentially stable and prone to periodic deteriorations in their health status, ones that might occur over two to three days.

The benefit of CCHT in the management of chronic conditions is exemplified by how it benefits the care of patients with chronic heart failure. In most health care systems, a patient with heart failure earns their right to an urgent clinic appointment or hospital admission when they are acutely symptomatic, for example, severe shortage of breath. If a patient survives such an acute life-threatening deterioration then they may spend several days on an intensive care unit. However, the deterioration in this patient's condition may have been taking place over several days. A simple intervention such as an increase in their diuretic medication could avert the crisis if the patient were alerted to do so when monitored data indicates a significant increase in weight and/or symptoms of increasing breathlessness. Ambulatory care clinics in most health care systems are still wedded to the traditional routine of seeing patients on a regular basis every 3, 6, 9, 12 or 18 months. Although a cherished institution, there is no evidence to attest to the effectiveness or cost-effectiveness of such routine outpatient care for chronic conditions. These routine visits are often provided ‘just in case’ a problem arises.

All too often patients deteriorate sometime before or after the regular clinic appointment. A more logical approach to the management of patients with chronic diseases is to see them when a problem is emerging, or ‘just in time’ rather than ‘just in case’. CCHT does this by re-engineering services based on this premise that clinic, or other staff can co-ordinate the care of a proportion of patients instead of seeing them regularly in the clinic. CCHT therefore operates like an air traffic control system by managing patients with chronic diseases who are at risk of deteriorating and essentially placing them in a ‘holding pattern’ from which they are brought to clinic when it is appropriate and necessary. CCHT programmes are working closely with VA’s Advanced Clinic Access programmes (Schall et al 2004) to rationalise the management of clinic care for patients with chronic conditions.

In organising the way in which patients with chronic conditions are managed in outpatient clinics, CCHT does not regard the patient as a passive recipient of care. The active participation of the patient and the caregiver in self-managing care is critical to the success of CCHT. The role of the care coordinator is not to direct patients in a manner akin to directing traffic across the continuum of care. Care coordinators actively work with patients to help them understand their symptoms, acquire relevant knowledge and adjust behaviours to reduce the risk of their condition deteriorating.

4 THE VETERAN’S HEALTH ADMINISTRATION: THE MANAGEMENT OF CHRONIC CONDITIONS USING CARE CO-ORDINATION AND HOME TELEHEALTH
Although CCHT patients in VA are typically managed for a primary condition such as diabetes or heart failure, 30 per cent of these veteran patients have multiple co-morbidities. CCHT services therefore supplement existing health care services and support patients with chronic conditions across the continuum of care.

CCHT programmes recognise that moving the care of patients with chronic conditions into the home places a burden on the caregiver in the home. VA routinely assesses caregiver support when enrolling veteran patients into a CCHT programme. Many CCHT are frail and elderly and need help with activities of daily living. VHA plans to systematically assess caregiver support in patients receiving CCHT with the intent of evaluating whether the caregiver plays the significant determinant of patient outcomes in CCHT programmes that the programmes postulate they are doing. VHA cannot provide services to caregivers but is able to help link caregivers with other local services provided by the voluntary sector, local government, states and the federal government.

Environment and political context

The profile of VHA’s patient population and their health care needs is a forerunner for the upcoming consequences of an ageing population on health care delivery to the general population. In the general population the number of elderly is increasing (US Bureau of Census 2001) by 1.5 per cent annually with a 2.2 per cent rise in both the over 65s and over 85s.

In contrast the number of veterans aged 85 and over is anticipated to grow by 100 per cent between 2000 and 2020 with a peak of 1.3 million in 2012. The total number of veterans age 65 or over peaked at 10 million in 2000 and is reducing due primarily to the mortality of World War II and Korean Conflict veterans. In 2013 there will be another peak in the over 65s to 9.2 million because of the ageing of the Vietnam era veterans.

By law VA is required to provide nursing home care for all veterans with a mandatory entitlement (Veterans Millennium Health Care and Benefits Act 1999). However, in the general population rates of nursing home usage are diminishing by 0.7 per cent annually with lower bed occupancy (National Centre for Health Statistics 2001). Veteran patients are expressing a preference to remain living in their own homes, when possible.

