Official Title: Randomized Trial to Test the "Coordinated Care for Health Promotion and Activities in Parkinson's Disease" Intervention in the Veterans Administration

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SPECIFIC AIMS

Over one million people in the US are estimated to have Parkinson's disease (PD), with nearly 60,000 new cases each year. PD is the second most common neurodegenerative disease, and over 40,000 veterans across VHA are diagnosed with it. PD is defined by motor impairments of tremor, bradykinesia, postural instability, and rigidity. However, disturbances in cognition, mood, sleep, and the autonomic nervous system – impairments that are often under-recognized and inadequately treated – can also severely affect quality of life for persons with PD.[1] Many evidence-based treatments exist to ameliorate or prevent the consequences of both the motor and non-motor effects of PD, but it is documented that these are significantly underutilized. This study will evaluate a strategy for increasing use of these treatments. We have designed a comprehensive, coordinated care management intervention, in which nurse specialists conduct structured assessments that have been previously pilot tested with veterans, and proactively identify problems and unmet needs, which then trigger protocols for delivery of evidence-based, coordinated PD treatment guidelines in concert with veterans' priorities, VA providers' expertise, and local community resources. The goals of this research study are to determine if a nurse-led, coordinated care management intervention improves quality of care for veterans with Parkinson's disease (PD), and to obtain cost and feasibility data necessary to guide subsequent dissemination and research on its spread throughout the Veterans Administration (VA), if proven effective in this trial.

Specific Aim #1 is to test this nurse-led, Chronic Care Model (CCM)-based PD care intervention, "Care Coordination for Health Promotion and Activities in Parkinson's Disease" (CHAPS"), by comparing with usual care - via a multi-site, randomized controlled trial (RCT) of veterans with PD seen at five VISN 22 Healthcare Systems (Greater Los Angeles, Las Vegas, Loma Linda, Long Beach, San Diego). Aim #1's primary study outcome is adherence to evidence-based practice guidelines that encompass both motor and non-motor manifestations of PD; secondary outcomes are veteran self-efficacy, health-related quality of life, and perceptions of PD care quality.

Our hypothesis is that this nurse-led, evidence-based, coordinated care management intervention will achieve: (a) higher adherence to PD quality indicators, and (b) better patient outcomes of health-related quality of life, patient self-efficacy and perceptions of care quality, relative to usual care over 18 months. To accomplish Specific Aim #1, veterans with PD will be recruited from Greater Los Angeles (GLA), Las Vegas, Loma Linda, Long Beach and San Diego Healthcare Systems, to achieve a target number of 300 enrolled and randomized in a 1:1 ratio to receive either the CHAPS care intervention, or care as usual (300 participants will be randomized equally into control and intervention groups, i.e. 150 in each group). Process measures and patient outcome data will be collected via structured telephone interviews with patients at baseline, 6, 12, and 18 months, and via abstraction of medical records. The first 204 participants will receive a 24-month survey to adjust for a 6-month delay in the project.

Specific Aim #2 is to (a) examine the extent of the nurse-led PD care management intervention implementation and factors associated with variations in degree of implementation, and (b) measure associated costs and cost offsets from the VA perspective, to provide regional and national VA leadership with data to guide decisions about the value of sustaining this PD care management intervention, and about feasibility of further dissemination within VA, if shown to be effective.

The hypothesis is that a process evaluation and a cost analysis will demonstrate that the intervention is feasible to implement and to sustain in terms of resource utilization. To achieve Specific Aim 2, three data collection methods will be used: (a) abstraction of data from: minutes of project meetings and staff satisfaction questionnaires of key staff including care managers and clinician champions on clinician position/role/responsibilities and impressions of and experiences with CHAPS, including suggestions for improvement, use of information systems, use of practice guidelines and templates, and

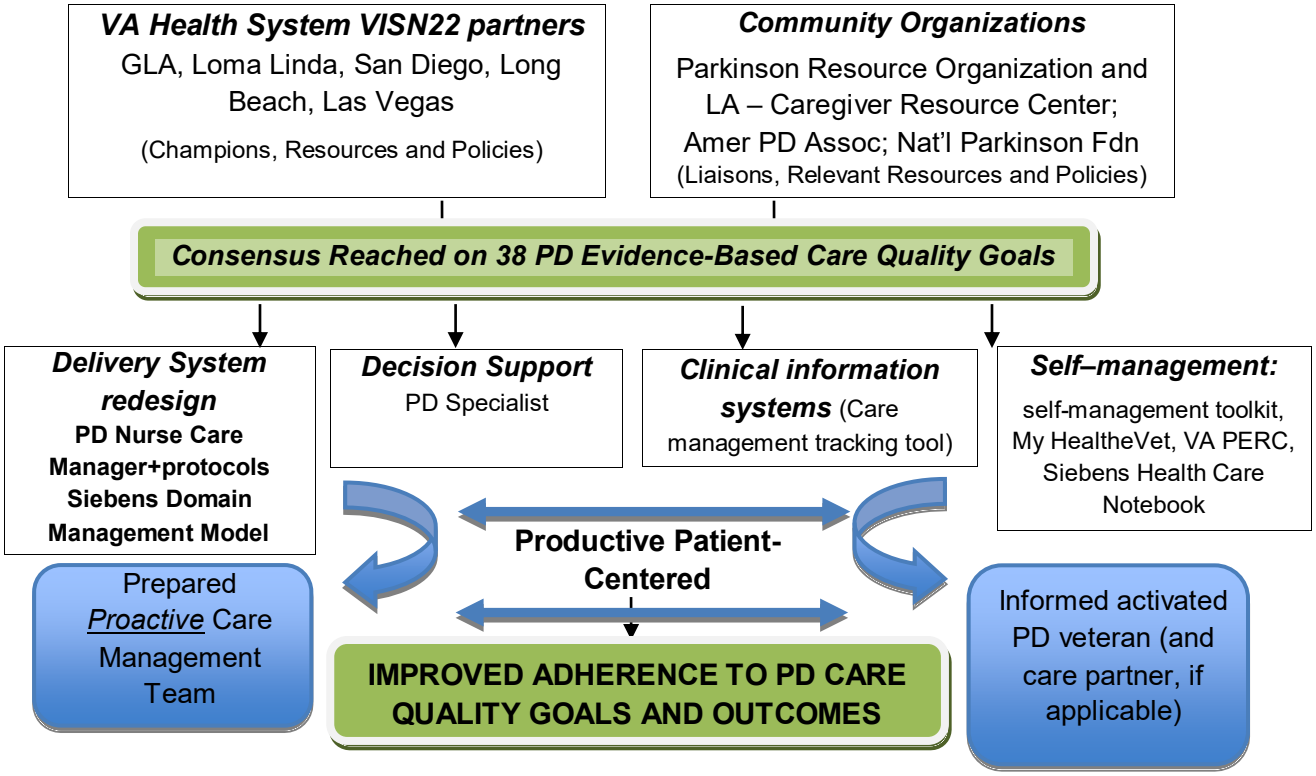
communication/coordination between and within organizations, (b) analysis of interview data with a randomly selected subset of study participants in the intervention arm (collected after the study follow-up period ends; at 18 month survey interview or 24 month for the first 204 enrollees); and (c) a cost assessment of the intervention (intervention program costs; cost offset of healthcare utilization for intervention arm relative to usual care), using data from VISN Data Warehouse, from the VA perspective.

Because of this research team's considerable experience in PD health services research, and previous care management implementation studies in dementia care; and championed by local and national VA and PD-advocacy groups; this team is well-positioned to conduct this randomized controlled trial (RCT) of a PD care management intervention. Study results will be used to inform future research including a larger RCT in multiple geographical locations, and policy decisions regarding care model adoption by the VA for future spread, both of which can be facilitated via the six VA Parkinson's Disease Research, Education, and Clinical Center (PADRECC) national network and the "National VA Parkinson's Disease Consortium."

BACKGROUND

Background – 1. Scientific Rationale. The care management intervention we plan to implement and test in this randomized controlled trial has been developed based on the Chronic Care Model (CCM).[2-4] The advantage of using this well-established model is that it focuses on multiple structural components of care that need to be in place to foster higher rates of evidence-based care processes, which in turn should achieve optimal health for individuals with chronic illnesses. The six CCM-components are illustrated in Figure 1 below and are (1) the health system, (2) community engagement and resources, (3) delivery system re-design, (4) self-management support, (5) decision support, and (6) clinical information systems. A central feature of the model we have developed is a *nurse care manager*, who will lead the execution and coordination of the care management activities to be carried out with veterans having PD.

Figure 1. Wagner's Chronic Care Model Used to Guide the VA PD Intervention Design



Delivery System Re-design: Rationale for Nurse Care Managers Using Tools, Protocols, and Algorithms to Provide Coordinated PD Care. Management of PD is complex and many aspects of its care appear well-suited to a Chronic Care Model-based intervention that has nurse care managers in a central role in care coordination. As examples, the non-motor effects of PD are often under-recognized but have profound negative effects on quality of life.[1] Yet, if they were identified – as through periodic assessments by a care manager– most of these non-motor PD manifestations could be effectively treated. In another example, there is an expanding plethora of drugs available to ameliorate the motoric symptoms, but due to the complex pharmacology of PD, many of these drugs eventually yield side effects more troublesome than the presenting symptoms prompting their use. Thus, proactive surveillance for these side effects and access to appropriate sub-specialist expertise to consult on medication adjustment could be coordinated by a nurse care manager. Timing and titration of doses to optimize PD patient's quality of life and functioning throughout the course of a day is particularly applicable given the pharmacologic effects of currently available PD therapies; thus, patient engagement in self-management, as taught by nurse care managers, is especially crucial in achieving optimal quality PD care.[2-3] In this intervention we propose to test, a nurse trained in using the PD care delivery tools and applying the PD care protocols that were previously developed in our pilot study will coordinate and deliver aspects of care, conduct structured telephone assessments, identify problems, educate, and communicate with appropriate medical and social support professionals. The Siebens Domain Management Model is used to organize clinical care into 4 domains to maximize benefit to patients and the VA system of care by utilizing this simple and uniform communication/assessment framework**.** A nurse-level provider is proposed because of the need for knowledge about medical and medication issues, as well as of psychosocial aspects of care and community resources. The nursing profession's psychosocial construct ideally supports a self-efficacy focus in care management design to bring attention to the strengths of individuals to maximize self-management of PD and ultimately, improvement in their quality of life.[5]

Self-management is the ability to succeed in self-identifying health problems and applying solutions to reach goals, such as controlling symptoms and knowing how health problems affect quality of life.[2-3] Areas of focus include integrating medication regimens into daily life, noting symptoms and treatment effects, and learning skills and strategies for successfully coping with difficult emotions. Self-management tools tailored to PD have been developed in our pilot study work, as well as training materials for nurse care managers to facilitate use of these tools by veterans.

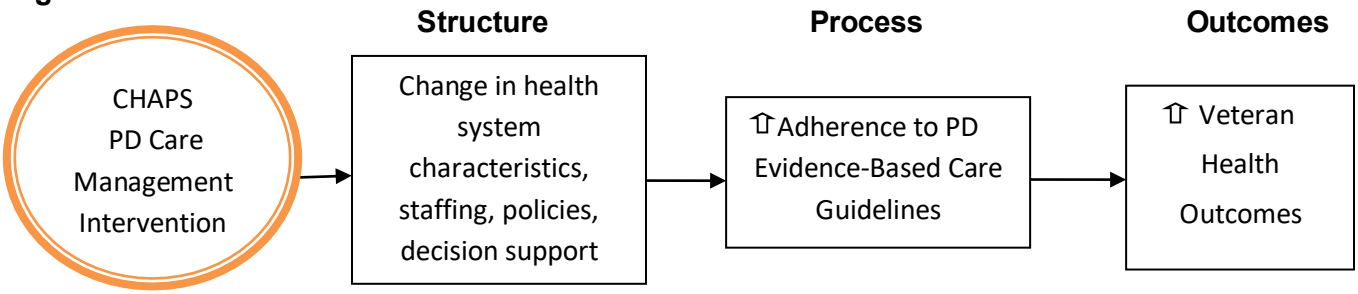
Decision Support consists of making accessible evidence-based information to manage care needs for veterans with PD. We created care protocols that map onto a set of 38 PD quality of care indicators that were selected by the VA health system and community-wide Task Force in our pilot study as highest priority. Protocols were developed to help guide veterans with complex PD care needs access to PADRECC movement disorder specialists, for consultation on care issues that arise through the care management activities by the nurse care manager.

Clinical Information Systems includes a Microsoft Access program to maximize efficient and timely implementation of the PD care protocols by the nurse care manager. The Access system is designed to be able to generate templates for providing automated reports such as to provide through CPRS to the veteran's physician treating the PD, and to enable the nurse care manager to track tasks with his/her caseload.

Health system and Community Organizations: In 2001, the VA established six PADRECCs around the US (http://www.parkinsons.va.gov) including a center based at the VA GLA and its network of seven other VA facilities in the southwest United States, including VISN22. PADRECC's mission is to provide optimal and effective quality PD care by educating and supporting clinical staff through regional movement disorder mentoring programs and journal clubs, putting in place movement disorder subspecialty clinics at GLA and the seven regional affiliated sites, and developing and maintaining effective collaborations among other PADRECCs nationally.[6] We established in our pilot study and will continue a Task Force that included a PD

nurse specialist, a general neurologist, movement disorder specialists from four PADRECC sites in VISN22, and investigators. Community champions include key PD community and advocacy groups and veteran and caregiver consumer representatives (Figure 1).

