Department of Veterans Affairs · Quality Enhancement Research Initiative

Stroke QUERI

Strategic Plan and Annual Report

November 2007

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Stroke QUERI

Strategic Plan

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STROKE QUERI STRATEGIC PLAN

Executive Summary

Overview

The mission of the VA HSR&D Stroke Quality Enhancement Research Initiative (QUERI) is to reduce the risk of stroke and to foster system, provider and patient processes that result in the best possible outcomes for veterans with stroke. This mission is accomplished by focusing on six core clinical goals: (1) improve acute in-patient stroke care; (2) prevent post-stroke complications; (3) initiate secondary prevention among veterans with stroke and transient ischemic attack; (4) ensure that veterans with stroke receive appropriate and high quality rehabilitation; (5) screen and treat veterans with stroke for post-stroke depression; and (6) support the reintegration of veterans into family and community life post-stroke. We use three main approaches to address our clinical goals: (a) evaluate evidence-practice gaps in stroke care; (b) identify and address disparities in stroke care; and (c) implement and evaluate innovative programs to improve the quality of stroke care and patient outcomes.

We operationalize this mission via work coordinated and conducted by three core Workgroups: 1) In-hospital Management (Dr. Bravata, lead); 2) Rehabilitation and Recovery (Drs. Chumbler and Williams, co-lead); and 3) Stroke Risk Factor Management (Drs. Beyth and Matchar, co-lead).

Highlights of Recent Accomplishments

In the past year, the Stroke QUERI realized a key goal of FY07: initiating the development of a "stroke scorecard." This project took the form of a Stroke Special Project with the Office of Quality and Performance (OQP). In this project, which will be completed in FY08, we will work with OQP to assess and feedback to all VA facilities their performance on Joint Commission (JC) stroke quality of care indicators during FY07, providing the first snapshot of the quality of inpatient VA stroke care. This project will also assess risk factor management one year prior to and six months post-stroke for all veterans receiving care in the VA during those time periods. These data will be critical to understanding variation in practices during inpatient stroke care, rehabilitation, and risk factor modification and to identifying the best targets for subsequent quality improvement efforts. This project builds on our recently completed project assessing inpatient stroke care in three VA and two non-VA facilities (QUEST project, currently in analysis).

Also in FY07, we used a healthcare system redesign framework to evaluate the process of inpatient dysphagia screening, partnering with front line providers and managers at two VAMCs to implement and evaluate this screening mandated by the VA Office of the Inspector General. This framework is a strategy we plan to increasingly explore in subsequent years, and are using it in our planned FY08 Implementation Project (see Section 1.7).

A long-term objective of the Stroke QUERI is to develop a stroke quality improvement network across the VA. Building on our FY07 VISN 11 Stroke Initiative (see Annual Report, Executive Summary), and using OQP Stroke Special Project data, we plan to take the next step in this process with our FY08 Implementation Project (see Section 1.7 for a more complete description). Briefly, this project will include examination of the OQP Stroke Special Project data on inpatient stroke performance and training of VISN 11 physician and nursing providers in healthcare system redesign methods. With Stroke QUERI support, facilities will select one

or more stroke inpatient performance measures to improve using redesign methods, plan and conduct local improvement efforts, and evaluate the impact of these strategies. Importantly, we will evaluate the contextual factors across facilities that are associated with successful implementation of evidence and will refine the training program as we plan for further expansion of this network in subsequent years. As we identify critical evidence-practice gaps and/or disparities in stroke care in the OQP Stroke Special Project, we envision using strategies learned via this Network to address these gaps.

We continued our use of information technology (IT) tools in implementation, with two active projects (telehealth to increase access and quality of rehabilitation and a clinical reminder to prompt depression screening post-stroke) using IT in active implementation to improve processes and outcomes of stroke care. We also received funding for a Service Directed Project (SDP) to develop and test a decision support tool to prompt and document guideline-adherent inpatient stroke care processes at three VA facilities (SQUIDSS project) and for an IIR evaluating treatment of sleep apnea as an evidence-based intervention to improve blood pressure control post-stroke and TIA. Finally, in FY07 the Stroke QUERI worked to increase engagement with other VA administrators, clinicians, and researchers committed to improving stroke care, adding several members to our core workgroups and engaging senior VA leadership in various workgroup, Executive Committee, and other roles (see Annual Report, Executive Summary for additional detail).

Key Features of Future Plans

In the **short term** (1-2 years), we are focusing considerable effort on improving the quality of inpatient stroke care, including screening and initial treatment of stroke risk factors for secondary stroke prevention, since this is a critical area in which performance standards have been widely disseminated but in which the VA is currently not engaged in performance measurement. The Stroke QUERI is beginning to initiate implementation activities in this arena, as exemplified by our FY07 implementation project to improve dysphagia screening in hospitalized stroke patients, and by our planned FY08 implementation project to develop a stroke quality improvement network in VISN 11 (see Section 1.7). As we measure inpatient stroke care quality and work with facilities to develop a stroke quality improvement network, we recognize that a critical element is effective health information technology (IT) tools to support best practices. For this reason, we have also collaborated with the Houston VAMC, one of the highest volume stroke facilities in VHA, on an SDP to develop a Stroke Quality Improvement Decision Support System (SQUIDSS) that will prompt and document guideline-adherent acute care processes in the VA electronic medical record. This project is just getting underway and will result in available stroke-specific IT tools for the field over the next 2-3 years.

We will continue our focus on improving the quality of post-stroke care by evaluating existing IT tools to promote high quality stroke care in the areas of access to rehabilitation interventions (via telehealth technology) and post-stroke depression screening (by modifying the VA's current annual depression screening tool so veterans are screened for depression within the first 6 months post-stroke). This work is accomplished via two ongoing funded projects. We are also actively implementing tools to improve caregiver and patient understanding of post-stroke care via projects involving print and electronic media including the MyHealtheVet platform. This work is also accomplished by funded SDP and IIR projects. These ongoing implementation projects will provide critical information about how to improve these important aspects of post-stroke care quality in the next few years. We will also continue to support the dissemination of the FIM supporting indicator for hospitalized veterans with stroke, as Dr.

Cowper-Ripley in Gainesville provides VACO with quarterly mapping of variation in performance.

Our efforts in the **medium term** (2-4 years) include broadening our efforts in stroke risk factor modification. Initially, this is likely to take place in the form of secondary stroke prevention management as we recently have had funded an implementation project to address risk factor assessment and management as veterans transition to home from their stroke or TIA admission (TOOLS). Stroke risk factor assessment and initial management will be assessed in our OQP project in FY08, as will risk factor management in the one year prior and six months following the acute stroke admission. This will provide key evidence-practice gap data that will inform our subsequent decisions about which aspects of stroke risk factor management deserve special attention. We are continuing work on tools to support anticoagulation decision support for patients with atrial fibrillation and their providers. Finally, we recently obtained funding for a project to identify and treat sleep apnea in patients with stroke and TIA, another important stroke risk factor and stroke outcome modifier that is not addressed by other QUERI groups.