VA has developed a long-term care (LTC) demand model to project future veteran patient demand for nursing home and home and community-based care from now until the mid-2020s.

The actuarial data supporting the LTC demand model includes functional status and utilisation of LTC services by veterans from national such as the National Long-Term Care Survey (Duke University/National Institute on Aging 2004) and VHA’s Survey of Enrollees (2003). Utilisation rates are then applied to the enrolled population stratified by gender, age, priority, disability, and marital status to determine demand for both nursing home care and community based care. The model accounts for variations in veteran patient’s use of VA LTC resources caused by variables that include distance, multiple eligibilities (Medicare and Medicaid), case management practices, and VA capacity. However, other factors that include reconfigurations of health care services, changes in health-related behaviours, use of assistive aids, improved socioeconomic status, different expressions of diseases, increases in levels of social support and disability reductions (Waidmann and Liu 2000, Cutler 2001, Allaire et al 1999) make future long-term care projections uncertain (Singer and Manton 1998). The provision of LTC to eligible veterans is a major issue for congress and veterans service organisations.

VHA seeks to provide long-term care services to veteran patients in the least restrictive setting, compatible with the individual’s medical condition and personal circumstances, and to provide this, whenever possible in home and community-based non-institutional settings. This philosophy honours veterans’ preferences for care at the end of life and helps to maintain ties with the veteran’s family, friends and spiritual community. Nursing home care is seen as appropriate for situations in which the veteran can no longer be maintained safely at home. In adopting this patient-centred approach to LTC, VA has expanded its LTC non-institutional services by more than 20 per cent in fiscal years 2004 and 2005, and plans to do so by an additional 18 per cent increase in fiscal year 2006. CCHT is a major component of VHA’s non-institutional care strategy and has required VHA to redefine the location of care.

Implementing home telehealth to support elders living independently in their homes or in assisted living facilities instead of institutional care settings requires more than technology to meet the complex care needs of this population (Joint National Committee on Prevention 1997, Clark et al 2000). The Institute of Medicine (2001)
considers current care delivery systems inadequate to deal with a rising prevalence of people with chronic diseases because of poor co-ordination of care and reluctance to implement new information technologies.

Another important trend considered in developing CCHT is the mounting pressure from patients and their immediate caregivers for more involvement in health care decisions that affect them. Advocacy groups are concerned about LTC and want people with disabilities to be more involved in how services are configured (Noelker and Harel 2000, Wunderlich and Kolder 2001). Such consumer demands, coupled with evidence that elderly patients with cognitive deficits can express their preferences (Feinberg and Whittlatch 2000) for treatment is prompting programmes in some US states to reconfigure how they provide long-term care services towards models of independent living (DeJong et al 1992). This trend was further encouraged by how the 1999 Supreme Court ruling in L.C. & E.W. vs. Olmstead interpreted the Americans with Disabilities Act (ADA) to mean that states must provide services in the most integrated setting appropriate to the needs of qualified individuals with disabilities. Independent living models challenge the usual way investment decisions between health care sectors are made (Feder et al 2000). A consumer focus in health care highlights schisms between need, want and demand (Stevens and Gabbay 1991). The way practitioners usually assess health needs of patients creates inconsistent variations for example in decisions made about where patients should die (Pritchard et al 1998). When practitioners gauge the preferences of their patients in a paternalistic way it can encourage supplier-induced demand (Labelle et al 1994). The multiplicity of clinical and financial considerations that currently drives the long-term care sector confounds efforts to introduce a more patient-focused orientation to delivering these services and perpetuates the fragmentation of care. As an integrated care delivery system VHA is able to make changes that are more challenging to achieve elsewhere.