Figure 2. Theoretical Model



Background – 1. Theoretical Framework. One way to conceptualize the mechanism by which this model is hypothesized to improve outcomes builds on Donabedian's "structure-process-outcome" framework of quality of care.[7] In this revised framework, the care management intervention causes change in the existing policies, staffing, and decision support relevant to PD care, which results in greater adherence to PD care guidelines or care quality goals. In turn, higher adherence should result in better health outcomes for veterans with PD.

Prior research in care management:

Alzheimer's Disease Coordinated Care for San Diego Seniors (ACCESS) randomized controlled trial (Vickrey, PI; Connor, Mittman, Lee). The research team's expertise includes development and testing of a care management intervention proven in a large-scale RCT to substantially improve dementia care quality and outcomes.[8] The ACCESS study was a cluster RCT (clinic level randomization) that included comprehensive in-home assessment of persons with dementia and their caregivers, collaborative goal setting between care managers and caregivers, and close follow-up and coordination between clients, health system clinicians, and community agencies that provided services for ACCESS participants. Based on Wagner's Chronic Care Model,[2-4] a Steering Committee of stakeholders from three healthcare organizations and three community agencies directed the content of the care management intervention, which was nurse- or social worker-led, and included structured assessments, care protocols, collaborative care planning, coordination with care managers at community agencies, and proactive follow-up and tracking. The ACCESS intervention led to substantial improvement in quality of care, nearly doubling adherence to dementia care guidelines. In addition, patient health-related quality of life, overall quality of patient care, caregiver self-efficacy, and level of unmet caregiving assistance needs were significantly better for participants in the intervention group than for those in the usual care group. Dr. Connor led analyses that examined the components of the care management activities that were associated with better caregiver outcomes [9]

Prior research in PD care delivery research:

Building on prior PD research and applying the VA Quality Enhancement Research Initiative (QUERI) framework,[10-11] our research team has previously addressed the first three QUERI steps: (1) developed evidence-based indicators for PD care, (2) documented gaps in VA care relative to these quality indicators, and (3) identified variations in care:

Development of quality of care indicators for Parkinson's disease (Cheng, PI; Vickrey, Lee). In 2002, we performed a systematic literature review on PD care.[12] Based on this, we developed or adapted 79 indicators of PD care quality, then obtained ratings of these indicators from an expert panel composed of VA PADRECC directors, through a two-round Delphi process.[13] Ratings for 71 indicators met validity and feasibility

thresholds. Applying cut-off thresholds for impact on outcomes, room for improvement, and overall utility identified a subset of 29 highly rated PD indicators. Subsequent studies measuring quality of care of PD patients have selected quality indicators from the set of 29 highly rated PD indicators.[14-15] Building on this work, Dr. Cheng chaired the American Academy of Neurology working group that has just published national quality indicators for PD care that will be put forward by the AAN for the AMA's Physician Consortium for Performance Improvement initiative.[16]

Association of specialist involvement and quality of care for Parkinson's disease; disparities in PD care in VA (Cheng, PI; and Vickrey; Vickrey and Mittman). This study demonstrated gaps in VA care relative to the PD indicators, particularly with respect to assessment of a range of non-motor symptoms and for management of PD medication complications.[17] Dr. Cheng and colleagues concluded that evidence-based (i.e., high quality) PD care was delivered about 2/3 of the time on average in a sample that included patients seen at a PADRECC clinic (and thus enriched in patients who could access such care). There were low rates on many indicators; for example, assessment of falls was conducted only about half the time (51%). Greater specialist involvement was associated with better management of PD motor manifestations and with assessments of non-motor PD manifestations; non-white race was associated with lower rates of depression treatment.[14] Primary care providers' knowledge about PD care was much lower than that of general neurologists, in a national survey.[18] Thus, implications for designing a PD care intervention to promote best-practices in PD care are: ongoing assessment of and access to subspecialists for management of motor complications, and care protocols that include standardized assessment of PD *non-motor* manifestations.

Preliminary Studies:

NRI Pilot Study Preparing for a Parkinson's Disease Care Management QI Trial (Connor, PI; Vickrey, Co-PI; Cheng co-I). Armed with these findings on gaps and sources of variation in PD care, the study research team is now addressing the fourth QUERI step, to "develop and implement programs to promote best practices." Supported by an NRI-funded PD pilot study led by Dr. Connor that will be completed in March 2011, tools and protocols for a Chronic Care Model-based intervention have been created and are being piloted. To date, a Task Force from four regional PADRECC network VA healthcare systems (GLA, Las Vegas, Loma Linda, and Long Beach) and five local PD advocacy and service organizations convened and selected, through a formal consensus process, 38 PD care quality goals as of highest priority. These indicators were drawn from a larger set of 106 indicators from our prior indicator development study[12], updated with evidence or indicators from Assessing Care of Vulnerable Elders, European Federation of Neurological Societies, and National Institute for Clinical Excellence. A two-round Delphi method was used for the Task Force to select 38 out of a set of 101 potential PD indicators.[13] Then, PD care management assessment tools, problem domains, and care algorithms and protocols were developed, tailored to those 38 indicators The intervention tools were pilot tested with 26 veterans with PD across the three pilot study sites: VA GLA, Loma Linda, and Long Beach. Changes made to the tools included re-organizing question sections in the assessment tool to ease the burden for the participant, removing some questions, and re-wording a few questions for clarity. Feedback from veterans indicated that the assessment tool identified unmet care needs. All pilot study activities have been accomplished.

Background 2 - Study Context and Implications. This study will be conducted in VISN 22 medical centers in the Southwest United States that are part of an existing regional network of Parkinson's Disease Research, Education, and Clinical Center (PADRECC) sites. Network sites have a clinical champion and regular movement disorder clinics, ongoing journal clubs by teleconference, and referral and research collaborations across the eight sites in two VISNs covering southern California, southern Nevada, Arizona, and New Mexico. However, this care model has been physician visit-based, and there are not enough movement disorder specialists to manage all veterans with PD seen in this region of the US. The new model we have developed will overlay the existing care delivery structure. In addition, it will meet the objectives originally envisioned for

the PADRECCs, to develop new clinical care models for PD and seek research funding to rigorously evaluate their impact on quality and outcomes.

Background 3 - Study features that will enable success in addressing problem of gaps in VA PD care. *To our knowledge, there has never been a trial of a coordinated care delivery program for Parkinson's disease care, either within or outside of VA.* Thus, a randomized trial of this carefully-designed, coordinated care management intervention will provide new knowledge not only about efficacy of this scientifically-grounded intervention, but also the feasibility of its widespread application, by measuring cost and by documenting contextual factors about its implementation. The study builds on previous research by our group including Dr. Connor's pilot study, and is based on an established model of chronic disease management that incorporates the collaborative efforts of the VA and the PD advocacy groups in a region, and which has support from administrative leadership at participating facilities and PADRECC clinical champions. It is adequately powered, and the 18-month follow-up should provide a sufficient timeframe to execute care management activities that can produce improvements in process measures in PD care and their translation into improved health outcomes.

SIGNIFICANCE

Significance 1 – Importance and Health Relevance of the Research. PD is a chronic neurodegenerative condition affecting an estimated 40,000 veterans treated within the VHA; it is the most common neurodegenerative disease after Alzheimer's disease.[19] The American Parkinson Disease Association states that nationally nearly 60,000 new cases a year are diagnosed with PD, joining approximately 1,500,000 people and their families in the US that are afflicted with this disease (http://www.youngparkinsons.org). About 10-20% of individuals are under age 50 when they develop PD, most are over age 65 at onset (http://www.youngparkinsons.org). PD affects not only mobility and gait but is also often associated with cognitive impairment, mood disorders including anxiety and depression, and other "non-motor" effects that often go unrecognized, with adverse consequences. Research has shown that these psychiatric and behavioral disturbances, cognitive symptoms, and other nonmotor difficulties such as pain, gastrointestinal, and lower urinary tract symptoms are as troubling or often more troubling when compared to motor symptoms.[1, 20]

While evidence-based treatments exist that are well-documented to improve outcomes for veterans with PD, there are substantial gaps in PD care within and outside of VA. In our previous research, for example, a sample of veterans with PD receiving care at three VA Healthcare Systems in the southwestern US were interviewed. Results indicated that veterans with PD reported receiving education and counseling about care issues rated important by a national panel of PD experts only 49% of the time overall, ranging from 34% for counseling on driving safety to 70% for understanding their PD medications (personal communication: Cheng and Vickrey). Of those with a care need in the prior 6 months, 46% reported this need was *unmet* (personal communication: Cheng and Vickrey). Sizeable room for improvement was identified for these veterans' needs for rehabilitation, mental health care, and home health care. Medical record reviews conducted in VA facilities in two US regions, found low adherence rates for multiple established quality of care indicators for PD,[15,17] including low rates of assessments of falls (51%; n/N=139/271) and depression (60%; n/N=163/271), and an association of non-white race with lower rates of depression treatment.[14,15,17]

Significance 2 - Prevalence and Urgency of the Problem. Parkinson's disease carries a large financial burden on families and society, as well. The combined direct and indirect cost of Parkinson's, including treatment, social security payments and lost income from inability to work, is estimated to be nearly $25 billion per year in the United States (http://www.pdf.org/en/parkinson_statistics). Noyes estimates the financial burden of care (out-of-pocket costs) for a person with PD living in the community to be about $20,000 per person per year.[21] Chen and colleagues determined that PD complicated with depression, was associated

with greater healthcare utilization.[22] A noteworthy study by Pressley and colleagues in 2003 found that comorbid conditions associated with Parkinson's disease included significantly higher rates of injuries such as broken bones (35.6% compared to 19.5% in those without PD; p<0.0001). This comorbidity was not only more common, but when it occurred in PD patients compared to those without PD, the cost ratios for broken bones, broken hip, dementia, and diabetes were 2 to 3 times higher, based on analysis of a large volume of Medicare claims over a 5-year period.[23]

In addition to these health and financial costs, as of October 30, 2010, a federal regulation was implemented making veterans who were exposed to Agent Orange and other herbicides while they were in the military http://www.publichealth.va.gov/exposures/agentorange/conditions/parkinsonsdisease.asp eligible for a range of VA benefits including healthcare. This may bring into VA thousands more elders with PD (particularly Vietnam-era veterans, who do not have to prove exposure) for ongoing healthcare. This increases the urgency to address gaps in PD care quality in VA.

Significance 3 - Potential Contributions of the Research. Indeed, PD has been identified as a high burden, high priority condition in VA, as evidenced by the establishment of the six PADRECCs nationally in late 2001 (http://www.parkinsons.va.gov). The PADRECCs are an integrated network established for the purpose of enabling the dissemination of knowledge about PD and its treatment to veterans and VA healthcare providers throughout the nation. While these PADRECCs have put in place the availability of movement disorder specialists in the VA system, *the volume of veterans with PD far exceeds the capacity of these centers*. Thus, the signature potential contribution of this proposed research is to move forward in a substantive way the original vision of the establishment of the PADRECCS, to raise to a high level the quality of PD care across the population of veterans with PD in VA. To do this, new models of care are needed that can efficiently engage health personnel such as nurses in coordinated care management for this chronic disease, rather than the traditional visit-based physician model. Developing a PD care model that incorporates periodic screening for comorbid conditions such as depression and cognitive impairment, and evidence-based treatment and management protocols may reduce healthcare costs and cost burden to VA and to patients and families, as well as substantially improve health outcomes.

Significance 4 - Audiences for the Results of the Proposed Research We describe intended audiences and channels in a later section of this proposal, but a key audience is the network of VA PD nurses and physicians in the National PD Consortium/PADRECC network, an existing VA network of providers with interests in movement disorders. This would be an ideal venue to identify early adopters, based on trial findings. Our audiences also include local VISN22 facility leadership, to encourage continuation of a successful program. We also identify researchers in the nursing research community in VA, VA implementation science (QUERI; CIPRS). Dr. Fran Weaver, who leads the research committee for My HealtheVet, has helped us identify a possible dissemination strategy involving My HealtheVet (see letters of support), based on study materials developed to meet the educational and support needs of veterans with PD, which would through this trial be evaluated by veterans. We also will share findings with the local and national VA advocacy community, who has been highly supportive and excited about this approach during the pilot study and a number of whom are willing to engage further on the study's Steering Committee or Advisory Board.

Significance 5 - HSR&D Solicitation or Priority Area. This proposal is responsive to two solicitations. First, there is an active solicitation on PD and related neurodegenerative diseases. Proposals responsive to **VA's Office of R&D's announcement** http://www.research.va.gov/funding/solicitations/docs/parkinsons.pdf **include the HSR&D** service, which indicates that responsive proposals can address veterans' physical and cognitive function, quality of life, cost of care, and health systems issues such as "comprehensive management, including the organization of outpatient services…management of comorbidities." Our proposal directly

addresses these issues and is thus highly responsive to the announcement. Second, this study falls directly within the scope and agenda of the **Nursing Research Initiative** (NRI), of (1) "testing and/or implementing nursing interventions that enhance health and prevent disease in veterans across the care continuum," with nurses in a central care management role, working collaboratively with other VA providers, community agencies, and the Veteran; and (2) focusing on a special population of interest, chronic illness. The care delivery intervention that we propose to implement and evaluate will translate **evidence-based care guidelines into practice,** guidelines that are aimed at **maximizing quality-of-life outcomes** of veterans with PD, which is a focus on the VA nursing research agenda. **This will be accomplished through a nurse-led coordinated care model. The nurse care manager** is trained in PD care **protocols**, and thereby equipped to assess, counsel, direct care, share information, and provide referral linkage for veterans with PD to maximize these veterans' physical, mental, and social functioning. This proactive, "preventive" **care coordination** intervention aims to head-off crises, which may reduce ER visits and inappropriate hospitalizations. This approach aims to use human and financial resources efficiently, focusing physicians on aspects of care requiring their expertise and ensuring that patients are connected to VA and community resources optimal for high quality of care. This application also meets the goal of the NRI for capacity-building in VA nursing research, through a mentored award that will enable the PI to develop into an independent nurse investigator in VA.