In the **longer term** (4 or more years), we have interest in expanding efforts to veterans with TIA, as we view this as a high risk group for whom prevention efforts might most effectively be targeted. Further, emerging evidence suggests that timeliness of evaluation of TIA patients is a crucial aspect of stroke prevention, and thus may be a good target for system improvements. Although little is currently known about TIA management in VA, and accurate and rapid identification of these patients is likely to be challenging, the OQP project will provide an assessment of risk factor management for those veterans with VA ED visits or hospitalizations for TIA in the two months prior to their stroke, and so will provide some guidance about where future improvement efforts could most effectively be targeted.

We recognize that the Stroke QUERI cannot support all of the elements necessary to implement this type of system-level change with our core resources alone. Because we are committed to improving stroke care across the clinical continuum and throughout VHA, our overarching strategy is to improve VA stroke care quality by developing key implementation tools development and conducting active intervention projects while engaging and supporting other VA offices, administrators, clinicians, and researchers in the ongoing process of improving stroke care for all veterans.

SECTION 1: CENTER MISSION, GOALS AND SCOPE

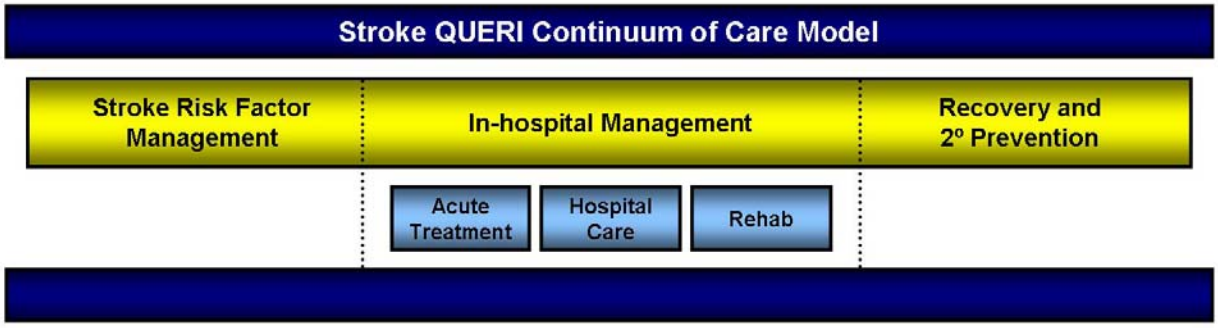
1.1 Clinical Focus and Scope

Stroke encompasses multiple diagnoses, most commonly divided into hemorrhagic and ischemic stroke subtypes. Hemorrhagic stroke represents approximately 15% of all strokes in the U.S. and includes the major diagnoses of intracerebral hemorrhage and subarachnoid hemorrhage. Ischemic stroke represents approximately 85% of all strokes in the U.S. and as such is the stroke condition on which the VA Stroke QUERI is focused. *Broadly speaking, the Stroke QUERI is committed to improving care and outcomes for veterans at risk for ischemic stroke and those who have sustained an ischemic stroke.*

It is in the at-risk population that we have the greatest overlap with other QUERI centers who are addressing vascular risk factors. This overlap is most relevant for the Diabetes, Chronic Heart Failure and Ischemic Heart Disease QUERIs. In view of the excellent work being carried out by these QUERI groups, we have explicitly chosen to not focus our work in the areas of diabetes and lipid management for primary stroke prevention. While we do address these risk factors as they pertain to secondary stroke prevention and implementation of stroke guidelines, we seek to leverage the efforts in performance measurement and disease management in these areas that have already been accomplished with the leadership of these groups.

One of the challenges for the Stroke QUERI is the reality that stroke is a heterogeneous condition that includes the provision of care by many different types of providers (e.g., nurses, internists, neurologists, physiatrists, therapists) across many different practice settings (e.g., outpatient primary care, outpatient specialty care, inpatient, rehabilitation). We also have the challenge of being a high impact, high acuity condition for which the volume and type of stroke cases varies substantially from one VA facility to another. As exemplified by our clinical model (see Figure 1), the Stroke QUERI is committed to engaging across all aspects of the stroke care continuum from prevention to acute treatment to rehabilitation and recovery, but we recognize the need to focus our work to realistically set and accomplish goals and to most effectively meet the needs of VHA. Because of the overlap in vascular risk factors mentioned above, we have chosen to limit our primary prevention work to important stroke risk factors either not specifically addressed by other QUERI groups or for which there are important considerations in the context of stroke, including management of atrial fibrillation and hypertension. At the present time, given current national and VHA emphasis on inpatient stroke care and given the current lack of performance measurement in this area within the VA, we are prioritizing work around performance measurement and improvement for acute stroke care (see Section 1.6 for further explanation of Stroke QUERI's prioritization of clinical goals).

Figure 1: Continuum of Care Model

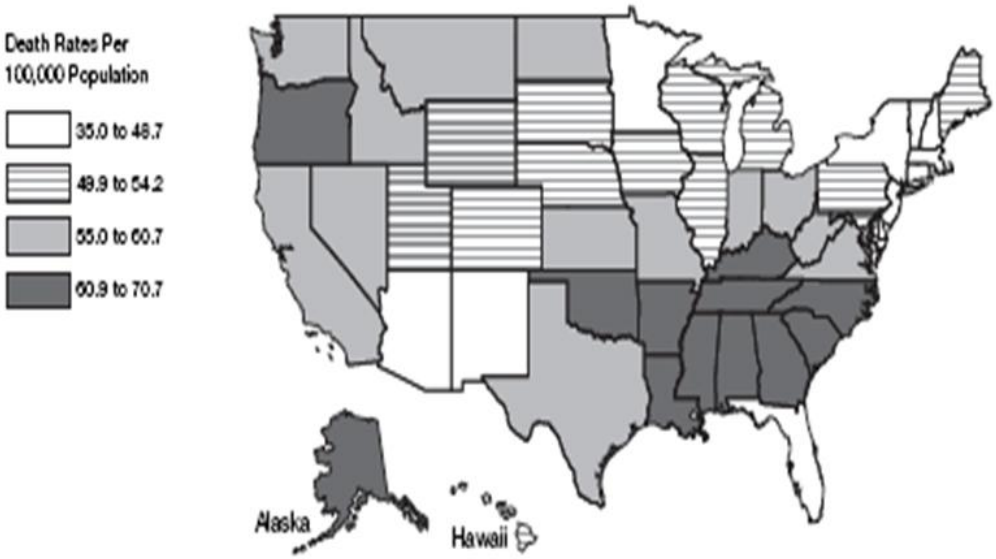


1.2 Significance and Consequence: Epidemiology, Morbidity/Mortality, Quality of Life and Costs

Stroke Prevalence: Each year in the U.S., about 700,000 people experience a new or recurrent stroke.[1] Approximately 500,000 of these are first strokes, with 200,000 recurrent attacks.[1] Stroke prevalence increases with increasing age and among people with Black race/ethnicity. For example, the stroke prevalence among men aged 65-74 years is 6.7 per 1000 for Whites and 10.4 per 1000 for Blacks, but among men aged ≥85 years the rates are 16.8 per 1000 for Whites and 24.7 per 1000 for Blacks.[1]

Mortality: Stroke is the third leading cause of death in the US. One in seven stroke survivors die within 6 months after their stroke, and more than half die within the first 5 years post-stroke.

