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ORIGINAL RESEARCH

The Care Coordination Home Telehealth (CCHT) rural demonstration project: a symptom-based approach for serving older veterans in remote geographical settings

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ABSTRACT

Introduction: Innovative healthcare delivery strategies are needed to address the healthcare needs of the 3.5 million older veterans living in US rural areas who face unique healthcare delivery challenges, including transportation barriers, poverty, and limited access to health professions and community-based programs. The care coordination home telehealth (CCHT) rural demonstration project was developed to address the mismatch between the timely identification of patient needs and the care delivered by the traditional disease-oriented institutionally-based healthcare delivery system for older rural veterans. The specific objectives were to: (1) serve as a facilitator of primary care; and (2) provide a portfolio of geriatric care management options to increase early detection of symptoms and to encourage adherence to care plans.

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Methods: Participants were recruited based on patterns of high outpatient, inpatient, and emergency care visits; 132 rural older veterans were enrolled. The CCHT applied care management principles to the delivery of healthcare services and used health informatics to facilitate access to evidence-based care. The CCHT's essential components, which were tailored to optimize remote access, included a face-to-face orientation, telephone contact with a designated care coordinator, and daily monitoring sessions using an in-home telehealth device to assess participants' medication usage, compliance, and symptoms, and to provide patient education.

Results: One hundred eleven participants successfully installed and connected the telehealth monitoring device in their homes without hands-on assistance, monitored complex medical and psychiatric symptoms, and reported medication compliance remotely. Of the 93 participants who used the device for more than 10 sessions, 88 reported they did not have any difficulty using the device, 86 reported they were satisfied or very satisfied with the device, 73 reported they were likely to continue using the device, and 46 reported improved communication between themselves and their primary healthcare provider.

Conclusion: Initial utilization and satisfaction evaluation data from this project supports the feasibility of employing a CCHT approach to serve medically-complicated older veterans in rural settings. This approach could also serve as a template for addressing a greater range of healthcare needs among other populations in hard-to-reach settings.

Key words: care coordination, chronic illness, rural health care, telehealth, veterans.

Introduction

Innovative healthcare delivery strategies are needed to address the physical and mental health needs of the growing numbers of older adults who live in rural and frontier areas where the population density can be as low as 6 persons per mile^2 (1.6 km^2)[1]. Older persons in these geographically removed regions experience unique healthcare delivery challenges including: (i) transportation barriers; (ii) poverty; and (iii) limited access to health professions and community-based programs[2-5]. The issues facing older rural adults become even more difficult when health problems in later life are compounded by circumstances that require a substantial outlay of emotional resources. For example, when older adults in rural settings develop Alzheimer's disease or other serious mental health conditions and family members take on caregiving responsibilities, they do so with little to no access to formal supports[6].

These issues have particular significance for the 3.5 million older veterans who live in rural contexts. In 2004, the National Alliance for Caregiving reported that 20% of rural care recipients and nearly 15% of rural caregivers were veterans and, of these, most lived in poverty[7]. Studies have also documented that older rural veterans have more physical health comorbidities than non-veterans[8] and that their healthcare needs have not been adequately met[9]. In addition, although many older veterans are entitled to service-connected healthcare benefits, those who live in remote regions may not utilize services because of the limitations noted above (eg inability to travel to Veterans Affairs [VA] facilities to receive health care).

The recent passage of the *Rural Veterans Care Act 2006*, which is focused on improving health care for all rural veterans[9], reinforces what the VA has explicitly acknowledged for several years – that building more hospitals and clinics will not adequately address the special needs of older rural veterans. While the VA has systematically encouraged the development of non-traditional approaches to care for these older rural veterans, Shay has been more specific in identifying the VA Geriatric Research, Education and Clinical Centers (GRECCs) as a

source of 'front-line' innovation for addressing the needs of older veterans in hard-to-reach settings[10]. The care coordination home telehealth (CCHT) rural demonstration project launched by the VA Salt Lake City Health Care System (VASLCHCS) GRECC-initiated telehealth work group, which is composed of applied clinicians, researchers, and students who span nursing, psychiatry, social work, psychology, and geriatric medicine, represents a direct response to the call for relevant innovative interventions.

Methods

Conceptual framework

The CCHT rural demonstration project was based on two concepts that have impacted the nature and scope of care provision for geographically hard-to-reach populations in the 21st Century—patient-centered care and telehealth.