RESEARCH DESIGN AND METHODS

Research Design and Methods 1 – Overview of Study Design. The proposed study is a multi-site, single-blinded, patient-level randomized-controlled trial of a nurse-coordinated care management intervention for Parkinson's disease ("CHAPS") relative to care as usual. Study outcomes will be measured by (1) surveys administered to veterans, to occur at baseline and at 6, 12, and 18 months (and 24 months for the first 204 enrolees), and (2) medical record abstraction in year 4. The primary outcome is adherence to evidence-based guidelines for PD care. Secondary outcomes include: patient health-related quality of life, self-efficacy, and perceptions of care quality. All outcomes will be assessed using intention-to-treat analyses. Three hundred veterans from across five VISN 22 VAs - Greater Los Angeles, Las Vegas, Loma Linda, Long Beach and San Diego - will be recruited and enrolled to enable a final analytic sample (accounting for attrition) of 266. Enrollees will be randomized in a 1:1 ratio to either receive the CHAPS intervention or care as usual. CHAPS intervention components include (1) periodic, structured telephone assessments administered by a nurse care manager specially trained in PD care management at each facility, to identify unrecognized problems (CHAPS Assessment Tool Appendix 1), (2) evidence-based algorithms and protocols to guide care coordination by the nurse care manager (CHAPS Nurse Care Management Manual, Appendix 2), (3) a standalone electronic Microsoft Access database for each nurse care manager, to enable automated triggers of care management and coordination activities, for tracking timeliness of activities (including 'overdue' activities) across a registry of his/her patients, and to enable efficient transfer of template clinical reports and care plans (see overall care plan "CHAPS Care Tracker" in Appendix 3) into CPRS (4) veteran and – where appropriate - family involvement in care planning ("My Action Plan" Appendix 4), (5) incorporating self-management tools including My HealtheVet, Patient Education Resource Center and a PD-specific, self-management toolkit including patient notebooks (Siebens Health Care Notebooks) to enrich communication with providers; and an information binder and logs from Davis Phinney (http://davisphinneyfoundation.org/living-pd/victory-counts) and; (6) proactive referral mechanisms both within VA and to Parkinson's disease-specific community resources as needed (referral template in Appendix 5) provide the Veteran has signed the HIPAA granting permission to provide PHI to community organizations as part of the referral process. Outcome variables will be collected by a research assistant interviewer blinded to trial arm status, with three waves of measurement occurring at 6, 12, and 18 months (and 24 months for the first 204 enrollees) after baseline measurement (evaluation survey, Appendix 6).

Nurse Care Managers, hired for the intervention, will have, at a minimum, a Bachelor of Science in Nursing. The PI will provide one week (40 hours) of PD care management education and training to the CHAPS Nurse Care Managers. These Care Managers will be monitored to confirm that care protocols, listed in the Care Manual, are being followed. Nurse Care Managers will also follow established nursing protocols per their site and as authorized by their nursing license. The PI will meet with Care Managers on a regular basis (weekly, then reduced to monthly when that reduction is made as a collaborative decision by the Nurse Care Managers and the PI). Meetings will provide the platform for consultation with the PI and for the Care Managers to share ideas about care management while maintaining patient confidentiality. These meetings will also support and monitor program implementation fidelity.
Because clinical cases and care management decisions are reviewed in these meetings, care delivery is monitored and proper care can be ensured. This approach mirrors, and in fact may surpass, the depth of supervision that is provided in usual care with "physician extenders" such as nurse practitioners, physician assistants, and specially trained nurses.

An analysis of CHAPS program costs and of the cost offset of VA healthcare utilization across the two arms will be conducted. Analyses of program implementation barriers and facilitators from veterans' and from those involved in the intervention will also be conducted.

Research Design and Methods 2 –CHAPS Intervention Description
The intervention to be implemented and evaluated. The CHAPS intervention focuses on early identification of PD-specific problems and management of those problems. CHAPS tool and protocols include the following:

Assessment:

a) A nurse care manager uses the CHAPS assessment tool (Appendix 1) to identify PD-problem areas at the initial visit and at 6 month intervals. This assessment tool was developed and pilot-tested among veterans enrolled in the previous NRI pilot-study. The tool will be implemented as an electronic form in Microsoft Access. We will be exploring creation of kiosks in Movement Disorder clinics participating in the study allowing subjects to administer portions of the assessment tool themselves. The assessment tool is based on existing validated and standardized instruments (e.g., PHQ-9 and the WHO-5) currently used throughout the VA. This CHAPS assessment tool is supplemented with assessment tools and questions developed and recognized by the research team as currently in use in other health care settings. Some of these tools and questions have been adapted to fit this patient population. For example, to assess daytime sleepiness, we adapted the Epworth Sleep Scale.

b) Assessment algorithms (triggers) will be developed as Microsoft Access queries to analyze the responses obtained from the assessment tool data to identify problem areas. Queries will be written and automated to identify problem areas. The queries will categorize problems into routine or urgent. For example, a score of 10-17 points on the Epworth Sleep Scale would be categorized as a routine problem, but a score 18 points or greater on the Epworth Sleep Scale would be categorized as an urgent problem. Nurse care managers will be able to conduct queries to determine problems for one patient and problems across his/her group of patients.

Management:

The CHAPS care management processes include re-assessments administered by the nurse over the telephone every 6 months at a minimum and more conversations over the telephone to address identified needs and problems as needed. The nurse will schedule calls with the veteran based on his/her needs. Calls will be adjusted to meet his/her needs. The nurse Care Manager might call the veteran a few days in a row, and then reduce those calls to weekly or monthly calls depending on your

needs. At a minimum, the nurse Care Manager will call veterans once a month to check on the veteran (or less frequently if the veteran requests). Care management tools and protocols include the following:

a) The care manager will follow the developed CHAPS Nurse Care Management Manual (Appendix 2) to address problems identified by the Microsoft Access query. This care manual is based on recent medical-based evidence about PD, including guidelines and high-profile publications as well as recommendations made by VISN 22-based movement disorder specialists on the management of PD. This manual will be printed as a hard-copy monograph but will also be available as a document stored on the VA server.

The CHAPS Nurse Care Management Manual will list a set of action items for each problem that can be used for care management. A list of action items will be organized into standardized templates (care plans) per problem area. The nurse care manager will enter action items per problem area into the patient's dynamic care plan. For example, if the Epworth Sleep Scale identifies excessive daytime sleepiness "Sleep problems" will be triggered. A standardized set of actions per problem will be available in the Care Manual and as a drop down list in the electronic care plan. The nurse and patient will collaboratively choose action items to address this problem. For example, an action taken by the nurse would be to counsel the patient about driving; and action taken by the patient would be to establish a bedtime ritual to help prepare his/her body and mind for sleep. Other choices would be consultations of other providers, such as referring a patient to a movement disorder specialist to reduce the total equivalent dose of dopaminergic medications, or a referral to a community organization for services. The program will also give the care manager the flexibility to type in an action item not already listed but that would be suitable for a particular patient. .

If veterans want to be referred to an agency outside the VA to address identified problems, the Nurse Care Manager will mail a HIPAA Authorization (VA form 10-5345 Request for and Authorization to Release Medical Records) to the veteran. The veteran will need to complete and sign the form and return it to the Nurse Care Manager, authorizing that information can be transmitted to the outside agency. The veteran will be given copies of the CHAPS Report of Assessment Summary and referral form prior to sharing the information with the outside agency. This information will be transmitted via telephone, mail or secure fax.

Discussions of veteran medical information to outside community agencies will be conducted in an office with the door closed to maintain confidentiality. Medical information will be faxed to a secure fax that is accessible only to the recipient. SSNs will not be included in the transmission of medical information.

b) We will also use tracking capabilities within Microsoft Access to supplement the capabilities of CPRS. CPRS currently contains all progress notes, medications, laboratory, and radiology reports, but it doesn't contain some tools for facilitating care management of patients. Desired capabilities include the ability to quickly examine all upcoming tasks across a panel of patients, retrieve notes relevant to a specific problem area, or to schedule reminders to oneself. These capabilities reside within an Access relational database. For example, a care manager would click on a button for "active problems," then a list of problems would appear. If "excessive daytime sleepiness" is listed as a problem, then the care manager will be able to retrieve all historical actions that this person has taken relevant to this topic in the study. The care manager will view future scheduled actions such as, calling the subject in one week to assess if symptoms are worsening.

In addition, templates for the self-management care plan ("My Action Plan", *Appendix 4*) will be

programmed into the MS Access database. These care plans can be largely populated with data already collected in the assessment tools and other forms in Access. During telephone meetings with the subject, the nurse will enter data in to the patient's self management care plan, "My Action Plan" to summarize the clinical content of the encounter as well as to remind the subject about changes in lifestyle habits that should take place between encounters. These self-management care plans will be printed and given (mailed or in-person) to veteran subjects.

A summarized version of the Overall Care Plan "CHAPS Care Tracker" (Appendix 3) generated by Microsoft Access will be copied and pasted into CPRS. CPRS notes will document care given by the CHAPS clinical team to better coordinate care given by other VA providers.

We plan to establish a specific Hospital Admission Notification in CPRS, at each site, to alert the CHAPS Nurse Care Managers (NCM) when an intervention patient is admitted to a VA hospital. This will help NCMs improve care delivery.

We plan to integrate other VA tools currently being rolled out to patients across the VHA network. Two ideas under development are (1) My HealtheVet that will include secure message communications between the care manager and patients, and (2) Facebook and other social media tools to disseminate educational materials and upcoming support group sessions to veterans enrolled in the intervention arm of CHAPS.

As part of total care management, if a veteran in the intervention group states that he/she has a caregiver during the administration of the CHAPS assessment tool, we will send the veteran a *CHAPS Intervention Caregiver Support Packet* (Appendix 7) that will contain assessment questions regarding depression, strain, social isolation, and overall health. Assessment questions will contain scoring guides to assist the caregiver in determining if there is a potential problem to seek self-directed support and assistance. The packet will also contain contact information for agencies that provide caregiver resources such as the Caregiver Resource Center. This packet is to be given to the caregiver by the veteran and is completely voluntary. Caregivers are not subjects of the study; in other words, the packet will not be collected or used by the study.

Research Design and Methods 2 – "Usual Care" Randomization Arm Description. Veterans randomized to the usual care arm will continue to receive care they would have received if they had not enrolled in the study. To minimize potential bias from participants' awareness of randomization arm assignment[25], we will provide to all study participants (both intervention and usual care arm participants) a brief educational handout on Parkinson's disease that is available in the VA's "Healthwise for Life" handbook (Appendix 8)[26]. This information includes a definition of PD, its symptoms, and several suggestions for managing PD such as medications and regular exercise. Since the CHAPS kiosk will be located publicly in the Movement Disorder clinic, it will not be withheld from any veterans who wish to use it. Also, the PADRECC Facebook page will be made available to all veterans.

Research Design and Methods 3 - Setting. The setting for this randomized trial is five VA facilities in VISN 22 (VA Desert Pacific Healthcare Network): two campuses (West Los Angeles and Sepulveda) of the Greater Los Angeles (GLA) VA, and the Las Vegas, Loma Linda, Long Beach and San Diego VAs. All five facilities are part of the Southwest PADRECC network, whose clinical champions have been collaborating in education, clinical care, and research activities since the network was established in 2001. Four of the facilities formally collaborated in the pilot study that selected PD care quality goals, and three facilities recruited veterans for pilot

testing. Clinical champions at all facilities are aware of the pilot study activities through ongoing monthly PADRECC conference calls. In terms of applicability to other populations, each of the six VA PADRECCs around the US has been assigned a region for which they are responsible for PD care. While most of these PADRECCs have a looser arrangement with their network of sites, this model – if successful – should be applicable/exportable to other regions in VA nationally through the PADRECCs/the National Consortium.

A Steering Committee developed out of the pilot study's Task Force will be formed for this trial, comprised of VA PADRECC site directors, a general neurologist, PD nurse specialists, and representatives of key community and advocacy groups, in addition to the PI-nurse scientist, co-PI/mentor, and research co-investigators. Letters of support from these individuals are included with this application. Yearly in-person meetings at Greater Los Angeles and monthly teleconference meetings of this health system/community-wide Steering Committee will continue throughout the four-year project. The Steering Committee's charge is to support program objectives related to implementing this intervention *across* multiple VA sites and the participating community organizations. Effort will be tracked as part of the cost assessment. Letters of support have been provided by the participating Steering Committee.