Patients want to be involved in choices about their care (Fowler et al 1995) but the operational realisation of this is complicated (Kane et al 1999), for example, when physicians frequently misinterpret their patient’s preferences (Heyland et al 2003) over end-of-life issues. An environment of evidence-based practice that gives patients access to relevant information helps them manage uncertainty and fosters shared decision-making. Evidence of clinical effectiveness is a negotiable currency that patient and practitioner can use when the decision-making process is shared. Evidence-based care should mean that decisions affecting patients are made according due weight to all valid and relevant information (Hicks 2003) and is conducive to shared decision-making. It also focuses attention on systems of care and how their component processes are co-ordinated across a wider continuum. Self-management based upon these principles is therefore an important component of CCHT in VHA.

Studies of medical errors show that health care systems fail at multiple points rather than from a fault in any one part (Leape 1994, Denison and Pierce 2003). A systems approach was taken to designing VHA’s CCHT programme so that the non-institutional LTC services it provides incorporates patient preferences, assesses patient’s health care needs and ensures the safe and efficient provision of care for chronic diseases.

The combination of a computerised patient record and performance measures means that now VHA outperforms the private US health care sector in 18 major indices of health care quality (Perlin et al 2005). CCHT programmes in the 21 VISNs are subject to both performance measures and monitors in VHA. VISNs have targets for non-institutional care in terms of the average daily census (ADC). CCHT meant that 12 of 21 VISNs met this measure in fiscal year 2005. VISNs have been set targets of patient numbers to be managed via CCHT.

Although VHA purchases some elements of community-based care for patients with chronic disease, CCHT is at the leading edge of health care development and VHA’s health informatics means that this is a programme that is currently only provided in-house for veteran patients.

The CCHT patients are subject to all the other quality measures for veteran patients (US Department of Veterans Affairs, 2007). Current performance measures include performing the short form (SF) 12 and patient satisfaction. Next year the performance measure will require reductions in utilisation but this year the performance measure relates to developing the data congruence upon which next year’s measure will depend.
**Financial arrangements**

Incorporating new programmes into mainstream health care funding is a major challenge in all health care systems, including VHA.

The direct costs associated with CCHT are in-home equipment costs, clinical care costs, administrative costs and information technology infrastructure costs. The implementation of CCHT in 2003 included a strategy for long-term funding of these various elements.

The in-home equipment costs for were initially met by providing seed funding for each VISN CCHT programme sufficient to purchase equipment to manage the first 1,000 patients. The home telehealth equipment is purchased through national contracts that have enabled VHA to stipulate health level seven (HL-7) standards and thereby standardise the technology platforms and bulk purchase at a reduced price.

The clinical staffing cost for CCHT in each VISN has been met by redeployment of existing staff and not new recruitment. The care coordinators who manage the care of CCHT patients link with interdisciplinary teams in primary care and use VA’s Advanced Clinic Access processes to refer patients for specialty care. The computerised patient record is a mechanism for communication and continuity of care across those involved in the care of the patient. There is no current procedural terminology coding system to bill for telehealth. VHA’s CCHT use appropriate external coding systems. VHA has an internal coding system for cost-accounting processes – the Veterans Equitable Resource Allocation system (VERA) (US Department of Veterans Affairs 2001). VERA allocates most of the congressional appropriation to VHA for health care – to the 21 regional networks (VISNs) nationwide.

VERA presents VISNs with economic incentive to increase the number of cases treated (workload) while minimising the costs per case. However, unlike allocations determined by other government and private-sector capitation arrangements, the total allocation to VISNs is capped by the amount of the annual congressional appropriation. As a result, the VISNs compete for VERA funds in what is essentially a zero-sum game, and if the growth rate of the total annual appropriation falls short of the growth in workload, then per-patient resource allocations decreases over time.

**Quality improvement**

VHA has introduced CCHT in a systematic fashion. Clinical processes have been standardised and conform to disease-specific guidelines in VHA (for example, for diabetes, chronic heart failure etc). To ensure that CCHT programmes are introduced in a rigorous and comprehensive way, VHA has introduced an internal accreditation programme for CCHT programmes which are called ‘conditions to participate’. This process is akin to the process the Joint Commission for the Accreditation of Health Care Organizations (JCAHO, http://www.jointcommission.org/) uses to review health care facilities. Home telehealth is an emerging technology that does not have formal external accreditation processes established.