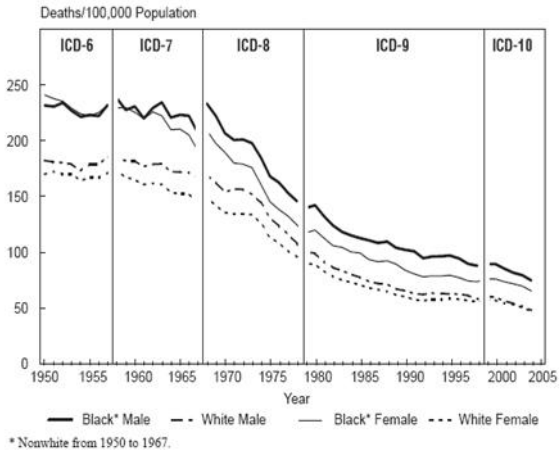
Figure 2: 2003 Stroke Age-adjusted Death Rates by State



Geographic variation is known to exist in stroke mortality with the highest stroke mortality rates seen in the southeastern region of the United States (see map above).[1] Although the stroke mortality rates decreased considerably during the 1970s, this rate of decline has slowed substantially in recent years. Stroke mortality remains highest among Black males and Black females.[2]

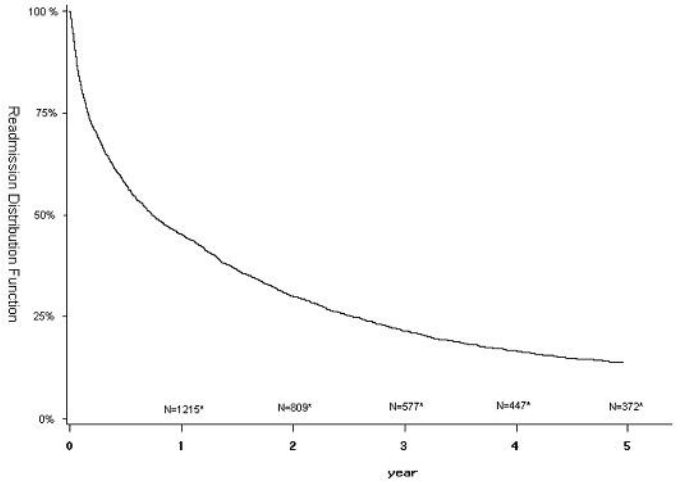
Morbidity: Stroke is a leading cause of serious, long-term disability in the U.S., with over 5.5 million Americans having survived a stroke.[2] Of these, more than 1.1 million American adults report difficulty with functional limitations or activities of daily living as a consequence of stroke.[3] Among stroke survivors, 15-30% are permanently disabled,[2] with 20% requiring institutional care at 3 months after stroke onset.[1] Stroke is considered the leading cause of acute-onset adult disability, and often has persistent negative effects on quality of life of both patients and their family caregivers.[3-5]

Figure 3: Death Rates for Stroke by Race and Sex, U.S., 1950-2004



Readmissions: Stroke patients are at increased risk of hospital readmissions. For example, among patients who survive an index stroke, 40% will have at least one readmission during the first year after the index stroke.[6] Over half will die or be readmitted at least once during the first year post-stroke and less than 15% will survive admission-free for five years.

Figure 4: Survival without Hospital Readmission



The most common cause of hospital readmission is pneumonia or respiratory illnesses, with an annual readmission rate between 8 and 9% throughout the first five years post-stroke. Stroke is a leading cause of hospital readmission (4-6% of patients annually), and accounts for a comparable number of readmissions as does acute myocardial infarction (4-6% of patients annually).

Costs: The estimated direct and indirect cost of stroke in 2006 was $57.9 billion, consisting of $37.3 billion (64%) in health care expenditures, $6.4 billion (11%) in lost productivity due to morbidity, and $14.2 billion (25%) in lost productivity due to premature mortality.[1] At the individual level, mean lifetime direct cost of ischemic stroke in the U.S. is $140,048. Stroke costs increase with increasing stroke severity such that the average cost for the first 30 days post-stroke was $13,019 for mild ischemic strokes

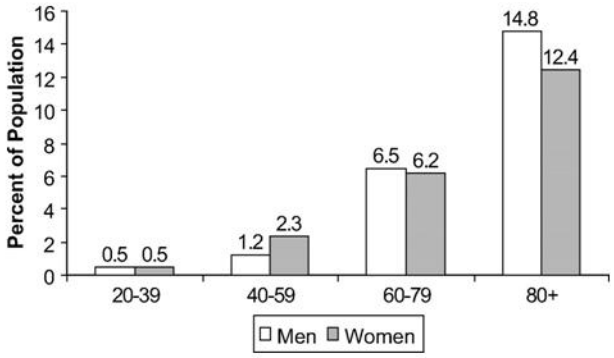
and $20,346 for severe ischemic strokes.[1] Evidence suggests that the cost burden falls disproportionately on minorities.

Stroke in the VA System: Within the VA, approximately 17,000 patients were treated for stroke during FY05. Preliminary data from our OQP special study suggest that in FY07, nearly 6,000 veterans were admitted to a VA facility for acute inpatient ischemic stroke care (excluding admissions for rehabilitation or extended care). One year post-stroke mortality for VA inpatients is approximately 20%; and 30% of veterans with stroke are discharged to non-community, institutional settings.[5] The total VA cost of stroke treatment was almost $315 million in FY05, with a cost per patient of over $18,000. The importance of stroke within the VA is emphasized by the fact that stroke patients account for over 10 percent of the VA's complex caseload, with a cost per patient that is over 3.4 times the overall VA average.[4]

Veterans are at increased risk of stroke because three of the most important stroke risk factors are common among the veteran population: older age; hypertension; and atrial fibrillation. Figure 5 displays the relationship between increasing age and increasing stroke prevalence.[1] Hypertension affects more than 8.5 million veterans, and approximately 220,000 veterans have atrial fibrillation. (2004 VHA Medical Inpatient datasets, both Acute Inpatient Main and Extended Care Main files, and VHA Medical Outpatient dataset).