Table 1. CHAPS Steering Committee

Site or organization	Individuals	Expertise or Titles
VA Loma Linda	Dr. Dorothee Cole	PADRECC site director
VA Loma Linda	Nurse Care Manager (TBN)	Nurse Care Manager
VA San Diego	Dr. Stephanie Lessig	PADRECC site director
VA San Diego	Erik Ernst, RN, DNP	Nurse Care Manager
VA GLA Healthcare - Sepulveda campus	Dr. Denson Fujikawa	General neurologist
VA GLA Healthcare - West LA campus	Dr. Emad Farag	PADRECC movement disorder specialist
VA GLA Healthcare - West LA campus	Virginia Janovsky, RN	PD nurse specialist/care manager
VA Long Beach	Dr. Steven Schreiber	PADRECC site director
VA Las Vegas	Dr. Selina Parveen	PADRECC site director
Los Angeles Caregiver Resource Center	Dr. Donna Benton	Director
Parkinson's Resource Center (PRO)	Jo Rosen	President and founder
West LA and Sepulveda VA campuses	Connor (PI), Vickrey (co-PI/mentor), Cheng (co-I), McNeese-Smith (nurse scientist, co-mentor)	Health services/care management research – nursing/neurology

Research Design and Methods 4 – Study Population Characteristics. The subject population for this study is men and women veterans with a diagnosis of Parkinson's disease (PD) who have had at least two visits between October 1, 2010 up to 12/21/2014 (or until full enrollment is achieved) to the VA Greater Los Angeles, VA Las Vegas, VA Loma Linda, VA Long Beach or VA San Diego. Based on our prior work, two ICD codes of 332.0 within one year had 89% sensitivity for PD diagnosis, relative to gold standard expert chart review.[27] Study inclusion criteria are:

1. Veterans with PD in VISN 22 with at least two ICD-9 diagnostic codes for PD (332.0) in the administrative data (VISN 22 Data Warehouse) from October 1, 2010 – through 12/31/2014 or until full enrollment is achieved.
2. At least 18 years of age
3. Demonstrate ability to provide consent for study participation, which will be determined at 4 points in time: Verbal consent, baseline survey and 6-, 12- and 18-month surveys (and 24 months for the first

204 enrollees). Assessment of mental function for the purpose of taking part in the research study is as follows: Our screening questions (SAFE VET Mini Quiz) for "ability to participate in research" are to determine if the veteran needs help in communicating with the research staff in order to participate in the research study. If the veteran is having difficulty understanding or enunciating over the telephone, we will ask the veteran if she/he would like to have his Care Partner help with this process and involve the Care Partner in a dialog to answer the research questions administered by research staff to the veteran subject. If at any time the veteran is not able to take part in a dialog with the research nurse or interviewer -- even with the Care Partner present -- then we will try again within two weeks. If the veteran is still unable to participate in a dialog over the telephone even with the help of his Care Partner, then we will NOT enroll the veteran.

The exclusion criteria are: current enrollment as a study subject in the Deep Brain Stimulation (DBS) VA cooperative study, as these subjects are not allowed to enroll in any other study per the DBS study protocol, and Veterans who are enrolled in the Care Coordination Home Telehealth (CCHT) program. Study clinical staff will review records in CPRS to remove Veterans from the recruitment list who are receiving VA care coordination or VA care management such as, Hospice or Care Coordination Home Telehealth.

All stages of PD and any level of functional status can be included in this study of PD coordinated care management, but all subjects must demonstrate ability to consent. Thus, veterans with PD and dementia that is at a stage in which they do not have the ability to provide informed consent will not be enrolled. Based on a prior study of veterans with PD identified in this manner at the GLA VA, we anticipate that there will be very few if any subjects under age 40, the mean age of the sample will be about 75 years, and 2% will be women.[17]

In September 2009, a query of administrative data from VISN22's Data Warehouse produced 1385 unique patients with two codes of PD within the timeframe October 1, 2008 – September 30, 2009 and across the five participating study sites (Table 2):

Table 2 ***Participating Study Sites***	*Total # of unique patients with 2 or more 332.0 codes in FY2008*
Los Angeles	***426***
Loma Linda	***330***
San Diego	***244***
Las Vegas	***173***
Long Beach	***212***
Total	***1385***

From this pool and following the recruitment strategies described later in this proposal and which we have employed in prior studies,[8] we anticipate being able to enroll a target sample of 300.

Estimated sample size and level of power. The sample size calculation is based on the primary outcome (Adherence to PD Guidelines Measure) in Specific Aim #1. Guideline adherence is expressed as the mean across the study participant group of the per-patient percentage of applicable guideline measures for which there was adherence. (An applicable PD guideline is one for which a participant is eligible).

From the literature of chronic disease coordinated care interventions for other conditions, reported effect sizes used for power calculations - and thus reflecting a perceived clinically meaningful difference - range from 0.25 to 0.5 [8, 28, 29] which are all in the range of a medium effect size per Cohen.[30] Using an alpha of 0.05, 90% power, and a medium effect size of between 0.3 and 0.4, we have calculated an analytic sample size of 300 subjects (150 subjects in each treatment arm). See Table 3 on the following page.

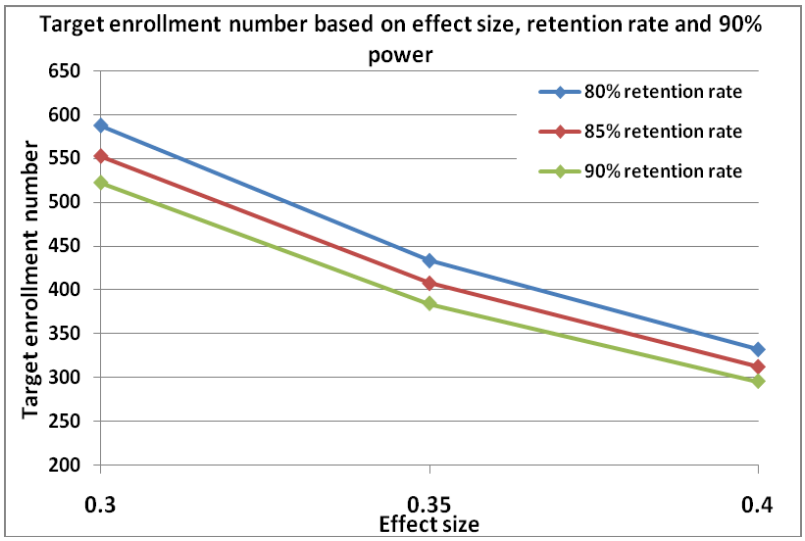
Although we will facilitate retention of subjects in the RCT as much as possible, we recognize that there will be a non-zero attrition rate because patients may decide to disenroll, or patients may die before the final outcomes are collected. The attrition rates of chronic disease coordinated care interventions for other conditions range from 10%-20%.[31-34] Target ***enrollment*** numbers based on variations of effect size and retention rates of 80-90% are shown in Figure 3. We choose to plan to enroll 300 veterans as this will yield an adequate analytic sample size, after accounting for the expected attrition rate. Based on the distribution of PD patients across the five VA Medical Centers, we expect that 30.7% of subjects (n~92) will be enrolled from VA GLA, 23.8% from VA Loma Linda (n~71), 17.6% from VA San Diego (n~53), 15.3% from VA Long Beach (n~46), and 12.5% from VA Las Vegas (n~38).

In FY2008, there were 1000 veterans with at least two diagnosis codes for PD. Thus, our target number for enrollment represents 40% of this pool. We enrolled a higher percentage of subjects for our ACCESS trial using an analogous approach.[8]

Table 3. Analytic sample size

Effect size	Analytic sample size with 90% power
0.3	2x235=470
0.35	2x173=346
0.4	2x133=266

Figure 3. *Enrollment* sample sizes for achieving analytic sample sizes, across a range of effect sizes and retention rates.



Note that the power analysis is almost certainly conservative in that the multivariate model used to formally evaluate study group differences has the typical effect of reducing residual variance of the model and improving the ability to detect group differences.

Research Design and Methods 5 – Study Variables

Research Design and Methods 5 - Primary Outcome (dependent variables) will be adherence to PD guideline implementation (care processes) that were identified by the VISN 22 and community-wide NRI pilot-study Task Force as high priority quality indicators for guideline implementation, out of prior PD guidelines developed in VA and other sources as described in the background. These guidelines cover 9 categories: Communication, Education and Continuity; Reporting; Diagnosing PD; Medication use; Motor symptom management; Management of non-motor PD complications; Non-pharmacological approaches; Palliative care; and Health maintenance. The primary outcome measure will be based on the proportion of eligible subjects receiving each recommended care indicators and calculated as a mean per patient of applicable care processes adhered to. Some care processes will be indicated only if triggered by an identified problem. For

example, referral to a primary care physician for evaluation and treatment of depression is only indicated if a depression screen is positive. Some survey questions will measure care processes, specifically regarding veteran education, counseling, referral and other practices for which medical charts are not always accurate, so the data sources for this primary outcome will be both medical record abstraction and telephone survey of study participants. The proportion of applicable recommendations followed for each veteran will be computed and aggregated to the two group levels (intervention and usual care arms).

Development of guideline adherence measures for those measures not previously operationalized is following a process in which PD indicator or care goal is converted to review criteria, which are then operationalized through specific clinical variables and chart review questions.[12] Each observable measurement is being mapped to an action/activity performed in the intervention. For example, a veteran with PD who has been identified as experiencing symptomatic orthostatic hypotension, then the patient is to be instructed about salt intake and head elevation for this care goal to be categorized as adherent. As another example, if the patient is taking antihypertensive medications and has symptomatic orthostatic hypotension, then this medication should be decreased.

Table 4. Categories and examples of adherence for selected PD care quality process measures or indicators (excluding assessment process measures)

Categories of 38 PD indicators	**PD QUALITY GOAL ADHERENCE EXAMPLES**
Communication, Education, & Continuity	• Should have a comprehensive care plan agreed between the individual, their family and/or caregivers and specialist and secondary providers.
Reporting	• All veterans should be assessed for abuse.
Diagnosing PD	• Diagnosis should be reviewed regularly & re-considered if atypical features develop.
Medication use	• Outpatient medical record should contain an up-to-date medication list.
Management of motor symptoms	• If receiving therapy with a dopaminergic agent, veteran should be assessed for motor complications at least every 6 months.
Management of non-motor complications	• If a veteran with PD is diagnosed with dementia, then an assessment of decision-making capacity should be conducted.
Non-pharmacological approaches/therapies	• All veterans with PD who have impairment of ADLs or in walking ability should be referred for physical therapy.
Palliative care	• Should have in outpatient chart: an advance directive, documentation of discussion about who would be surrogate decision maker or a search for surrogate, or indication that there is no identified surrogate.
Health maintenance	• Should receive assessment of activity level and be provided with counseling at least yearly to promote appropriate regular physical activity.

Research Design and Methods 5 –
Secondary Outcomes (dependent variables); all obtained from telephone survey interviews (Appendix 6)

Patient health-related quality of life- The Health Utilities Index (HUI) has been used in many clinical studies covering a wide range of health problems. HUI questionnaires are effective tools used to measure health status, report health-related quality of life (HRQL), and produce utility scores (ranging from 0=death to 1= perfect health) that can be used in formal cost-effectiveness analyses.[35] The HUI is available in multiple versions (time frame, informant) and two languages. It provides comprehensive, reliable and valid measures of health status and HRQL. We have previously used the HUI-3 in studies of Alzheimer's disease, and found good responsiveness to change.[36] We will employ the interviewer-administered, self-report version of the HUI (which yields both HUI-2 and HUI-3 scores) in this trial.

Because the mental health domain of health-related quality of life will be specifically targeted in this intervention and has modest coverage in the HUI, we will expand our assessment of this domain through two additional measures. The WHO-Five Well-being index (WHO-5) is a five item screening device which was derived from a larger scale developed for a project on quality of life in patients suffering from diabetes.[37] During the first evaluation of the screener, 10 of the original 28 items were selected due to homogeneity shown across European countries participating in the study.[38] Because positive psychological well-being should include positively worded items only, the 10 items were reduced to five items resulting in the WHO-Five which covers positive mood, vitality, and general interests.[39-40] The WHO-5 has been validated in the PD population as a screening tool.[41] The WHO-5 showed high validity and was sufficient in detecting depression without differences in the validity indices compared to the Beck depression inventory (the standard screening tool for PD depression).[41]

The PHQ-9 is the nine item depression scale of the Patient Health Questionnaire which measures depressive symptoms over the previous 2 weeks. The PHQ-9 incorporates DSM-IV depression diagnostic criteria with other major depressive symptoms into a brief self report tool. There are two components of the PHQ-9; assessing symptoms and functional impairment to make an initial depression diagnosis and obtaining a severity score to help select and monitor treatment.[42] The PHQ-9 performed comparably to the Geriatric Depression Scale (GDS) in identifying depression among primary care elderly.[43]

Patient self-efficacy- The General Self-Efficacy Scale (GSES) is a 10-item scale that assesses perceived self-efficacy (i.e. the belief that one's actions are responsible for successful outcomes) regarding coping and adaptation abilities in both daily activities and isolated stressful events. The scaled score for each question ranges from 1 to 4. Higher scores indicate that the patient demonstrates a stronger belief in self efficacy. Studies have shown that the GSES has high reliability, stability, and construct validity.[44-45] The GSES has been tested in a wide age range and among various chronic disease populations such as Parkinson's.[46]

Patient perceptions of care quality. The Consumer Assessment of Health Plans (CAHPS) is a standardized survey that asks consumers and patients to report on and evaluate their experiences with health care. The survey covers topics that are important to consumers, such as the communication skills of providers and the accessibility of services. A subset and adaptation of items from this survey will be used to determine if health care experiences change throughout the intervention.[47] We will also use the Patient Assessment of Care for Chronic Conditions (PACIC), a 20-item survey that measures specific actions or qualities of care that patients report they have experienced in health care delivery. The tool provides a consumer assessment of important aspects of care for chronic illness patients. The survey is divided into five subscales: patient activation, delivery system design/decision support, goal setting, problem solving/contextual counseling and follow-up/coordination. The overall PACIC is scored by averaging scores across all 20 items.[48]

Research Design and Methods 5 - Other Variables including the participant's sociodemographic characteristics (age, gender, marital status, employment, ethnicity, and education), duration since onset of symptoms of PD and duration since onset of diagnosis of PD, functional status/PD-related activities of daily living, and social support will be obtained by telephone interview with the study participant. Medical comorbidities will be gathered via medical record abstraction.