Patient-centered care: Patient-centered care is based on a best-practice approach to care delivery that considers not only the diagnosis and treatment of disease, but also the quality of the patient–clinician relationship, including direct patient access to the provider. This closed system of informal service provision emphasizes continuity of care across presenting problems, even when the primary care provider does not have the personal expertise to diagnose and treat a particular disorder. The continuity of care model is captured in the 4 domains proposed by Bergeson and Dean[11]:

1. Ready access to one's care provider via healthcare navigators.
2. Encouraging patient participation in the care process by making it easier to voice concerns and actively shape the design of care.
3. Patient support for self-management efforts.
4. Establishment of an efficient mechanism for coordinating care as the patient's symptoms change due to disease progression, new disease presentation and/or aging.

Telehealth: The authors' view of telehealth's overarching aim is to maximize access to hard-to-reach populations, such as older rural veterans, who might not otherwise seek care. While early forms of telehealth focused on replicating clinic-based care using telecommunications to provide medical information and services[12], over the past 25-30 years, telehealth technologies have expanded to include an array of communication media and tools that are used by a large number of medical specialties. Today, telehealth encompasses many healthcare tasks (eg administrative functions, providing education, direct healthcare demonstration projects, and communication with patients) completed through telecommunications technology[13].

Despite telehealth's growing popularity, Glueckauf recently noted that randomized controlled trials are limited in number and cautioned that 'the efficacy and cost-effectiveness of telehealth in meeting the healthcare needs…of older adults with chronic illnesses' is still in question(p.2)[14]. Nevertheless, recent developments in this area are promising. For example, with the advent of supportive technologies, telehealth applications for home care patients have led to lower use of inpatient and outpatient care[15], and early evidence suggests that older adults who have participated in telehealth interventions have been satisfied[16]. Telehealth interventions have also been effective for cardiovascular care[17], and pilot studies have shown potential for stroke rehabilitation[18] and hospice care[19]. Another example is the modification of traditional mental health treatment so that it can be delivered over the telephone with outcomes that are as efficacious as in-person psychotherapy[20].

A critical feature that has not been systematically explored is the role of personal contact to provide instrumental assistance to implement telehealth technology in the homes of older veterans who have had little or no experience with advanced technology. The CCHT rural demonstration project provided an implementation model to explore this feature.

Care Coordination Home Telehealth Rural Demonstration Project

Goals: Based on the conceptual framework discussed above, and funded by the VA at the national and regional level, the VASLCHCS GRECC-initiated telehealth work group designed and implemented the CCHT rural demonstration project. An integrated, electronically-interactive care coordinator/navigator system was envisioned that could address the mismatch that commonly occurs in remote geographic areas between the timely identification of patient symptoms and needs and the care delivered by the traditional healthcare delivery system. Built on a model of high utilization and early symptom detection, CCHT applied care management principles to the delivery of healthcare services and used health informatics to facilitate access to evidence-based care. The specific objectives of CCHT were to: (i) serve as a facilitator of primary care; and (ii) provide a portfolio of geriatric care management options in order to increase early detection of symptoms and to encourage adherence to care plans. An important aspect of CCHT was to identify symptoms and problematic behaviors that worked against a participant's ability to remain functionally independent and comfortable at home. This approach was a departure from the traditional disease-based model of care which typically addresses one diagnosis at a time and does not consider symptoms outside the criteria for the identified ailment. Additionally, disease-based care focuses on the illness as a problem requiring a provider initiated treatment – rather than on a collaborative, strengths based, model of health – and responds to identified problems, rather than preventative health promotion during periods free from disease. Institutional review for the protection of human subjects was requested from the University of Utah Institutional Review Board and the VA Research and Development Committee and the project was determined to be exempt.

Components of Care Coordination Home Telehealth: The CCHT demonstration project included the following components: (i) participant recruitment; (ii) a face-to-face group orientation enrollment meeting; and (iii) a personalized post-enrollment care coordination home telehealth intervention delivered by licensed healthcare professionals (advanced practice nurses and social workers).

Participant recruitment Because the CCHT demonstration project was based on a model of high utilization, the authors worked with Information Resources Management to create a database of older veterans living in rural settings from the VA's Computerized Patient Record System using the following selection criteria: use of 4 or more active prescription medications; age 65 years or older; and patterns of high utilization of healthcare services over the past year including more than one hospitalization or emergency room visit, and/or more than 2 primary care visits.