Moreover, many veterans have risk factors for post-stroke mortality which include older age, male sex, increasing comorbidity, discharge not to home, and prior admission within a year of the index stroke event.

Figure 5: Age and Prevalence



Variation in Stroke Care Quality: Despite advances in the prevention and acute management of stroke, many patients do not receive high quality care. Wide variation in acute stroke care exists including under-use of established therapies (e.g., antiplatelet agents, anticoagulation for atrial fibrillation), over-use of unproved therapies (e.g., intravenous anticoagulation), and misuse of therapies (e.g., errors in the administration of thrombolytic therapy).[7-10] Despite successful implementation of stroke care quality improvement programs at many individual facilities, stroke care quality has not been improving substantially for the nation. For example, among Medicare beneficiaries only 55% of ideal candidates received warfarin for atrial fibrillation during 1998-1999 and this rate increased only modestly to 57% in 2000-2001.[8] Similarly, among the U.S. academic medical facilities in the University Healthsystem Consortium, only 45% of stroke patients received screening for dysphagia prior to oral intake in 1999; this rate fell to 35% in 2001, and was 38% in 2005.[11] The Paul Coverdell Stroke Registry, a national sample of acute stroke admissions, found that although 92% of patients received antithrombotic therapy at discharge, only 45% of eligible patients were screened for dysphagia, 34% had lipid evaluation, and 21% received counseling for smoking cessation.[12]

Variation in Stroke Outcomes is Associated with Variation in Stroke Care Quality: As expected, adverse post-stroke outcomes are associated with poor stroke care quality.

Numerous studies have demonstrated the relationship between processes of stroke care and post-stroke outcomes. For example, among patients treated with thrombolytic therapy, in-hospital mortality increases as the number of major protocol deviations increases: 14% mortality among patients with no major protocol deviations; 29% mortality with 1 major protocol deviation; and 36% mortality with ≥2 major protocol deviations.[9] In another example, adherence with post-stroke rehabilitation guidelines has been shown to be associated with post-stroke functional recovery where increasing levels of guideline adherence is associated with increased improvements in motor function and activities of daily living.[13]

In recognition of the gap in stroke care quality, national and state legislation has been enacted; the previously mentioned Paul Coverdell Stroke Registry program funded by the Centers for Disease Control and Prevention (CDC) is active in developing stroke networks committed to measuring and improving stroke processes and outcomes; and several state legislatures have enacted legislation requiring ambulances to preferentially deliver persons with suspected stroke to a Primary Stroke Center-certified facility if one is available locally.

Quality Improvement Programs Improve Stroke Care Quality: Emerging evidence demonstrates that a variety of stroke care quality management programs can successfully improve stroke care quality.[14-16] The American Stroke Association (ASA) Get With the Guidelines (GWTG)-Stroke program represents the largest national program to date; preliminary data suggest that ongoing measurement and feedback of performance on stroke quality indicators via this program is an effective way to improve stroke care quality.[17-20] Ongoing quality improvement activities are also a key feature of Primary Stroke Center Certification by the JC, with measurement of ten key stroke quality indicators a foundation of this certification program.[21]

1.3 Treatment/Management Evidence Base

Selected examples of the evidence guiding the Stroke QUERI scope of work are included below. The breadth of evidence presented in this section reflects the complexity inherent in stroke systems of care, as we must consider multiple lines of evidence for stroke prevention, acute treatments, and rehabilitation interventions critical to providing optimal stroke care. Relevant guidelines referencing these examples are given in Section 1.5. The examples of the evidence are organized around the framework of the six Stroke QUERI clinical goals.

This brief summary of selected components of the evidence base is intended to convey several key points. First, the care of patients with stroke and TIA is complex and multi-faceted. Second, excellent quality care for patients with cerebrovascular disease requires the participation of numerous clinical staff (i.e., nursing, Emergency Medicine, neurology, internal medicine, Physical Medicine, Rehabilitation, pharmacy, and often health psychology and psychiatry) across the care continuum (from the acute stroke period through rehabilitation to secondary prevention in the outpatient setting). Third, providing excellent stroke care quality is associated with improved outcomes for patients. Fourth, important questions about fundamental aspects of stroke care exist; some of these questions are addressed in our emerging/controversial evidence section.

Clinical Goal No. 1: Improve acute in-patient stroke care

Coordinated Inpatient Stroke Care: A meta-analysis of randomized controlled trials of organized inpatient stroke units found that stroke units were associated with a 17% reduction in one-year mortality (OR 0.83; 95% CI 0.69-0.98) and 25% reduction in the combined endpoint

of death or institutionalization (OR 0.75; 95% CI 0.65-0.87).[22,23] This benefit of stroke units is not likely due to differences in patient characteristics between stroke units and general wards because the trials were randomized. In addition, many of the observational studies demonstrated that patients were similar with respect to their baseline characteristics. Given that the observed benefit of stroke units is not due to differences in patient characteristics, it is likely that the benefits are due to differences in stroke care between stroke units and general wards, although the specific elements responsible for the observed differences are not well known. The data reflecting the benefits of stroke units is largely based on European style multidisciplinary combined acute-rehabilitation units and may not reflect the current practices within the typical US stroke unit which is focused on acute care with a much shorter length of stay.

Intravenous Thrombolytic Therapy: The use of intravenous thrombolysis with tissue plasminogen activator (tPA) given within 3 hours of stroke symptom onset is associated with an increased proportion of patients with a favorable stroke outcome.[24,25] For example, for patients treated within 90 minutes of stroke symptom onset the odds ratio of a favorable outcome at 3 months was 2.11 (95%CI 1.33-3.55) whereas the odds ratio was 1.69 (95%CI 1.09-2.62) if the tPA was given 90-180 minutes after symptom onset.[26] Several studies have demonstrated that the risks of tPA associated complications (e.g., intracranial hemorrhage) increases with the degree to which the guidelines are not followed.[27,28] Intravenous thrombolysis with tPA remains the only FDA-approved medical therapy for acute ischemic stroke.

Antiplatelet Medication Use: The use of aspirin within 48 hours of stroke onset is associated with a modest reduction in mortality.[29,30] This appears to be due primarily to a reduction in early recurrent stroke events as opposed to improvements in the neurological symptoms of the index stroke.[24] Antiplatelet medications reduce the risk of secondary stroke among patients with stroke or TIA from 22% among patients not taking an antiplatelet agent to 18% among patients taking antiplatelet therapy.[31] The use of combined antiplatelet medications is discussed below in the section on emerging/controversial evidence.