Functional Status-ADL Subscale of UPDRS-The Activities of Daily Living (ADL) subscale is Part II of the Unified Parkinson's Disease Rating Scale (UPDRS) and will be used to measure functional status. This subscale can be administered by an interviewer, and it rates the effect of PD on daily activities such as bathing, walking, eating, dressing etc. It has been shown that the ADL subscore may be less affected by variables such as drug cycle and motor fluctuations[49] and may therefore be an effective measure to assess improvement or decline in this area.

Social support. We will use the Social Support Survey developed for the Medical Outcomes Study.[50] It is easy to administer to chronically ill patients; items are short, simple, and easy to understand. The 19-item survey consists of four social support subscales and an overall functional support index. A higher score for an individual scale or for the overall support index indicates more support

Comorbidity. The Charlson Comorbidity index was developed to prospectively classify comorbid conditions that might change the risk of mortality for use in longitudinal studies. The index predicts the one-year mortality of a patient who may have multiple co-morbid conditions. Each condition is given a score of 1, 2, 3 or 6 depending on the risk of dying associated with the condition; an individual's scores are summed to yield the index value. This method for estimating risk of death from comorbid disease has support for predictive validity and has been widely-used.[51]

Health services utilization. Physician visits, emergency department visits, hospital admissions, nursing home admissions (distinct from respite care), home care services, and pharmacy data will be obtained from the VISN-22 Data Warehouse, which includes admissions to non-VA hospitals if the VA reimburses those hospitals for the care delivered. We will include home care services to examine whether there are fewer hospitalizations in the intervention group and thus less need for post-acute home care, and we will examine pharmacy costs to assess whether increased provider contact in the intervention arm results in an increase in pharmacy costs.

Intervention Activities' Time: Start Up and Maintenance. Estimates of start up and maintenance costs will be generated in part from intervention activity logs, as recorded at various sampled dates by the nurse care managers in a Nurse Activities Log, and by an Intervention Activities Log Tool. These logs track the frequency and the time required for care management activities performed by the nurse care managers as well as intervention-related activities (preparing intervention materials for veterans) performed by any other staff assistants.

Research Design and Methods 6 - Recruitment and Enrollment/Consent Processes. A list of eligible veterans with at least two ICD-9 diagnostic codes for PD (332.0) in the administrative data will be generated through a query of the Data Warehouse for VISN 22 from October 1, 2010-\ through 12/31/2014 or until full enrollment is acheived.[27] An electronic version of that list will be securely transferred from the VA GLA Data Warehouse programmer who generates it to the study RA, who will sort veteran's names by the provider who has seen the patient at those visits. A CHAPS nurse care manager will review, in CPRS, the VHA Data Warehouse query results received from the VHA Data Warehouse programmer. If there are multiple providers for a given veteran, the provider to whom the name will be sorted will be prioritized in the following way: first, a movement disorder neurologist; second, a general neurologist; and third, a primary care physician. Each provider will be asked to vet his/her respective list, removing any veteran's name that is deemed inappropriate to contact about the study, and having the opportunity to add names of potentially eligible subjects to the list

who are in their care. Each vetted list will be provided to the study Research Assistant (RA) who will then coordinate recruitment and enrollment with the designated research staff over a 12-month period. In order to protect subjects against undue influence or coercion, we will not have a study nurse consent potential veteran subjects. Recruitment occurs in three steps:

1. Veterans whose names are approved by their provider will be mailed an *Introduction Letter* (Appendix 9) signed by that provider and the study PI, and a *Decline Card* (Appendix 10) they can return (in an envelope for privacy) to indicate if they want to decline any further contact. The *Introduction Letter* simply introduces the veteran to the fact that the research study is taking place at the VA and states that 2 weeks later the veteran will receive another mailing with additional information about the study. The letter will indicate that the veteran can return a *Decline Card* declining to hear further about the study, and no additional mailings will occur. The card will include an ID number linked to the list of all potential participants. Returned *Decline Cards* will result in the RA deleting that person's name from the list, so that there will be no further contact.

2. Those veterans who do not return a decline card from the initial mailing will 2-3 weeks later be sent a *Recruitment Letter* (Appendix 10) signed by the study PI, an *Recruitment FAQ Sheet* (Information Sheet, Appendix 11) with facts about the study in bulleted form containing all the elements of written consent and a *Preferences for Contact* (Appendix 12) card. The *Recruitment Letter* introduces the veteran to the fact that the research study is taking place at the VA and states what the veteran can do if he/she wants to be contacted about the study, or not hear anything further about the study. The preference card can be used by the veteran to indicate the best time and telephone number for contact by the study RA or to opt-out of the study. Returned *Preferences for Contact card* indicating "opt-out" will result in the RA deleting that person's name from the list, so that there will be no further contact.

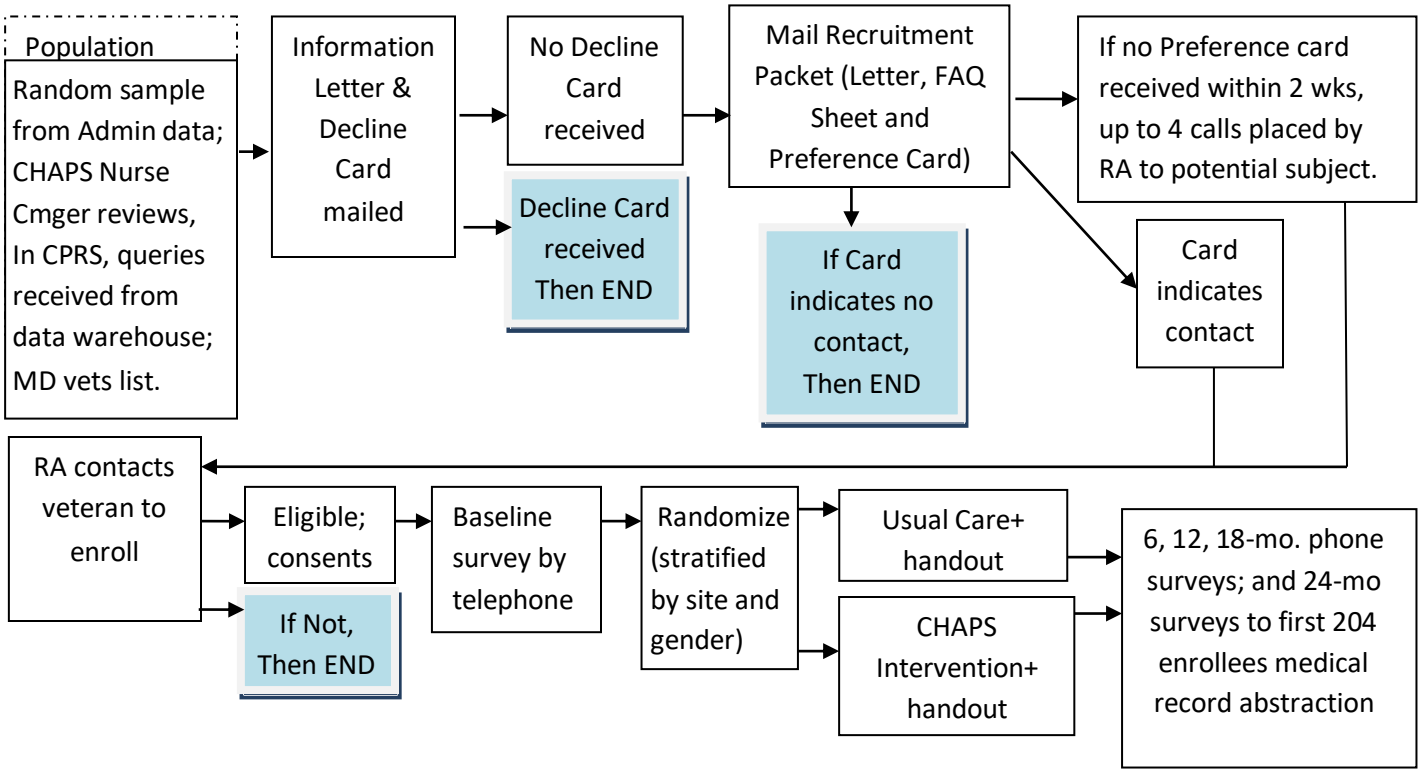
3. If the *Preference for Contact Card* is received by the RA and it indicates a preference to be contacted, designated research staff will call the veteran according to the preferences for time and numbers. The staff member will call the veteran and initiate the study *Introductory Script* (Appendix 13). If a preference card is not received by the RA within 14 days, designated research staff will call the veteran to read the study *Introductory Script*. All future contact (assessment interviews and surveys) will occur via telephone according to the preferences for time and numbers indicated by the veteran.

A verbal enrollment and consent process will be used in this study containing all of the elements of informed consent (See Appendix 14). A copy of the verbal consent script will be given to the participant so s/he can reference it during the verbal consent process. The opportunity to consider participating in the study, ask questions and have more time before providing consent will be provided. All procedures must be IRB-approved. If the veteran consents to the study the RA will continue to enroll the veteran using the *Enrollment Script* (Appendix 16)

At the time of consent, baseline, 6, 12 and 18 months (and 24 months for the first 204 enrollees), the potential participant will be asked 3 screening questions for "ability to participate in research". These questions are to determine if the veteran needs help in communicating with the research staff in order to participate in the research study. If the veteran is having difficulty understanding or enunciating over the telephone, we will ask the veteran if she/he would like to have his Care Partner help with this process and involve the Care Partner in a dialog to answer the research questions administered by research staff to the veteran subject. If at any time the veteran is not able to take part in a dialog with the research nurse or interviewer -- even with the Care Partner present -- then we will try again within two weeks. If the veteran is still unable to participate in a dialog

over the telephone even with the help of his Care Partner, then we will (1) NOT enroll the veteran (if not already enrolled in the study), or (2) remove the enrolled veteran subject from the study and transfer the veteran to usual care for his/her care to be continued.

Figure 4. Flow diagram of steps in the recruitment, enrollment, intervention and evaluation in the RCT of CHAPS intervention



<u>Randomization to Intervention vs. Usual Care Arms.</u> Before enrollment begins, a list of intervention/usual care status matched with planned study ID numbers-as yet unassigned to subjects- will be created by the study data analyst under the supervision of the statistician, using a randomization website. There will be 10 lists, to account for stratification by site and by gender, in order to optimize balance of randomization assignment across these two factors. These lists will be kept in a central secure location only accessible to the Project Manager. After the RA Interviewer completes the enrollment and the baseline telephone interview, he or she will notify the Project Manager that the recruited a new participant. The Project Manager will inform the un-blinded RA of the randomization status for each particular study ID. Either the un-blinded RA or the Project Manager will notify the appropriate nurse care manager about newly enrolled study participants randomized to the intervention arm.

Participants will be randomly assigned equally in a 1:1 ratio into the intervention group (PD care intervention, CHAPS) or control group (usual care). There will be 150 subjects randomized to the PD care intervention, CHAPS (intervention arm) and 150 subjects randomized to usual care (the control arm). Subjects randomized to the CHAPS group will be contacted by a CHAPS Nurse Care Manager via telephone within 10 working days after completion of the baseline survey.

Research Design and Methods 6 - Data Collection Strategy and Timeline. The data collection strategy will include quantitative and qualitative components. Enrollment will begin midway through Year 1 and is scheduled to occur over 25 months (a rate of about 10-30 enrollees per month), and data will be collected from participants at baseline, 6, 12, and 18 months (and 24 months for the first 204 enrollees). Medical record abstraction will commence in Year 4. Interviews with a subset of intervention arm participants will occur in Year 4, after their follow-up has ended. The project manager will track and report recruitment and retention status by site over time to the Steering Committee each month. We will report these data both to our project Advisory Board, as needed, and a DSMB. The PADRECC site directors at the VA GLA (Dr. Bronstein), VA Las Vegas (Dr. Parveen), VA Loma Linda (Dr. Cole), VA Long Beach (Dr. Schreiber), and VA San Diego (Dr. Tecoma) are committed to participating in the study.

Veteran survey: telephone interview (Appendix 6). Telephone surveys will be administered to all study participants by trained research assistants. A baseline interview of about 30-40 minutes duration will be administered prior to randomization. Three follow-up telephone interviews will also be about 30-40 minutes duration. Each will be administered at 6, 12, and 18 months (and 24 months for the first 204 enrollees) after enrollment by a research assistant who will be blinded to randomization status. Procedures to promote retention will include allowing the interviews to be broken into multiple sessions, and scheduling at times that are convenient for the veteran. Study participants will be provided $25 per survey as recognition for their time. SSNs will be obtained from CPRS to process subject payment. SSNs will be included in the Patient Registry which will be stored in an Excel file, and will be placed in a password protected file on a VA desktop computer that is backed-up on the secure server at the VA Sepulveda HSR&D COE.
Occasionally Veterans move and/or change their telephone numbers. In the event the study RA is unable to reach an enrolled participant by telephone in order to administer the Evaluation survey (s), an "Unable to Reach for Survey Letter" (Appendix 17) will be mailed to the enrolled participant. The letter aims to offer a participant the opportunity to continue with the study and to complete the Evaluation surveys at baseline, 6, 12 and 18 months (and 24 months for the first 204 enrollees). This letter will be mailed in the event the participant's phone number has been identified as either no longer in service, appears disconnected, or is now an incorrect number for the respective participant.