Veterans who met the criteria were mailed an invitation letter summarizing the project and were invited to phone in if they desired more information. Support staff provided a brief telephone orientation that incorporated standardized responses to anticipated questions, including that the project was available at no cost to the participant, technical or computer knowledge was not needed to participate, and enrollment in the project would not affect VA benefits. If callers had additional questions, staff recorded their requests and the care coordinator responded within 24 hours. Interested veterans were invited to attend one of the face-to-face group meetings facilitated by the CCHT care coordinator. They were also told they could meet with the care coordinator privately; however, none selected this option. Every attempt was made to meet with veterans at times convenient for them. Veterans were instructed to bring all prescription and over-the-counter medications, including those provided by non-VA sources to the meeting. Family members were also encouraged to attend.

Group orientation enrollment meeting Enrollment in the project occurred by means of a 2 hour face-to-face group orientation. Groups accommodated up to six veterans and any family members who chose to attend. The small size permitted an interactive approach that engaged veterans in raising concerns related to their overall VA care experience, as well as the CCHT project. The social nature of the

meeting encouraged sharing of military-related experiences and fostered a sense of camaraderie common in the veteran population.

The CCHT care coordinator initially welcomed participants, collected comprehensive baseline information (ie psycho-social history, caregiver contact information, preferred method of learning, functional status, assistive devices for ambulation and medication administration, nutrition, sleep, preventive care, home safety, and personal healthcare goals), and described the project. The care coordinator then discussed selection criteria and expectations for participation, along with the supports and services that the project would provide, and reassured participants that this project was not intended to replace their relationship with the primary care provider but to enhance it.

The care coordinator also introduced the telehealth monitoring device, explained its function, and gave each participant a device. The device was about the size of a telephone answering machine, with a 3 x 6 inch LCD screen that displayed questions and educational content. Participants entered information in response to the content displayed on the LCD screen by pressing one of 4 buttons on the device that corresponded to a multiple choice response set appearing on the bottom of the screen. In addition, peripheral medical devices to measure blood pressure and weight were attached to the monitoring device via a cable attached to a USB port. The care coordinator demonstrated how to connect the device to a telephone, and participants practiced connecting the device to outlets made available for this purpose. The care coordinator observed the process and noted who had difficulty, paying particular attention to dexterity, comprehension, and vision and hearing difficulties. Most participants were able to set up the device with very little aid. Those who required additional assistance were provided this at the meeting and were instructed to call the care coordinator when they got home so she could assist them over the phone.

All participants needed to install the required equipment into their homes after the enrollment meeting because no home visits were made by the CCHT team for this purpose. Many of the participants and their family caregivers indicated that they were not technologically sophisticated and voiced concerns about managing the telehealth device alone. However, after the care coordinator used the device to transmit a variety of health-related questions, participants were reassured and typically chose to participate. Near the end of the meeting, participants received a take-home packet with contact information for the CCHT care coordinator, available resources, and the phone number for the 24 hour triage-nurse line along with instructions to phone 911 (the US emergency number) in emergencies. The care coordinator gave participants a portable medication administration box as well as instructions on using it. The box had individual sections for each day of the week and up to 4 times daily dosing compartments large enough to hold several pills. In addition, the care coordinator recorded each participant's medications and asked about how medications were taken, including frequencies, dosage, correspondence with meals, and proper storage. The orientation concluded with a lengthy question-and-answer period. Many of the questions asked were related to medications, and entitlements and benefits available through the VA. Veterans also used this time to talk about their experience with the VASLCHCS.

Personalized post-enrollment intervention Post-enrollment, the CCHT care coordinator's role was geared toward helping each participant to identify and achieve his or her unique healthcare goals and to maintain safe and functional independence. The care coordinator's first post-enrollment activity was to establish a baseline of behavior and preferences for each participant. Information included the participant's self-reported history of living situation, medical history, functional status, caregiver information, home safety evaluation, other non-VA providers seen, and personal health goals. All prescription and over-the-counter medications (including herbal supplements, vitamins, and naturopathic medications provided by pharmacies and providers, internal and external to the VA), were documented in each participant's electronic medical record. These medications were compared with medication lists

brought to the enrollment meeting by the participants and discrepancies were addressed.

The care coordinator worked with each participant to develop an individualized plan of care based on the participant's healthcare goals, and alerted the primary care provider to this plan. Needed services were identified, including but not limited to pharmacy for medication review; occupational and/or physical therapy for adaptive equipment and mobility support; and social work for financial assistance, establishing power of attorney, advance directives and referrals to community resources (eg transportation, meals, housekeeping assistance, support groups). Participants with complex medication regimens or restrictions were often referred to a dietician to help them with meal planning.