Clinical Goal No. 2: Prevent post-stroke complications

Assessment of Swallowing Functioning: Depending on the detection method used, timing of screening, and stroke severity, 20% to 50% of stroke patients have a swallowing abnormality.[32,33] Abnormal swallowing is an important independent predictor of chest infection (OR 11.8; 95% CI 3.3-49.6).[33] Dysphagia has also been associated with a higher risk of dehydration and death.[32] The detection of dysphagia is necessary so that patients may be offered appropriate diet to reduce the risk of aspiration as well as possible therapies. For example, percutaneous endoscopic gastrostomy feeding has been shown to improve nutritional status and reduce mortality among some stroke survivors.[34]

Deep Vein Thrombosis (DVT) and Pulmonary Embolism Prophylaxis: Stroke patients are at increased risk of venous thromboembolism.[35,36] Estimates of the incidence of symptomatic pulmonary embolism vary depending on the screening strategy used, ranging from 1% to 13% in the first 2 weeks after stroke symptom onset.[36] Pulmonary embolism has been identified as the cause of death in up to 25% of early deaths after stroke.[36] Prophylaxis of deep vein thrombosis (DVT) with unfractionated heparin or low molecular-weight heparin reduces the incidence of DVT, pulmonary embolus, and short-term mortality.[29,36,37]

Clinical Goal No. 3: Initiate secondary prevention among veterans with stroke and transient ischemic attack

Hypertension Management: Compelling evidence for more than 30 years has demonstrated that the control of high blood pressure contributes to the primary and secondary prevention of stroke.[38-41] Hypertension has been identified as the risk factor with highest population attributable risk for stroke, representing the primary cause in over 50% of all ischemic strokes.[42] Overall, antihypertensive therapy is associated with a 30% to 40% reduction in the incidence of stroke.[43] Numerous studies, conducting in a variety of settings, have demonstrated that a decrease of 10 mm Hg in systolic blood pressure is associated with a 30% decrease in the relative risk of stroke.[44-46]

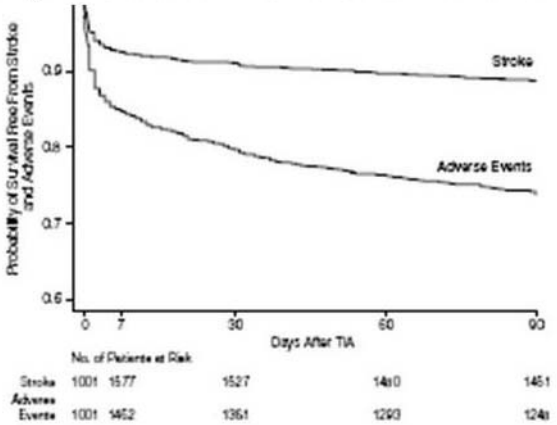
Atrial Fibrillation Management: Atrial fibrillation is an increasingly common, potent, and yet modifiable risk factor for stroke. Multiple clinical trials have demonstrated the superiority of warfarin compared with placebo in the prevention of thromboembolic events among patients with nonvalvular AF. Pooled data from 5 primary prevention trials of warfarin versus control have been reported.[47] The efficacy of warfarin has been shown to be consistent across studies, with an overall relative risk (RR) reduction of 68% (95% CI, 50 to 79) and an absolute reduction in annual stroke rate from 4.5% for the control patients to 1.4% in patients assigned to adjusted-dose warfarin. This absolute risk reduction indicates that 31 ischemic strokes will be prevented each year for every 1000 patients treated. The risk reduction for both primary and secondary prevention is similar.[48] Overall, warfarin use has been shown to be relatively safe, with an annual rate of major bleeding of 1.3% for patients on warfarin compared with 1% for patients on placebo or aspirin. The optimal intensity of oral anticoagulation for stroke prevention in patients with AF is an International Normalized Ratio, 2.0 to 3.0.

Symptomatic Carotid Stenosis Management: Three prospective clinical trials have demonstrated the benefits of carotid endarterctomy (CEA) over medical therapy for patients with symptomatic carotid stenosis of at least 70%.[49-51] The stroke risk reduction is much less for CEA performed in the setting of symptomatic carotid stenosis of 50-69%. Given these data, the 2006 AHA/ASA Guideline for the Prevention of Stroke in Patients with Ischemic or Transient Ischemic Attack recommends CEA for symptomatic carotid stenosis of 70-99%, recommends considering CEA depending on patient factors (e.g., age, comorbidity) for symptomatic stenosis of 50-69%, and states that CEA is not indicated for patients with symptomatic stenosis of <50%.[43] We discuss current controversies in asymptomatic carotid stenosis management and the use of carotid artery stenting in the Emerging/Controversial Evidence section below.

Transient Ischemic Attack (TIA): Annually in the United States, 200,000 to 500,000 transient ischemic attacks come to medical attention.[52-54] Nearly 15% of all strokes are heralded by a TIA.[1] Approximately 30-50% of TIAs according to the classic definition (focal neurological deficits resolving within 24 hours), would be considered infarctions on the basis of diffusion-weighted magnetic resonance imaging findings.[55] Despite currently available secondary prevention strategies, at least 10% of TIA patients have a stroke in the 90 days after the TIA.[56,57] Approximately 25% of TIA patients have a recurrent TIA, stroke, cardiovascular hospitalization or death in the 90 days after the TIA. [56] Recent data suggest that rapid evaluation after TIA is associated with decreased risk of stroke.[58,59]

Lipid Management: The Stroke Prevention by Aggressive Reduction in Cholesterol Levels (SPARCL) trial evaluated the effects of atorvastatin (80 mg/day) in patients with a history of stroke or TIA without cardiovascular disease. Patients in the atorvastatin arm had a 16% reduction in the risk of stroke and 35% reduction in major coronary events.[60] We discuss the management of hyperlipidemia for stroke risk reduction in the Emerging/Controversial Evidence section below.

Figure 6: Stroke- and Event-free Survival



Diabetes Management: Diabetes is a risk factor for stroke[43] and is present in about one-third of stroke patients.[61] Although tight diabetes control has not been shown to decrease the risk of stroke or other macrovascular events, the identification of diabetes is important in the post-stroke patient because the presence of diabetes may change other risk factor management strategies (e.g., hypertension goals). For example, patients with diabetes whose blood pressure was under control had a 44% reduction in the relative risk of stroke compared with patients with diabetes whose blood pressure was higher.[62]

Tobacco Cessation: A strong body of evidence has demonstrated that cigarette smoking is a risk factor for stroke. The relative risk of stroke in heavy smokers (more than 40 cigarettes a day) is twice that of light smokers (less than 10 cigarettes per day). Stroke risk decreases significantly two years after cessation of cigarette smoking and is at the level of nonsmokers by 5 years. [1]