Medical Record Abstraction. Veteran-participant medical records will be abstracted from VA CPRS by experienced, nurse chart abstractors after training in use of the tool by the PI and Dr. Cheng. Abstractors will be blinded to randomization assignment. This trial's tool will be adapted from an electronic tool (programmed in Microsoft Access) previously developed by Cheng et al, 2007 and that already includes many of this study's care process (guideline) measures. Development of the revised electronic tool is underway in the current pilot study. Orientation and training in use of the data collection tool will be conducted with the nurse chart abstractors when this task is begun in Year 4. Written guides, variable definitions, and use of categories such as yes, no, unknown, not documented, date, etc. will be provided.[52] We will assess agreement and identify any areas needing further clarification by having both nurse chart abstractors apply the tool to the first 10 medical records; if necessary, the tool may be further refined at this point. Both nurse chart abstractors will abstract 10% (N=40) of the records, identified by random selection (after the initial 10 records). The PI will be available for questions throughout the chart abstraction process and will meet with the abstractors at least monthly during this process or more often as needed. New information or changes will be communicated in writing and reviewed at these meetings, to ensure that both abstractors are aware of them.

Process Evaluation. This component of the evaluation will examine the delivery of the intervention, the quality of its implementation (fidelity) and the organizational context (policies, personnel, structures, and procedures) influencing implementation and effectiveness. Since this intervention is a paradigm shift from

traditional clinical practice, it is important to identify potential barriers to its implementation, both to identify strategies for addressing them within this trial and to assess them for their possible effects on adaptation and successful implementation of the intervention in other VA facilities. We propose to collect these process evaluation data from two sources. We will obtain veterans' perceptions, through interviews with a 10% sample (N=20) selected through random sampling, of veterans randomized to the intervention arm. Study participants will be offered the opportunity to participate in a 10-15 minute telephone interview at the end of their 18-month study follow-up period (or 24 months for the first 204 enrollees), to assess their perceptions about specific components of the care management intervention. For example, these participants will be asked if they used My HealtheVet and if so, what was the experience like for them; the goal would be to determine if the communication opportunities afforded through My HealtheVet were used and were perceived as useful. Examples of general questions are: "What is it like…? Or What is the experience of.…?" . We will also collect data on implementation barriers through analysis of meeting minutes collected by the Project Manager on weekly calls with each VA site and at the monthly Steering Committee calls. We have found that these are a rich source of information about the implementation process for another ongoing study.[53]

Intervention Costs. **1) Start-up costs** needed to implement the intervention, such as computer hardware, software development, and items required for care manager training, will be tracked and recorded during the initiation of the program. The study Project Manager will be responsible for keeping records of expenses as they occur. Start-up costs will also be tracked using the Intervention Activities Log which logs the amount of staff time required for one-time intervention activities. **2) Maintenance costs** will be estimated by the Cost Assessment Activity logs which collect the frequency and the time required for care management activities and resources required.

Health Services Utilization. Physician visits, emergency department visits, hospital admissions, nursing home admissions (distinct from respite care), home care services, and pharmacy data for the period 12 months preceding enrollment and during the 18 months (or 24 months for the first 204 enrollees) of the intervention will be collected from the VISN-22 Data Warehouse. The VISN-22 Data Warehouse contains detailed clinical data about Veterans Administration care (including hospitalizations, clinic visits, prescribed medications and demographics) for 5 hospitals and 28 community-based clinics within the VA Desert Pacific Healthcare Network. The database includes admissions to non-VA hospitals if the VA reimburses those hospitals for the care delivered. CHAPS investigators will prepare a query to the VISN-22 Data Warehouse in Year 4 for these data on study participants.

Missing-data, respondent dropout, interviewer bias.

Missing-data: Data collected from medical record abstraction and administrative records will be complete and will not contain missing data. All survey data is collected by immediate computer entry using a computer software program (Microsoft Infopath or Microsoft Access) that will be programmed to incorporate appropriate skip patterns and flag invalid entries as the RA administers the telephone survey. This computer based data collection will produce a clean dataset with minimal missing data and no out-of-range entries. Periodic data quality checks will be carried out by the data manager to identify systematic patterns of missingness that may occur during data collection.

Respondent dropout: In order to reduce dropout due to the participant being unreachable, we will collect multiple contact phone numbers at enrollment and implement tracking procedures for contact attempts by the study team as outlines in the human subjects section. A toll-free number will be available for participants to reach the research staff and flexible interview times will be offered to participants. If necessary, surveys can be completed over multiple contacts with the participants.

Interviewer bias: Study research assistants that conduct the telephone surveys, and the nurse abstractors who conduct the medical record abstractions will be blinded to the intervention status of participants.

Data Management and Quality Control. Research subject level data will be maintained in 3 separate files:

1) A master file (Registry) containing participant names, contact information (address and telephone number), a unique subject ID, social security number, dates of consent, and dates of each evaluation survey completion and respective human subject payment information for survey completion. There will be a separate master file for each participating site for a total of 5 master files. The Project Manager, Research Assistants, and Principal Investigator (PI) will have access to all 5 master files. Nurse care managers will only have access to the master file that correlates with their respective site. Nurse abstractors will have access to identifiers (subject name and social security number) for accessing subjects' individual records in the VA Computerized Patient Record System (CPRS). Social security numbers will be obtained to process subject payment.

2) A file containing the unique subject IDs and survey data. The Project Manager, Research Assistants (RA), PI, Statistician, and Data Analyst will have access to the survey data.

3) A randomization file that includes the unique subject IDs and randomization status. These data will be maintained in a separate location from care management data that is being collected for clinical care purposes. The Project Manager, Research Assistant (not the Interviewer), PI, Statistician, and Data Analyst will have access to the randomization file.

All files will be password protected and kept on a folder stored on the VA Sepulveda HSR&D COE secure server. Access to the file will be restricted to the research team. A user's manual outlining instructions for proper data entry procedures and a data dictionary containing definitions of study variables and descriptions of data coding conventions will be written. All data collected are de-identified and include unique subject IDs that are linked to the randomization file for randomization ascertainment and analysis. All research staff will have successfully completed the VA HIPAA course. Staff will abide by all HIPAA precautions and restrictions regarding research study data to protect human subjects, as detailed in the Human Subjects section of this application. The intervention nurse care managers, herein referred to as "Coordinated Care for Health Promotion and Activities in Parkinson's Disease" (CHAPS) and the RA interviewer will ask the care management and evaluation survey questions respectively in a closed room so that anyone in the hall cannot hear their conversations or interviews.

We plan to have all evaluation surveys (administered to both arms of the study: control and intervention), and CHAPS Assessment tool (administered to the intervention participants only) in electronic form with direct entry into an MS Access database. However, for unforeseen reasons (e.g. technical issues with electronic database), hard copies of these evaluation surveys or CHAPS Assessments may need to be used. The data from these hard copies will be double entered into the electronic database within 10 business days and a cross comparison will be done between the two entries. In the event that any discrepancies are found, we will use the hardcopy source document to correct the inconsistent entry.

Data will be kept in the MS access database on a password protected VA computer. All files will be password protected and kept in a folder stored on the VA Sepulveda HSR&D COE secure server behind a VA firewall. Data kept in the MS Access database will not be used for future research. Data will be kept in the database until VA policy allows for its destruction.

Hard copies of subject study-related recruitment and intervention materials, including the following list of items, will be maintained in the PIs office in a locked file cabinet until VA policy allows for their destruction. This office will be locked when not in use

- Decline and Preference for Contact Cards
- HIPAA Authorization (VA Form 10-5345)
- Copy of CHAPS Report of Assessment Summary (prepared by the CHAPS Nurse care Manager) mailed to participant if requested,
- CHAPS Self-assessment summary print out from kiosk that the veteran can give to his/her provider at a movement disorders clinic visit,
- Copy of veteran's self management care plan "My Action Plan" (intervention arm) mailed to participant
- Referral to agencies outside the VA

We will establish a 4-member multidisciplinary centralized data safety monitoring board (DSMB) that will include two Movement Disorder Specialists, Dr. Sarah Richardson and Dr. Indira Subramanian, a Geriatrician, Dr. Joshua Chodosh and a Parkinson's disease nurse specialist, Ms. Joann Harnar. The DSMB will be chaired by Dr. Subramanian. This board will meet prior to patient enrollment and then every 6 months to evaluate any adverse effects related to recruitment, enrollment, interview process and the care management intervention.

Care management, is an enhancement of usual care (i.e. usual care consists of all treatment options available to a provider to individualize a patient's care). The care management intervention processes in this study include asking questions to identify problems and unmet needs, some of which are often under-recognized and under-reported in usual care. Intervention care managers will provide information and support, and link veterans with appropriate providers and social services to address and manage these issues. Although we do not anticipate any breaches of confidentiality in this study, human error may result in accidental breaches of confidentiality. This risk will be minimized through rigorous IRB and ISO approved privacy confidentiality and data security procedures. Therefore, we foresee no potentially reportable adverse events related to the care management intervention in this minimal risk study except for possible breaches in confidentiality. Each site will convey any reportable events to the study PI at GLA who will then report these events to the Central IRB and our project DSMB.

Research Design and Methods 7 – Strategy for Data Analysis. All analyses will follow the intention-to-treat principle in that participants are included in the analyses regardless of the level of exposure to the intervention activities. In order to accomplish this analysis in patients who drop out of the study, we will employ a conservative imputation method such as last-value-carried-forward (LVCF). We will consider a P value less than or equal to 0.05 as statistically significant.

Specific Aim #1. Primary Outcome: Guideline Adherence. Guideline adherence will be determined by de-identified medical record and caregiver survey data. Outcomes are expressed as a percentage of applicable guidelines followed, which can be treated as continuously-scaled. In Table 4 of this application are examples of PD indicator process measures. Overall guideline adherence will be calculated as the mean percentage of eligible guidelines per patient that was adherent. Each of the 38 guidelines will also be analyzed individually.

All multivariate analyses will be preceded by bivariate analyses to describe relationships between key variables. First, descriptive statistics comparing the two arms on sociodemographic and clinical characteristics

(such as duration of PD) and on study outcome measures at baseline, using two-sample t-tests for continuous variables and χ^2 tests for categorical variables. We'll also compare baseline characteristics between participants who complete follow-up surveys and participants who do not complete follow-up surveys. Participants who do not finish the 18-month follow-up (or 24 months for the first 204 subjects; see below) due to bereavement or loss to follow-up will be excluded from the analyses but sensitivity analyses will include these participants.

An intention-to-treat analysis on all guideline adherence over time will be conducted using linear regression (or logistic regression when analyzing guidelines individually) with sampling weights using the sandwich variance estimator (robust variance estimator and Huber correction)[54-55] as implemented in Stata, version 11. Intervention status, indicator variables for site and corresponding baseline measure will be included as independent variables in all models. Other potential important covariates will be selected in advance of data analysis to be included in the model.

Although we anticipate modest attrition in this sample, we will use attrition weights for dependent variables obtained from the survey. Attrition weights will be derived using a logistic regression of the response status (completed study vs. not completed) on predictors, including demographics. The response probability will be predicted for each subject according to a fitted model. The weight will be the reciprocal of response probability.

The analysis also must account for the gap in the intervention over more than 6+ months for the subset of the first 204 patients enrolled in the trial and randomized to the intervention arm. Because of this, a 24 month survey was added to the study for all 204 of these individuals. The remaining 96 subjects who will be enrolled to obtain the final target enrollment of 300 but who will not experience this gap in the intervention will be followed for the pre-defined 18 months. In order to combine both of these "cohorts" into a complete analysis, a variable will be incorporated into the regression models to reflect the period of time the subject was off the intervention. For the subset out of the first 204 patients who were randomized to the intervention arm, this variable will take on a value of the number of months for this period; while for the second cohort of 96, this variable will take on the value of 0. (Also, any subject in the control ("usual care") group in either cohort will receive a value of 0 as well). This will be used as a linear adjustment variable to account for this anomaly in the way the intervention was administered, by incorporating it into a multiplicative interaction effect with intervention status. If this term is significant, then it will indicate that the delay of intervention affects the outcomes. The main effect of intervention status will remain as a separate term in the model.

Specific Aim #1. Secondary Outcome Measures:

Using the data collected at baseline, 6-month, 12-month and 18-month (or 24 months for the first 204 subjects) follow-up, we will examine the difference in the change score (from baseline to 6 months, baseline to 12 months, and baseline to 18 months or 24 months) of the secondary outcome measures between two study arms. These measures will be analyzed using linear regression with sampling weights using the sandwich variance estimator (robust variance estimator and Huber correction).[54-55] Intervention status, indicator variables for site and corresponding baseline measure will be included as independent variables in all models and potential covariates associated with each outcome measure will also be included as independent variables including the adjustment variable as noted above.

Sensitivity analyses will be performed to check the robustness of the main results or to explore other associations. These will include analyses using the last observed outcome measure carried forward to 18 months (or 24 months for the first 204 subjects) for those who do not reach the study end point, using only the 6 months of data, using only 12 months of data, and testing whether outcomes change significantly over time within each study arm.