The care coordinator employed the telehealth device in daily monitoring sessions to assess participants' medication usage, compliance, and symptoms and to display educational modules to reinforce appropriate medication use and self-management. Participants responded to the health queries on the device every day from their homes, thus the care coordinator was able to identify trends in their responses. Responses were reviewed daily on a secured web site and participants who did not respond each day were immediately contacted, as were those whose responses to questions were triaged by the CCHT team as high risk. The care coordinator consulted with the primary care provider and other healthcare providers to address high risk issues and to facilitate patient-centered care planning throughout the intervention. Participants with the most active acute symptoms and/or exacerbations of chronic conditions received the most personal attention from the care coordinator, including repeat personal phone consultations.

Polypharmacy was a major issue for these frail older veterans; therefore, issues surrounding medication use and symptom management became a major focus of preventive education[21]. In addition to reminders to take medications, educational messages also included descriptions of the benefits of prevention activities to prevent inappropriate medication use. Formally-validated instruments specific to drug use such as blood pressure monitoring (for heart drugs) and standardized health surveys (for other medications) were also administered. The CCHT team reached consensus about the frequency with which specific messages would be delivered, and the protocols and thresholds for triaging response patterns that characterized patients as high, medium, or low risk. In order to maintain patient interest and reinforce program adherence, the team included a series of health-related trivia questions that participants responded to, followed by a reinforcement message.

Results

Participants

These participants were recruited based on rural residence and patterns of high outpatient, inpatient, and emergency care visits. Participants selected under these criteria included veterans with multiple chronic diseases and polypharmacy issues and veterans with multiple emergency care visits and/or hospitalizations, but few outpatient visits. One hundred and thirty-two veterans receiving care through the VASLCHCS were enrolled in the CCHT demonstration project. Participant characteristics are summarized (Table 1).

Progress to date

One hundred eleven participants (84%) successfully installed the monitoring device without additional hands-on assistance (verified by an obligatory contact with the CCHT team once the participant's device was installed). Participant disenrollment occurred for a number of reasons, and as summarized (Table 2), a relatively large number dropped out prior to the tenth monitoring session. Frequency of dropout was less for those who continued past the tenth session. Ninety-three participants (70%) who continued past the tenth session completed a satisfaction survey (Table 3), reporting high satisfaction with the CCHT monitoring device.

Table 1: Baseline participant characteristics

Characteristic	*N* (%)†
Age (years)	
<50	1 (0.76)
50-59	16 (12.1)
60-69	20 (15.2)
70-79	50 (37.9)
80-89	44 (33.3)
90-99	1 (0.76)
Sex: male	120 (90.9)
Race: Caucasian	128 (97)
Service era	
World War II	53 (40.2)
Korea	32 (24.2)
Post-Korea	10 (7.6)
Vietnam	30 (22.7)
Post-Vietnam	1 (0.76)
Persian Gulf	4 (3.0)
Other	2 (1.5)
Distance from VA (miles)††	
1-100	83 (62.9)
101-200	18 (13.6)
201-300	26 (19.7)
301-400	2 (1.5)
>400	3 (2.3)
Active medications	
0	12 (9.1)
1-10	22 (16.7)
11-20	53 (40.2)
21-30	26 (19.7)
31-40	14 (10.6)
≥41	5 (3.8)
Primary care physician visits past year	
0	35 (26.5)
1-10	83 (62.9)
11-20	8 (6.1)
≥21	5 (3.8)
No Shows in past year	
0	38 (28.8)
1	32 (24.2)
≥2	62 (47.0)
Emergency room visits past year	
0	54 (40.9)
1-10	68 (51.5)
11-20	8 (6.1)
≥21	2 (1.5)
Hospital admissions past year	
0	77 (58.3)
1	28 (21.2)
≥2	27 (20.5)

VA, Veterans Affairs.
†*N* = 132. ††One mile = 1.609344 km.

Table 2: Participant disenrollment frequencies

Reason for disenrolling	No. sessions enrolled *n* (%)†		
	0–10 30 (22.7)	**11–100 21 (15.9)**	**>100 16 (12.1)**
Refused	23 (17.4)	11 (8.3)	4 (3)
Alternative treatment plan	4 (3)	4 (3)	3 (2.3)
Permanent placement	0	1 (0.8)	1 (0.8)
Moved out of area	0	2 (1.5)	1 (0.8)
Phone disconnected	2 (1.5)	0	2 (1.5)
Died	1 (0.8)	3 (2.3)	5 (3.8)

†*N* = 132.