Physical Activity: Numerous studies have demonstrated that increased participation in physical activity (e.g., walking, sports, or general activity level) is associated with a reduced risk of stroke and stroke death. A meta-analysis including 31 observational studies demonstrated that moderate and high levels of physical activity protected against total stroke, hemorrhagic stroke, and ischemic stroke.[1] The Northern Manhattan Study reported that increased physical activity was associated with decreased ischemic stroke risk across all racial/ethnic and age groups and for each gender (odds ratio 0.37).[1]

Sleep Apnea: Sleep apnea is a risk factor for stroke,[63-65] is present in at least half of patients who survive a stroke or transient ischemic attack (TIA),[66-78] and is associated with recurrent stroke and death.[66-78] Sleep apnea may be common in patients with cerebrovascular disease both because stroke contributes to the development of sleep apnea (via reduced pharyngeal muscle tone, impaired consciousness leading to airway compromise, and disrupted sleep architecture) and because the sleep apnea was present before the stroke or TIA but was unrecognized.[79,80] Stroke patients with sleep apnea are more likely to have factors associated with recurrent stroke, including hypertension, disordered cerebral blood flow and cerebrovascular reactivity, and increased fibrinogen level.[78,81,82] Continuous positive airways pressure (CPAP) is a safe and effective treatment for sleep apnea.[83-88] Especially relevant for stroke risk reduction, CPAP lowers blood pressure in patients with sleep apnea and hypertension.[85,89-94] Unfortunately, few patients with cerebrovascular disease are screened for sleep apnea or referred for treatment with CPAP.[80,95,96]

Clinical Goal No. 4: Ensure that veterans with stroke receive appropriate and high quality rehabilitation

Post-stroke Rehabilitation: Adherence to the VA/DOD post-acute stroke guidelines are associated with improved functional recovery, community rehabilitation discharge, and patient satisfaction. Specifically, increasing guideline adherence from 50% to 75% could increase Functional Independence Measure (FIM) motor score at rehabilitation discharge by 4 FIM points and increasing adherence by 10 points is associated with a 1.4 odds ratio for being discharged to the community.[13]

Various physical therapy interventions have been evaluated to improve mobility and/or upper extremity function post-stroke. Since many of these trials are small and/or non-randomized, it is difficult to make specific recommendations about the type of therapy that should be provided a given patient. Some of the current questions about post-stroke physical therapy are described below in our Emerging/Controversial Evidence section. A meta-analysis of post-stroke occupational therapy suggested that although OT appears to improve independence and functional outcomes post-stroke, the precise interventions and schedules of therapy responsible for the improvements are not known.[97]

Clinical Goal No. 5: Screen and treat veterans with stroke for post-stroke depression

Using VHA inpatient/outpatient administrative databases, it is estimated that between 40% to 57% of individuals post-stroke have depression. PSD is associated with worse functional outcomes, lowered quality of life and increased post-stroke mortality. Our prior work has demonstrated that these effects are present in veterans with stroke and we found that those with a new depression diagnosis post-stroke had a 25% increase in mortality and health care utilization post-stroke.[98,99] We have also recently shown that for veterans receiving only VHA care post-stroke there is no geographic variation in depression diagnosis, but among dual-users of VHA and Medicare post-stroke care, veterans in the Southeast, Mideast, and Far West regions are less likely to be diagnosed with depression.[100]

Current VA/DoD and ASA guidelines recommend screening for depression post-stroke. Although many existing depression screeners have been shown to be valid in assessing depression post-stroke, we documented that the PHQ-9 and PHQ-2, commonly used for depression screening in VA Primary Care clinics, are valid assessments of post-stroke depression.[101]

Several small clinical trials have suggested that treatment with an antidepressant can improve depression symptoms in patients with post-stroke depression, and we recently completed a five-year multi-site randomized trial of depression care management demonstrating that guideline-adherent depression care resulted in significantly more depression remission than usual care after stroke.[102] Our ongoing implementation study is evaluating whether a CPRS-based depression screening and treatment reminder is more effective than usual care in improving depression detection and treatment in the first six months post-stroke.

Clinical Goal No. 6: Support the reintegration of veterans into family and community life post-stroke

Stroke Caregiving: Three systematic reviews, and seven clinical trials, have demonstrated educational interventions have been successful in improving the patient's and caregiver's

knowledge about stroke and may assist patients and caregivers in making decisions about treatments.[103] Unfortunately, stroke survivors and their caregivers often do not have the information necessary to manage the recovery process,[104,105] caregivers are dissatisfied with information provided to them about stroke and lack basic knowledge about stroke and prevention of future stroke.[106] The information they do receive is often not tailored to individual patient needs, creating a gap in meeting the needs of this group.[107]

Community Reintegration: Community reintegration is defined as "integration into a homelike setting, integration into a social network, and integration into productive activities such as employment, school, or volunteer work"[108] For individuals living with a disability, community integration often represents the most important aspect of the rehabilitation process given that the ability to participate in meaningful activities in the home and community promotes quality of life. Among individuals with stroke, community integration is recognized as one of the most important but underestimated areas of rehabilitation.[109] Issues that affect individuals with stroke and their families upon community reintegration include social support, caregiver burden and depression, family interactions, family education intervention, social and leisure activities.[109] Although few interventions have been demonstrated to improve community reintegration a single small trial of early discharge to home with a home-based rehabilitation (compared with usual care in an inpatient rehabilitation facility) was successful at improving quality of life, reducing the number of services required, and increasing satisfaction with community reintegration.[110]

Emerging/Controversial Evidence

The above evidence base reflects high-quality RCT-based evidence, and is uniformly promulgated via guidelines from multiple groups. In addition to the evidence detailed above, some other aspects of stroke care reflect new emerging and/or controversial evidence related to ischemic stroke treatment or prevention. Among this broad group of possible additional areas of stroke care worthy of mention, we focus on those with the most robust evidence and/or current investigation including: post-stroke lipid management, acute blood pressure management in stroke, acute glucose management in stroke, specific rehabilitation modalities (e.g. constraint induced therapy, gait supported treadmill, robot-assisted therapy), carotid artery stenting, treatment of asymptomatic carotid stenosis, and use of combination antiplatelet therapies for secondary stroke prevention.

Lipid Management: The data are clear and convincing that statin treatment decreases the risk of a first stroke in patients with CHD or in patients at increased CHD risk (i.e., DM). As indicated above, however, the use of statins for secondary stroke prevention in patients <u>without</u> CHD and the question of whether symptomatic carotid artery stenosis represents a CHD-equivalent have been debated.

In May 2001 the National Cholesterol Education Program (NCEP) published their Adult Treatment Panel (ATP III) report.[111] As part of this report, symptomatic carotid artery disease and asymptomatic carotid stenosis >50% were classified as a "coronary heart disease (CHD) equivalents" and as such the LDL-cholesterol treatment goal was <100 mg/dl. This report specifically stated that there were insufficient data available to address the question of whether LDL-lowering therapy (as primary prevention) reduces stroke risk,[112-121] and did not address lipid management goals in patients with stroke but without carotid stenosis.