Specific Aim #2a. Process Evaluation Analyses: A qualitative process evaluation will be conducted to assess implementation process barriers and facilitators to the intervention. This evaluation offers an opportunity to look inside the "black box" of care processes and implementation processes to better understand them. To do this, the research team will focus on detailed project meeting minutes from weekly meetings with intervention arm nurse care manager and the clinician champion at each site, and veteran's impressions documented in the 18-month survey (or 24-month survey for the first 204 enrollees). We will administer 5-10 minute surveys to the intervention arm nurse care managers and clinician champions at each participating VA site about the usability of the Siebens Domain Management Model and the Siebens Health Care Notebook in the intervention. We will also offer satisfaction questionnaires to key staff including CHAPS nurse care managers and clinician champions on impressions of and experiences with CHAPS. We may also supplement these with review of care management activity documentation in the tracking systems, (#1 and #2 below). To analyze these data, we will explore common threads or themes guided by the following implementation evaluation concepts .[56]

1. **Implementation processes:** Provider clinician engagement, any team formation or processes; delineation of gap between planned and actual implementation, planning processes, nurse and community organization staff participation in program training, extent of use of protocols and of CHAPS Nurse Care Management Manual, nature and degree of communication between care managers and physicians, clinician attention to communication and use of clinical information provided, push back, spread.
2. **Tools:** CHAPS Nurse Care Management Manual, letter templates and communication protocols.
3. **Impact:** Perceived changes in care quality, patient satisfaction, efficiency, and costs; unexpected consequences.
4. **Implementation barriers and facilitators:** Factors perceived to hinder or complicate the implementation; factors perceived to contribute to successful implementation.
5. **Lessons learned:** Nurse care manager and clinical champion's assessment of most important lessons learned.
6. **Environmental context and organization support:** Health system and community organization characteristics, other VA care management practices, use of information systems; key leadership support, organizational resource commitment
7. **Veterans' impressions:** Veteran's assessment, veteran's care plan, interactions with the nurse, community organizations, VA social services, use/usefulness of MyHealtheVet, etc.

We will employ a formal card sort approach to theme analysis of the interviews with veterans.[57] We will organize implementation barrier notes and items from meeting minutes into an excel spreadsheet. In both instances, Drs. Connor, Vickrey, and Cheng will meet together to come to consensus on sorting the text segments into categories/themes.

Specific Aim #2b. Cost Assessment: Using data collected from the Activity logs and itemized start-up costs, we will estimate separately both fixed and variable start-up and implementation costs of the intervention. Total costs for the intervention implementation will be calculated, broken down as technical assistance costs borne by the research team and implementation costs attributable to clinical staff.

Specific Aim #2b. Health Services Utilization: We will aggregate and compare health services utilization costs between the two study arms. The average cost per patient will be generated based on the administrative data and augmented by selective self-reported healthcare use from the telephone survey. We will calculate the costs associated with health services utilization in the 12 months preceding intervention and during the 18 months of the intervention. Utilization will include physician and emergency room visits, hospital admissions, nursing home admissions, home care services, and pharmacy data. We will determine the units of each service utilized per patient and apply standard unit costs from data costs of VA patient care encounters from

the VA Health Economics Resource Center (HERC). More information on the methods used by HERC to calculate average cost data can be found at: http://www.herc.research.va.gov/methods/methods_cost_ac.asp. The total cost of each participant will be examined between intervention and usual care using a two-sample t test and multivariate regression. Because of potential imbalances associated with the high costs of end-of-life care, we will conduct sensitivity analysis excluding participants who died during the study period.

If the costs for the intervention arm are significantly higher than usual care and significant improvements to patient outcomes are observed then we may perform a formal cost-effectiveness analysis using the primary and secondary outcomes. In addition, we also have the option of generating quality-adjusted life years (QALYs) based on the Health Utilities Index collected during the telephone interviews.

Advantages of the study design. The advantage of patient-level randomization rather than using physician or clinic and conducting a cluster trial is that the potential for imbalance across the randomization arms is greatly minimized with patient as the unit of randomization and analysis. Conducting a formative evaluation will provide key data on context and barriers that may need to be anticipated as the intervention is adapted to other settings. A cost analysis from VA perspective provides critical data on the value of the intervention in terms of resource-investment relative to any clinical benefit that is observed. The study design also takes advantage of the already established VA PADRECC at the GLA VA and its network of seven other VA facilities across the southwest United States. The GLA, Loma Linda, and Long Beach sites enrolled subjects in the NRI pilot. During the pilot-study, community partners (Parkinson Resource Organization, APDA, etc) have further solidified collaborative relationships with CHAPS investigators and clinical champions in PD across the VISN, as well as genuine excitement and commitment to the trial's goals. These community partners provide complementary services and have developed aspects of coordination to provide needed services for veterans with PD. These partners have agreed to implement the intervention in their respective clinical settings and to participate in project meetings. They have also agreed to provide their impressions and experiences implementing the intervention at their respective sites.

New care delivery methodologies to be used. This study will utilize technology that fosters veterans exploring access and use of communication and self-management tools for Parkinson's disease, such as the via the CHAPS Kiosk in the PADRECC clinic, and access from home or elsewhere to *My HealtheVet* and the PADRECC *Facebook* page.

Disadvantages and potential limitations of this design.
Since the unit of randomization is by patient rather than by physician or clinic, physicians will know which of their patients are receiving the intervention due to information and communication received from the CHAPS care managers. It is not possible to blind physicians to the intervention status of their patients; therefore this design will not be able to eliminate unintended interventions by physicians to their patients in the usual care arm. However, the nurse care manager fostering patient participation by actively linking veterans with medical and social services will be instrumental in this intervention,[58] so we anticipate that this small risk of experimental contamination is unlikely to affect study results, and the advantages of patient-level randomization outweigh any disadvantage. Another potential limitation is the availability of problem-specific information to any veteran (including usual care) at the "CHAPS kiosk" and the "PADRECC *Facebook* page," but since the nurse care manager will be actively encouraging use of these resources with intervention patients, the amount of use by usual care patients during this period is likely to be minimal. The lack of generalizability inherent in RCTs impacts the potential of study results. However, we have few restrictions in inclusion and exclusion criteria, to maximize the applicability of findings to all veterans with PD.

DISSEMINATION

Our general approach will be to disseminate/raise awareness of the study, its design, and rationale to administrators, clinician stakeholders, PD community/advocates, and researchers early in the study period. We will be able to share findings on implementation barriers before the study ends; these may be applicable and relevant to administrators, clinicians, and health services researchers studying other chronic diseases. Dissemination of the final study findings will be relevant to all audiences, but of particular import if the intervention has efficacy, as the rationale for broader spread will of course be high in that circumstance.

Dissemination 1 - Timelines. While dissemination activities based on final trial outcomes will commence in Year 4, dissemination of the trial design and rationale, and of initial findings about implementation barriers and strategies for overcoming them, can begin in earlier project years. Tools and products for implementing the intervention (training materials, care management manual, etc) will be made widely available in VA (and beyond), if the intervention has efficacy.

Dissemination 2 – Intended Audiences, Channels.
In addition to traditional dissemination in scientific journals (with articles on study design, implementation challenges, and main findings - all to be led by the PI, Dr. Connor), we propose the following strategies and audiences, aimed at other researchers, administrators, and "early adopters" in VA interested in participating in a next stage of rollout of the intervention in multiple geographical regions:

a. **VA PD Nurse and Physician Providers in the National PD Consortium.** We will leverage our existing regional and national network of PADRECCs to disseminate findings and products of the CHAPS intervention trial. In Year 1, we will raise awareness of the trial by presenting its design and rationale at the PD Consortium National Meeting. These meetings are held in alternate years and draw ~70 movement disorder experts, nurses, and clinical researchers in VA from all over the US. In Year 3, we would propose to give a presentation on implementation challenges at this meeting. At the end of the trial, we would propose to hold a ½-day session on trial findings and a session to discuss strategies for next steps in its spread. We would anticipate sharing intervention products on the consortium web site (http://www.parkinsons.va.gov/New_Front_Page.asp). The Southwest PADRECC Director, Jeff Bronstein, is the National Consortium co-chair and will facilitate these activities.
b. **VISN 22 leadership.** We will develop brief presentations on project goals and rationale to maintain awareness of the study during its execution, which the PI and mentor will deliver annually to leadership of the participating facilities, of facilities of the back-up sites, and of the VISN 22 administrative leadership. Our final report of study findings will include a "business case" analysis of program costs and other findings that will enhance evaluation of CHAPS' value. We will share study progress with the Patient Aligned Care Team stakeholders at our facility, both researchers from the HSR&D Center of Excellence and the administrators and others with whom they are engaged in this effort.
c. **VA nursing research community.** The PI will request permission to attend the Nursing Research Advisory Group meeting at the Annual HSR&D meeting each year, to learn about venues and mechanisms for sharing study findings in the VA nursing community.
d. **My HealtheVet.** We have reached out to the Veterans and Consumers Health Informatics Office to share qualitative evaluation data on veterans' use of My HealtheVet. Knowledge gathered through this study that can inform My HealtheVet about its structure and resources will be submitted for review and any suggested additions that this study might offer to help veterans with PD will be prioritized by the My HealtheVet Clinical Advisory Board, for possible development of a condition center for Parkinson's disease.
e. **VA implementation science community.** Dr. Mittman directs the VA CIPRS and we will work with him to develop dissemination strategies, including presentations on the Implementation Cyber Seminar Series. http://www.queri.research.va.gov/ciprs/programs.cfm

f. **Local and national PD advocacy Community.** The PD advocacy community is very active locally and nationally, and with our connections to this community through representatives on the Steering Committee and on the Advisory Board, we plan to bring attention to study findings through presentations and through newsletters, and to brainstorm with these representatives ways in which these organizations can partner with their local and regional VAs to implement CHAPS in a subsequent larger-scale study, if it is found to efficacious in this trial.
g. **National VA Quality Leadership.** We will request to share our findings and "toolkit" with OQP for possible dissemination on their website. We would ask for opportunities to dialogue about ways to imbed monitoring of one or two PD care indicators into national performance monitoring and improvement activities.
h. **HSR&D Service**. The next phase of a QUERI process would be to monitor implementation and outcomes of a larger-scale study involving sites from multiple geographic regions, and we propose to develop an application for funding of such a research study, depending on this study's findings.
i. **Clinicaltrials.gov**. We will register the study on clinicaltrials.gov website, which will aid in dissemination of study findings, and update with study findings at the end of the trial.

Dissemination 3 – Estimated Budget. Development of study products and tools is part of the study budget and will require no additional resources. Travel to the National Consortium meetings and local VISN travel to give presentations will be supported through PADRECC funds. Other dissemination activities will occur through conference calls. Thus, there is no additional budget for these activities.

PROJECT MANAGEMENT PLAN (following page)

PROJECT MANAGEMENT SCHEDULE Updated November 2014 NRC11-126

KEY ---- ongoing/scheduled **X** deleted previously scheduled activity # revised 2014

Project Months	Year 1	Year 2		Year 3		Year 4		Year 5	
	5/1/12-9/30/12	10/1/12-4/30/13	5/1/13-9/30/13	10/1/13-4/30/14	5/1/14-9/30/14	10/1/14-4/30/15	5/1/15-9/30/15	10/1/15-4/30/16	5/1/16-9/30/16
	FY12	FY13	FY13	FY14	FY14	FY15	FY15	FY16	FY16
ACTIVITIES	**0-6**	**7-12**	**13-18**	**19-24**	**25-30**	**32-36**	**37-42**	**43-48**	**49-53**
Annual Advisory Board meeting				---		#		#	#
Steering Committee teleconf meetings		---	---	---	---	---	---	---	#
Weekly project and teleconf site meetings	---	---	---	---	---	---	---	---	#
Project internal DSMB meetings		X	---	---	---	---	----	---	#
Weekly mentor-mentee meetings	---	---	---	---	---	---	---	---	#
IRB approvals; annual renewal & Vendorizations	---		---		---		---		#
Patient identification from VISN 22 Data Warehouse & VHA National Data Systems (NDS)	---			X	#				
Vet patient lists with providers	---	---	---	---	---	#			
Recruit and enroll study participants	---	---	---	X	---	#			
Collect baseline measures	---	---	----	---	---	---			
Collect 6, 12, & 18-mo follow-up measures		---	----	---	---	---	---	---	---
Collect 24-mo follow-ups on first 204 enrollees							#	#	#
Hire nurses to cover GLA, LV, LL, LB & SD	---			#	#				
Train all nurse care managers	----	---	---	#	#				
CHAPS care management activities		---	---	X	---	---	---	---	#
Intervention refinement based on NCM feedback				---	---				
MS Access programming of CHAPS tools	---	---	---	---					
Abstract medical records							X	X	#
Analyze data and prepare manuscripts				---		---			#
Produce annual project reports		---		---		---		---	#
DISSEMINATION ACTIVITIES									
a. Present at VA National PD Consortium mtg			---		---		---		#
b. Present to VISN 22 leadership annually			---		---		---		#
c. Present to Nursing Research Adv Group			X		---		---		#
d. Apply to My HealtheVet Clinical Advisory Board to develop a Condition Center for PD									#
e. CIPRS to cyber seminars			X			---			#
f. Present to community organization leadership			X			---			#
g. Office of Quality Performance (OQP): PD Toolkit									#
h. Prepare proposal to HSR&D for roll out									#
i. Register with clinicaltrials.gov and update	---								#

PROJECT MANAGEMENT SCHEDULE Updated December 2015 NRI 11-126

KEY --- ongoing/scheduled **X** deleted previously scheduled activity **# updated to accommodate project extension through 4/30/2017**