Table 3: Participants' satisfaction with the Care Coordination Home Telehealth monitoring device

Question	Response	*N* (%)†
Has your experience using the telehealth monitoring device been	Positive	73 (79.3)
	Neutral	16 (17.4)
	Negative	3 (3.3)
Have you had any difficulty using the telehealth monitoring device?	Yes	5 (5.4)
	No	88 (94.6)
If needed, how likely are you to continue using the telehealth monitoring device in the future?	Very likely	64 (68.8)
	Likely	9 (9.7)
	Somewhat likely	14 (15.1)
	Not very likely	4 (4.3)
	Don't know	2 (2.2)
Overall, how satisfied are you with the telehealth monitoring device?	Very satisfied	46 (49.5)
	Satisfied	40 (43.0)
	Somewhat satisfied	3 (3.2)
	Not very satisfied	3 (3.2)
	Not at all satisfied	1 (1.1)
Overall, how would you rate the ease of using the telehealth monitoring device?	Very easy	72 (78.3)
	Easy	17 (18.5)
	Not very easy	1 (1.1)
	Difficult	2 (2.2)
Since using the telehealth monitoring device, how satisfied are you with the communication between you and your doctor or nurse?	More satisfied	46 (49.5)
	Less satisfied	7 (7.5)
	No difference	40 (43.0)

†*N* = 93.

Discussion

The CCHT project demonstrated that it is feasible to use a symptom-based approach, as opposed to a disease-based approach, when coordinating home telehealth care for medically-compromised older veterans in rural areas. Components contributing to the continued enrollment in the CCHT project appeared to be personal telephone contact with a designated care coordinator, a face-to-face orientation meeting, and technology that was relatively simple and straight-forward to understand and use. Because the CCHT team did not go into participants' homes to set up the technology, the face-to-face enrollment meeting with the care coordinator, in which participants' questions were answered and participants rehearsed the telehealth monitoring device set-up and response process, was critical. This meeting not only addressed problems expected to arise

in using the technology, but it was also designed to enhance participants' confidence in their ability to manipulate the device. Another objective of the meeting was to reinforce the CCHT team's availability to troubleshoot technology-related problems. As reported, 111 participants (84%) returned home and installed the monitoring device without additional hands-on assistance. Of those, a sizeable percentage employed the technology on a daily basis; for those who used the device beyond 10 sessions, satisfaction was high.

The CCHT project also demonstrated the importance of family caregivers in the lives of older rural veterans with severe physical and/or cognitive impairments. Although they were not the focus of the demonstration project, it was quickly apparent that family caregivers were instrumental in facilitating communication between the participant and the care coordinator and that they had additional needs specific to care-giving[22]. Therefore, consistent with Glueckauf and colleagues' statement that 'there is growing support for the efficacy of telehealth as a delivery system for skills-building interventions with dementia caregivers' (p. 38)[23], the authors are currently developing web-based educational and decisional content specifically for caregivers on a wide range of topics such as managing difficult behaviors, stress management for the caregiver, prioritization of activities, and respite resources that can be implemented in the home. The authors are also building in the capacity for participants and their caregivers to send messages directly to the care coordinators to ask specific questions not already addressed in the standardized content. In addition, because these families are located in rural areas, the website is being populating with community-specific resources.

Conclusion

At this early stage of CCHT, feasibility has been considered primarily in terms of whether older medically compromised rural veterans can – unaided and in their own homes – set up and connect telehealth equipment and monitor complex medication regimens and symptoms on a daily basis. On that basis, the evidence suggests this symptom-based telehealth intervention for older rural veterans may be a viable alternative to a traditional disease-oriented institutional-based model of health care. However, it is recognized that additional outcome data is needed to support the efficacy of CCHT. The relatively high dropout rate at program inception in spite of efforts to ensure system installation and connectivity needs further examination. Therefore, at present data from additional CCHT outcome measures related to disenrollment and utilization patterns are being collected and analyzed. These findings will enhance capacity to employ a CCHT approach to serve medically-complicated older veterans in remote geographic locations and to adapt it to address a greater range of healthcare needs among other populations in hard-to-reach settings.

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