Recent advisory statements and guidelines have suggested that most stroke and TIA patients would benefit from statin therapy[122] and that the NCEP ATP III guidelines should be applied to

stroke or TIA patients with CHD or CHD equivalents. The 2006 AHA/ASA Guidelines for the Prevention of Stroke in Patients with Ischemic Stroke or Transient Ischemic Attack added that stroke or TIA patients with an event presumed due to atherosclerosis but without CHD or a CHD equivalent are "reasonable candidates" for a statin medication.[43]

Current debate on who to treat and what the appropriate LDL goal is for patients post-stroke was informed by the August 2006 publication of the SPARCL trial.[60] This trial randomly assigned 4731 patients with stroke or TIA who had LDL-cholesterol levels of 100 to 190 mg/dl and no known CHD to receive 80 mg of atorvastatin daily or placebo. During a median follow-up of 4.9 years, the stroke rate was lower in the statin group: 11.2 % versus 13.1% (adjusted HR 0.84; 95%CI 0.71 to 0.99; p=0.03). The risk of major cardiovascular events was also lower in the statin group: 22.4% versus 29.0%; adjusted HR 0.74; 95%CI 0.66-0.83; p<0.001). Based on these data, it seems reasonable to recommend treating stroke patients with statins if LDL is ≥ 100, but the dose and choice of statin and the potential modifying role of carotid stenosis in determining LDL target and statin dose remains controversial.

Blood Pressure Management in Acute Stroke Setting: The benefits of treating blood pressure either as primary or secondary stroke prevention are well established.[43] However, the best approach to blood pressure management in the acute stroke period remains an area of evolving research. Arterial hypotension has been associated with neurological worsening.[123] Similarly, large, speedy falls in blood pressure (e.g., associated with sublingual nifedipine use) have been associated with neurological worsening.[124] Since some small studies have suggested benefit in moderate acute increases of blood pressure in patients with ischemic stroke, there are currently several ongoing multi-center trials evaluating a variety of approaches to blood pressure management in the acute stroke period.

Glucose Management in Acute Stroke Setting: Control of hyperglycemia among critically ill patients has been shown to reduce infections, length of stay, and mortality. [125] Among patients with acute myocardial infarction (MI), there are at least two conflicting trials. The DIGAMI I trial demonstrated that rapid aggressive control of hyperglycemia has been associated with improved 1-year survival,[126] although the subsequent DIGAMI II trial did not demonstrate an association between acute hyperglycemia treatment and mortality.[126] In stroke patients, acute hyperglycemia has been associated with worse functional outcomes in multiple randomized trial datasets and in cohort studies.[127-130] One recent study did not find benefit in rapid control of hyperglycemia in stroke patients,[131] but this trial was halted early due to slow enrollment and mortality rates were lower than expected, so the opportunity to observe benefit associated with treatment was reduced. A NINDS pilot randomized controlled trial of acute hyperglycemia treatment was recently completed (A. Bruno, PI; Dr. Williams, co-investigator).[132] Although not powered to examine efficacy, this trial did demonstrate safety and feasibility of the approach. Another NINDS-funded ongoing pilot clinical trial is ongoing (K Johnston, PI). Current acute stroke management guidelines suggest that although the level at which specific interventions should be provided is not known, it is reasonable to initiate treatment among patients with blood glucose > 200 mg/dL.[24]

At the Indianapolis VAMC, Dr. James Walsh, endocrinologist, has successfully developed and implemented a CPRS-based insulin decision-support tool that improves SQ insulin ordering processes and has been shown to reduce the proportion of veterans with hyperglycemia in the surgical ICU and the medical wards.[133] This intervention begins after the first hospital day and involves use of standardized orders to prompt best practices in insulin maintenance and correction doses in hospitalized diabetic patients. Although sufficient evidence does not yet support rapid normalization of hyperglycemia in stroke (using IV insulin) and trials evaluating

this intervention are ongoing, based on the evidence for general benefit in other hospitalized patients, we are evaluating the use of this subcutaneous insulin intervention in stroke patients hospitalized at the Indianapolis VAMC in an ongoing RRP and we are evaluating hyperglycemia management during acute stroke in the OQP Stroke Special Project.

Rehabilitation Modalities: Another area of controversy involves three specific rehabilitation modalities. First, constraint-induced movement therapy (CIMT), which forces the use of the affected limb in post-stroke hemiparesis by immobilizing the unaffected arm, has been used in several RCTs with acute, subacute and chronic stroke patients. A recent multi-site randomized trial has shown that ischemic stroke survivors receiving CIMT compared to usual therapy had significant and sustained improvement in upper extremity function in the first 9 months post-stroke, [134] but questions about patient selection, dose, and duration of therapy remain; at least one preliminary study demonstrated that very early initiation of this therapy may be harmful.[135] A 2007 meta-analysis of repetitive task training (including constraint-induced therapy) suggested that although this may be effective for lower extremity functional improvement, current evidence did not support its use for upper extremity function and further well-designed randomized trials were needed.[136]

Second, locomotor training using partial body weight-supported treadmill (BWST) walking has been widely investigated for individuals after stroke, but whether this can be recommended and for what type of patients it should be considered remains debatable.[137] This therapy is currently being tested in an NIH-funded multi-site randomized trial (P. Duncan, PI).
Third, in recent years there have been several studies that have investigated the effects of robot-assisted therapy on motor and functional recovery in patients with stroke. A meta analysis of ten studies involving 218 patients found no overall significant effect in favor of robot-assisted therapy, primarily due to marked heterogeneity in studies between distal and proximal arm robotics.[138] Likewise a Cochrane review reported that electromechanical-assist (robotic) devices with usual physical therapy may be superior to usual therapy alone in promoting independent walking in patients initially non-ambulatory post-stroke, but questions about patient selection, dose, and duration of therapy remain. [139] An ongoing randomized controlled trial funded jointly by VA Cooperative Studies and Rehabilitation Research and Development Services (CSP 558) has been designed to address some of the methodological concerns present in the prior robot-assisted therapy trials and will compare motor and functional outcomes among post-stroke patients who are randomly assigned to one of three treatment arms: intensive conventional therapy, robot-assisted therapy and usual care.