VHA has established a comprehensive coding system for CCHT with the electronic registration of patients onto the data systems using HL-7. Formal outcomes measurement processes have been developed that use a data cube that provides routine data for all patients on:

- utilisation (for example bed days of care, emergency room visits etc)
- disease-specific (for example, glycosalated haemoglobin)
- quality of life (short form 12)
- patient satisfaction.

CCHT patients have to meet the normal quality assurance processes in VHA. CCHT patients have improved immunisation rates 60 per cent to over 90 per cent in hard-to-reach patients with mental health problems. CCHT programmes require signed, informed consent from patients for the delivery of this routine clinical care service.
Role of health care professionals

CCHT involves an interdisciplinary approach. Those coordinating the care are typically specialist nurses or social workers because resolving issues across the continuum of care often involve bio-psychosocial issues. Care coordinators can come from many professions.

Physician input is at the local programatic level where they are responsible for the programmes and referrals. Physicians are also involved in the management of CCHT programmes at the VISN level and in the development of the disease management dialogues that support patient management.

Often in new projects training of staff is not considered. When the CCHT programme was implemented, a national CCHT training centre was established in Lake City, Florida. A web-based curriculum was established with certification from the University of Florida. Since the centre became operational in January 2004 over 2,000 staff have been trained in CCHT by a combination of face-to-face and distance learning methods.

CCHT in VHA has established links with the Joint Commission for the Accreditation of Health Care Organizations (JCAHO), the Agency for Health Care Research and Quality, national care and case management organisations and disease management organisations.

Each VISN has a lead for CCHT and a lead for data integrity issues related to coding, research and outcomes. The leads meet bi-monthly and the strategic direction of the programme is developed with input from this group. Details of the strategic plan for CCHT in VHA are available at www.va.gov/occ.

Communications/IT and data analysis support for the service

Information is shared between providers using VHA’s computerised patient information system. Standardisation of data elements from the home telehealth systems means these data are available on a computerised patient record. Effectively VHA is developing a continuous, computerised patient record that receives information from the patient at home as well as the traditional episodic data that are collected when a patient is in hospital or seen in the outpatient clinic. Figure 2 in Attachment 1 shows the view of the CCHT vital sign data on a computerised patient record.

Figure 3 in Attachment 1 shows the processes whereby a physician electronically enrolls a patient for CCHT. VHA is developing a clinical reminder to flag-up patients who should be considered eligible for CCHT based upon routine utilisation and disease-specific data. Patients are automatically registered on the vendor systems and the VHA data systems.

Figure 4 in Attachment 1 illustrates the national telecommunications infrastructure VHA has developed to support CCHT and the ability to monitor bottle necks in data transmission.

Outputs and evaluation of outcomes

CCHT data that contains vital signs, disease management monitoring and patient questionnaires are in the process of being electronically linked with the new VHA Health Data Repository (see Figure 3 Attachment 1). This will provide outcomes data for CCHT patients that link with all other VHA data sources.

A list of outcome measures that will be collected as routine data via the data cube are shown in Attachment 2.

CCHT programmes are being studied as part of VHA Health Services Research and Development Funded Studies and results.
Preliminary results

Overall studies of CCHT

These have shown reductions in hospitalisations, 30 per cent fewer emergency room use, and a 30 per cent reduction in the average number of bed days of care, and improvements with respect to health-related quality of life (Chumbler et al 2005) and benefits in terms of satisfaction (Wakefield et al 2004), utilisation (Huddleston and Kobb 2004, Chumbler et al 2004), clinical outcomes and cost.