	Year 1	Year 2		Year 3		Year 4		Year 5		Year 6
Project Months	5/1/12-9/30/12	10/1/12-4/30/13	5/1/13-9/30/13	10/1/13-4/30/14	5/1/14-9/30/14	10/1/14-4/30/15	5/1/15-9/30/15	10/1/15-4/30/16	5/1/16-9/30/16	10/1/16-4/3-/17
	FY12	FY13	FY13	FY14	FY14	FY15	FY15	FY16	FY16	FY17
ACTIVITIES	**0-6**	**7-12**	**13-18**	**19-24**	**25-30**	**32-36**	**37-42**	**43-48**	**49-53**	**54-60**
Annual Advisory Board meeting			X	---		---		---		#
Steering Committee teleconf meetings		---	---	---	---	---	---	---	---	#
Weekly project and teleconf site meetings	---	---	---	---	---	---	---	---	---	#
Project internal DSMB meetings		X	---	---	---	---	----	---	---	#
Weekly mentor-mentee meetings	---	---	---	---	---	---	---	---	---	#
IRB approvals; annual renewal & Vendorizations	---		---		---		---		---	#
Patient identification from VISN 22 Data Warehouse & VHA National Data Systems (NDS)	---			X	---					
Vet patient lists with providers	---	---	---	---	---	---	#			
Recruit and enroll study participants	---	---	---	X	---	---	#	#		
Collect baseline measures	---	---	----	---	---	---	#	#		
Collect 6, 12, & 18-mo follow-up measures		---	----	---	---	---	---	---	---	#
Collect 24-mo follow-ups on first 204 enrollees							---	---	---	#
Hire nurses to cover GLA, LV, LL, LB & SD	---			---	---					
Train all nurse care managers	----	---	---	---	---					
CHAPS care management activities		---	---	X	---	---	---	---	#	#
Intervention refinement based on NCM feedback				---	---					
MS Access programming of CHAPS tools	---	---	---	---						
Abstract medical records							X	X	#	#
Analyze data and prepare manuscripts				---		---			---	#
Produce annual project reports		---		---		---		---		#
DISSEMINATION ACTIVITIES										
a. Present at VA National PD Consortium mtg; PADRECC website			---		---		---		X	#
b. Present to VISN 22 leadership annually			---		---		---		X	#
c. Present to Nursing Research Adv Group			X		---		---		X	#
d. Apply to My HealtheVet Clinical Advisory Board to develop a Condition Center for PD									X	#
e. CIPRS to cyber seminars			X			---			X	#
f. Present to community organization leadership			X			---			X	#
g. Office of Quality Performance (OQP): PD Toolkit									X	#
h. Prepare proposal to HSR&D for roll out									X	#
i. Register with clinicaltrials.gov and update	---								X	#

Mentors' Role Purpose, and Interactions with the PI:
1. Barbara Vickrey, MD, MPH: Dr. Vickrey will provide experienced and effective mentorship of Dr. Connor in all aspects of this study. Dr. Vickrey, a neurologist and accomplished health services researcher, has mentored numerous post-doctoral students and physicians in health services research over the past 15 years. Drs. Vickrey and Connor have a long-standing professional relationship. Dr. Vickrey was the PI for a multi-site randomized controlled trial of a dementia care management program for which Dr. Connor was Project Manager while completing her PhD. Currently, they work together at the Southwest PADRECC; their offices are next to each other in Building 401 on the VA West LA Campus. Dr. Vickrey serves as Co-Principal Investigator and mentor on Dr. Connor's HSR&D NRI funded pilot-study. Dr. Vickrey will meet twice weekly with Dr. Connor at the VA and will be available by telephone and email throughout the week to facilitate the study's success and Dr. Connor's continued growth via this scientific endeavor.
2. Donna McNeese-Smith, RN, EdD: Dr. McNeese-Smith is an experienced nurse researcher, having been involved with a variety of research studies, usually as PI, throughout her 18 years as an academic faculty member of the UCLA School of Nursing. Her research has focused on health services including case management research; particularly organizational variables such as leadership and organizational and patient outcomes. Dr. McNeese-Smith served as the chair on Dr. Connor's doctoral dissertation committee and currently serves as mentor and consultant on Dr. Connor's HSR&D NRI funded pilot-study. Dr. McNeese-Smith will be available by telephone for the weekly mentor-mentee calls and will be available by email throughout the week to aid in Dr. Connor's growth and accomplishments as a new nurse investigator. Dr. McNeese-Smith will attend yearly project meetings providing the necessary consultation to help guide this research.

Member of the research team and how their work will be coordinated:
Research Team: The research team consists of Drs. Connor, Vickrey, Cheng, Ganz, Lee, and Mittman and Lisa Edwards Project Manager. Drs. Connor, Vickrey, Cheng, and Lisa Edwards will have weekly research team meetings to facilitate all project activities. A workflow management system (Gantt chart of main tasks) will be used to coordinate all project work. All meetings will have an agenda distributed in advance. Ms. Edwards will record specific meeting minutes.
Karen Connor, PhD, RN, MBA; Principal Investigator, will oversee all aspects of the research study methodology assuring the scope and integrity of the project and products. She will oversee the coordination of the project work, hold weekly internal meetings with research staff and prepare for and lead external meetings with the Steering Committee. She will manage the budget and be responsible for successful completion of the project objectives and deliverables within budget and timeline.
Barbara Vickrey, MD, MPH: Co-Principal Investigator/Mentor, will provide an overall advisory role to implement the intervention, plan and analyze data, and assist Dr. Connor to accomplish all dissemination activities, meeting with her weekly and supporting her as needed as Dr. Connor leads project-related meetings.
Eric Cheng, MD, MS: Co-Investigator/Mentor: Dr. Cheng led the prior studies to develop PD quality indicators and to develop a medical record abstraction tool to measure quality of care for PD in the VA. He has used VA databases for research studies in stroke and PD. He will work closely with Dr. Connor to design and program the Medical Record Abstraction tool database. Dr. Cheng will oversee the project data analyst and medical record abstractors that carry out administrative data pulls, medical record abstraction and analyses. He will oversee overall data management together with Dr. Connor. Dr. Cheng will take over Mentor responsibilities for Dr. Barbara Vickrey upon her departure from VA on September 30, 2015.
Lisa Edwards, BA: Health Science Specialist (Project Manager) will provide administrative and management assistance to the research team in all areas of the study. Ms. Edwards will coordinate project activities including IRB applications and renewals, meetings and related materials, subject recruitment materials, and preparing reports throughout the project period. She will assist in orchestrating all project meetings. She will draft project-related presentations and portions of manuscripts for dissemination.

Other research team members: David Ganz, MD, PhD; Martin Lee, PhD; and Brian Mittman, PhD will join the Research Team meetings on a monthly and as needed basis for the study to proceed per study protocol.
David Ganz, MD, PhD, geriatrician has a PhD in Health Services from UCLA and extensive experience in analysis of health plan utilization data as well as in conducting cost analyses. He is with the VA GLA Geriatrics Research, Education, and Clinical Center. Dr. Ganz will consult on data collection protocols for costs and utilization data, and will assist in analyses and data interpretation.
Martin Lee, PhD, senior statistician at the Sepulveda VA HSR&D COE, is available to provide to supply statistical support and assist in determining which statistical procedures are appropriate for the research.
Brian Mittman, PhD, Director of the VA Center for Implementation Practice and Research Support (CIPRS), has substantial involvement in the VA QUERI and international recognition in implementation research. Dr. Mittman will provide expert advice on the evaluation of the implementation, on qualitative analyses, and dissemination activities.
Frances Barry an experienced data analyst -- who has previously analyzed data will be responsible for data management and statistical analysis activities.
Jessica Needham, BA, research assistant, will assist in recruitment and enrollment; she will be the un-blinded RA. She will meet with Dr. Connor and Ms. Edwards on a weekly basis (Years 1 and 2).
Michael McGowan: interviewer will administer patient surveys at baseline, 6, 12, and 18 months, and 24 months for the first 204 to veterans enrolled in the study. He will be supervised by Dr. Connor and Ms. Edwards. He will function as the RA blinded to randomization assignment.
To-be-named Registered nurses will abstract outcome data from CPRS medical records.

Clinical Implementation Teams: The clinical implementation team at GLA, Las Vegas, Loma Linda, Long Beach, and San Diego consists of a nurse, a back-up nurse and a physician. These nurses and physicians will participate in site-research team meetings to facilitate recruitment and intervention protocols. We anticipate1.5FTEE clinical implementation nurses will care manage the enrolled subjects across the five sites. Physicians may work remotely with a clinical implementation nurse from another site. Each site team will carry out recruitment and implementation efforts and will notify the Research Team of barriers and facilitators to these efforts.

Primary site (VA Greater Los Angeles).
Virginia Janovsky: Ms. Janovsky is the full-time GLA PADRECC nurse specialist-certified who has worked with PD veterans for several years. Ms. Janovsky's role (as well as the nurses to be hired at the sub-award sites) includes conducting initial and periodic re-assessments, providing education and care coordination, collaboratively developing care plans with veterans, following up with referrals to providers and linkages with community-based resources, and coaching veterans on My HealtheVet, Davis Phinney Manual workbook, the VA Patient Education Resource Centers to promote self-management skills.
Dr. Emad Farag (West LA campus) a PD specialist, will assist with the recruitment process and will work closely with Ms. Janovsky, providing decision-support to carry out the clinical protocols.
Dr. Denson Fujikawa, general neurologist at Sepulveda campus, will assist with recruiting subjects and will provide the time necessary to carry out the protocols at the Sepulveda VA campus in coordination with Ms. Janovsky's care management activities.

Proposed collaboration and coordination with institutions or investigators outside PI's facility:
VA Las Vegas, VA Loma Linda, VA Long Beach and VA San Diego sub-award sites
Each physician will work closely with the assigned project nurse to implement the intervention protocols. Each site will carry out care management duties utilizing the tools, materials, and protocols developed in the NRI-pilot study. All clinical implementation team members will participate in regularly scheduled calls with the Research Team and will provide feedback about the recruitment and intervention processes.

- VA Loma Linda clinical implementation team will consist of **Dorothee Cole, MD** (movement disorders specialist and VA PADRECC site director), and a Amanda Markusson, NP, a PADRECC-supported GLA nurse.
- VA Las Vegas clinical implementation team will consist of **Selina Parveen, MD** (movement disorders specialist and VA PADRECC site director), and Jessica McKee, RN, a PADRECC-supported GLA nurse.
- VA Long Beach clinical implementation team will consist of **Steven Schreiber, MD** (Chief of Neurology and VA PADRECC site director), and Jessica McKee, RN, a PADRECC-supported GLA nurse.
- VA San Diego clinical implementation team will consist of **Stephanie Lessig MD**, (neurologist, Movement Disorders Specialist and VA PADRECC site co-director) and Mary Tichacek, APRN, a PADRECC-supported GLA nurse.

Consultants, contractors, and other non-VA employees: Consultants will provide relevant PD and care management expertise to the implementation and evaluation of the intervention: Donna McNeese-Smith (UCLA School of Nursing), Donna Benton (Caregiver Resource Center- Los Angeles); Jo Rosen (Parkinson's Resource Organization).
Los Angeles Caregiver Resource Center (Donna Benton, PhD, Director) http://geroweb.usc.edu/lacrc/ will coordinate the effort of her staff to connect veterans referred to CRC for support groups, respite care, referrals to legal and financial consultations, and in-home family consultations to assist caregivers to develop solutions for problems they face in their caregiving. Dr. Benton will provide feedback about the implementation process at CRC and will participate in monthly calls with the Steering Committee.
Parkinson's Resource Organization (PRO; Jo Rosen, President and founder)
http://www.parkinsonsresource.org will provide outreach to veterans referred to PRO and will provide information and feedback about the implementation process in monthly calls with the Steering Committee
Donna McNeese-Smith (UCLA School of Nursing) will provide mentoring to Dr. Connor as stated above.
Hilary Siebens, MD (Siebens Patient Care Communications) will provide education and teaching sessions to CHAPS nurse care managers regarding the Siebens Domain Management Model and the Siebens Health Care Notebook.

Advisory Board Members: Advisory board members will provide advice on a regular basis to the Steering Committee and the Research Team on implementation and evaluation of the CHAPS intervention. The Advisory Board will meet annually in-person at the VA Greater Los Angeles PADRECC location on VA West Los Angeles campus.

Table 5. CHAPS Advisory Board

Site or organization	Individual	Expertise or Title
VHA Neurology	Robert Ruff, MD, PhD	National Chief Neurology
VA GLA Healthcare System	Jeff Bronstein, MD, PhD	Southwest PADRECC Director National PD Consortium Co-Director
VA GLA Healthcare System	Sharon Valente, PhD	Director of Nursing Research, VA GLA
VHA Neurology	Fran Weaver, PhD	PD research, My HealtheVet Research Director
National Parkinson Foundation	Peter Schmidt, PhD	National Director
American Parkinson's Disease Association (APDA)	Michele Popadynec, RN, MPS	Acting Director, Scientific and Medical Affairs
Veteran Representative	John Ball	Patient Advocate/Representative
Care Partner Representative	Edna Ball	Patient Advocate/Care Partner Representative

National Parkinson Foundation (NPF) advisory board member, Peter Schmidt, will attend annual meetings to help coordinate services at the local center of excellence at University of Southern California to which veterans can be referred for special classes, support groups and/or educational activities. Mr. Schmidt will be available by telephone and email to assist with NPF resource delivery at the local level. http://www.parkinson.org

American Parkinson's Disease Association (APDA) advisory board member, Michele Popadynec, will attend annual meetings to provide input about how APDA can provide patient support and educational assistance to veterans with PD. She will be available by telephone and email to assist with APDA resource delivery at the local level. http://www.apdaparkinson.org