CCHT contribution to meeting of performance measures:

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Percentage</th>
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<tr>
<td>Medication adherence</td>
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<tr>
<td>Hypertension systolic blood pressure less than 130</td>
<td>75%</td>
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<tr>
<td>Diastolic blood pressure less than 80</td>
<td>less than 91%</td>
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<tr>
<td>Diabetes mellitus glycaemic control HgBA1c value</td>
<td>less than 91%</td>
</tr>
<tr>
<td>Patients with chronic heart failure prescribed ACEI or beta-blockers</td>
<td>97%</td>
</tr>
</tbody>
</table>

Outcomes analyses

Hypertension

- Overall for those at moderate-risk (141–160) and (81–95) there was a reduction with CCHT compared with usual care
- 62 per cent greater reduction in systolic values with CCHT (p = 0.015)
- 38 per cent greater reduction in diastolic values with CCHT (p = 0.050)

Diabetes

- 50 per cent reduction in likelihood of hospitalisation with CCHT (p < 0.001)
- Hospital bed days of care reduced by an average of 3.1 days with CCHT (p < 0.0001)
- 11 per cent reduction in likelihood of visiting an emergency room with CCHT (p = 0.04)
- An regression analysis comparing CCHT with the usual care group found that the CCHT had significantly lower A1c values at six months
- The average 6-month change among CCHT enrollees with diabetes showed a significant mean decrease (change = –1.36, p<0.0001)

Figure 1: Quality of life measures of CCHT patients before enrolment and six months after enrolment

Patient satisfaction

From telephone administered questionnaire = 92 per cent.
Figure 2: CCHT Vital Sign Data viewed on VHA’s computerized patient record

<table>
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<tr>
<th>Date</th>
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1. VA staff requests patient be considered for enrollment by sending VistA consult.
2. Care Coordinator completes the VistA consultation and registers patient:
   a) Care Coordinator initiates registration of patient from Home Telehealth service using VistA.
   b) VistA sends HL7 sign-up message with patient identification to vendor system.
   c) Vendor subscribes for MPI updates thru the interface engine.
   d) Vendor confirms registration back to VistA.
3. Care Coordinator links device with patient record and arranges to have device installed in the patient's home.
4. The patient uses the in-home device to capture vital signs and respond to any questions.
5. Device exchanges information with vendor, normally once per day.
6. Vendor sends measurement data to the Health Data Repository (HDR) via the Interface Engine using HL7.
7. Using Vendor Viewer, Care Coordinator logs into vendor system to review patient information.
8. Care Provider and Care Coordinator can review Home Telehealth and VistA information in VA Viewer.

May 2005
Figure 4: The telecommunications infrastructure to support CCHT in VHA and the presentation of network transmission status
Attachment 2.

CCHT outcomes measures

Routine Outcomes Reports for CCHT will be implemented in several phases towards the end of fiscal year 2006 and will include the following variables to review in the CCHT patient populations: Demographics, Utilization Measures, Clinical Measures and Patient Satisfaction.

Demographic information
- Age
- Sex
- Race
- Active illnesses at enrollment
- Caregiver status
- Date of enrollment in CC/HT program
- Date of discharge from CC/HT program

Utilisation
- Admissions to inpatient care (for any cause)
- Bed days of Care
- Readmission rate (within 30 days of discharge)
- Nursing home bed days of care
- ED visits
- PCC provider visits
- Specialty clinic visits
- Skilled home care visits
- Outpatient prescriptions
- CC/HT compliance
- Total cost of care

Clinical
- ACE inhibitor Rx (for CHF diagnosis)
- Beta-blocker Rx (for CHF diagnosis)
- Diuretic Rx (for CHF diagnosis)
- Lipid Rx (for diabetes diagnosis)
- Anti-hypertension Rx (for hypertension diagnosis)
- Anti-glycemic Rx (for diabetes diagnosis)
- Inhaler Rx (for COPD diagnosis)
- Weight (for CHF and DM diagnosis)
- BMI
- Blood pressure (for hypertension and diabetes diagnosis)
- HgbA1c (for diabetes diagnosis)
- LDL (for CHF and diabetes diagnosis)
- PFT (for COPD diagnosis)
- Home O2 (for COPD diagnosis)
- Mortality
- Influenza vaccination
- Pneumonia vaccination
- Eye exam (for diabetes diagnosis)
References


Noelker NS, Harel Z eds (2000). *Quality of Life and Quality of Care in Long-Term Care*. New York: Springer.


US Bureau of the Census (2001). ‘Projections of the total resident population by 5-year age groups, race and Hispanic origin with special age categories.’ *Middle Series, 1999 to 2100* (Table NP-T4).