Carotid Artery Stenting: Carotid artery stenting (CAS) was approved in 2004 by the FDA for the treatment of carotid stenosis in high risk patients, largely based on the results of one RCT demonstrating non-inferiority of CAS. [140] Despite the fact that CAS procedures are increasing rapidly, studies continue to raise questions about the risk-benefit ratio for CAS and how to appropriately define the “high risk” for CEA population.[141-146] One major ongoing trial in this area is the Carotid Revascularization Endarterectomy Versus Stenting Trial (CREST).[147] The Centers for Medicare and Medicaid Services (CMS) recently declined to expand coverage of stenting for asymptomatic patients. CMS does cover stenting for patients with high-grade symptomatic stensosis who are at high risk for CEA. Recognizing this area of controversy, the Stroke QUERI plans to assess the use of carotid stenting and CEA during FY07 in our OQP Stroke Special Project.

Asymptomatic Carotid Stenosis: Another area of controversy in management of carotid stenosis is in the management of the asymptomatic patient. A large randomized controlled trial suggested small but significant benefit for surgical versus medical management of carotid

stenosis in asymptomatic persons with greater than 60% carotid stenosis.[148] Due to the small margin of benefit and the requirement for very low surgical morbidity and mortality to realize even these modest benefits, many clinicians are recommending surgery for asymptomatic stenosis only when the degree of stenosis increases (e.g. to 80% stenosis). This clinical rationale is based on the observation of increased stroke risk as asymptomatic carotid stenosis increases. Others are raising the question of surgical benefit compared to current best medical therapy.[149] Current VA practices in the management of asymptomatic carotid stenosis are unknown.

Dual Anti-platelet Medication Use: Finally, another major area of controversy is in the use of dual antiplatelet agents for secondary stroke prevention. As more options for antiplatelet treatment became available, especially clopidogrel,[150] the use of more than one antiplatelet medication in a given patient became more common, especially in the treatment of patients with recurrent symptoms on a single medication. The most common clinical setting for this practice is in the patient with recurrent stroke or TIA on aspirin alone, commonly referred to as "aspirin failure," where clopidogrel has been added to aspirin in an attempt to further decrease recurrent stroke risk. Although randomized controlled trials have found no additional benefit for combined aspirin and clopidogrel compared to aspirin alone[151] or clopidogrel alone[152] for secondary stroke prevention,[153] and although the combination of aspirin with extended release dipyridamole is also available and has been shown to more effective than low dose aspirin alone,[154] it is likely that this dual use of aspirin and clopidogrel is still commonplace. One subgroup analysis of the CHARISMA study suggested that dual antiplatelet therapy might benefit those at highest risk of recurrent events (those with prior episode of myocardial infarction, stroke, or peripheral arterial disease).[155] In response to this publication, the VHA Pharmacy Benefits Management Strategic Healthcare Group and the Medical Advisory Panel is currently reviewing recommendations for the use of clopidogrel in combination with aspirin in various clinical populations including stroke. We will assess current practices of dual antiplatelet use in the VA with our OQP Stroke Special Project as we record antiplatelet medications at the time of stroke admission and discharge.

Post-stroke Problems with Less Evidence in Support of Specific Interventions: Several clinical conditions are recognized as being common among the post-stroke population or associated with increased stroke risk, but have insufficient data to support specific interventions and/or are lower on our prioritization list. Specifically, the optimal management of falls, cognitive impairment, alcohol use, obesity, diet, and pain in post-stroke setting remains undefined. We will continue to follow the evidence as it develops in these areas.

1.4 Current Practices and Quality/Outcome Gaps

The Stroke QUERI, our research partners, and other VA researchers have documented significant evidence-practice gaps in stroke risk factor management and stroke care quality. We anticipate collecting additional important and comprehensive data about these and other gaps as a result of our OQP project to be completed in FY08.

Coordinated In-Patient Stroke Care: A survey of VISN 11 demonstrated that none of the medical facilities in that VISN have a coordinated in-patient stroke service.

Intravenous Thrombolytic Therapy: A review of 1487 stroke and TIA patients at 3 VA medical facilities and 2 non-VA facilities (QUEST, unpublished data) found that thrombolytic therapy with tPA was being used in two of the three VA centers and that the rates of major protocol violations were comparable between VA (25%) and non-VA facilities (28%).

Antiplatelet Medication Use: A study of 1222 stroke survivors discharged alive to a non-hospice disposition from three VA medical centers or two non-VA hospitals (1998-2003) found that stroke patients discharged from a VA facility were more likely to receive anti-platelet or anticoagulant medications that patients discharged from non-VA facilities (QUEST, unpublished data). For example, 205/281 (73.0%) of veterans compared with 597/941 (63.4%) of non-veterans were discharged on aspirin ($p<0.0032$). Similarly, 279/281 (99.3%) of veterans compared with 890/940 (94.6%) of non-veterans were discharged on either an anti-platelet or anticoagulant medication ($p=0.0007$).

Assessment of Swallowing Functioning: A report by the Office of the Inspector General (OIG)[156] evaluated the management of patients with feeding and swallowing problems in VHA medical facilities and found significant variations in care and opportunities for improvement of dysphagia evaluation and management. Even though the OIG report was not restricted to patients with stroke, the findings are important for veterans with cerebrovascular disease because dysphagia is common after stroke. A recent review of swallowing evaluations at the North Florida/South Georgia Veterans Healthcare System in Gainesville and Lake City medical facilities demonstrated that only 43 out of 188 veterans (23%) admitted for stroke or TIA received a documented swallowing evaluation during the past six months (FY07 Implementation Project- Dysphagia). A review of 971 stroke patients at three VA facilities demonstrated that 32% of stroke patients had a swallowing evaluation performed; and 41% had either a speech or swallowing evaluation performed (QUEST study).

Deep Vein Thrombosis (DVT) and Pulmonary Embolism: Among veterans admitted to one of three VA medical centers with stroke or TIA, 209/325 (64%) received DVT prophylaxis within the first 48 hours of admission (QUEST, unpublished data).

Hypertension Management: In the VA, there is substantial variability in blood pressure control. Several VA studies have documented that only 25% - 40% of hypertensive patients had their blood pressure under control (<140/90 mm/Hg).[7, 24-26] Data from VISN 11 indicated that only 26% of veterans with stroke met the established VA performance criteria for hypertension management of having at least 75% of blood pressure measurements at or below goal.[157] A study of veterans undergoing either carotid endarterectomy, coronary artery bypass grafting, or percutaneous coronary intervention at 5 Veterans Administration Healthcare Systems evaluated guideline-recommended control of blood pressure in 12-month periods before and after a vascular procedure. Compared with the carotid endarterectomy group, the percutaneous coronary intervention group was more likely to achieve optimal control of blood pressure (OR: 1.92, 95% CI: 1.42 to 2.59) and the coronary artery bypass graft group was more likely to achieve optimal control of blood pressure (OR: 1.53, 95% CI: 1.42 to 2.59).[158]

Atrial Fibrillation Management: Using VA administrative databases, QUERI investigators determined the impact of warfarin for secondary prevention of mortality and morbidity among stroke patients with atrial fibrillation (AF). A retrospective observational cohort of individuals with stroke and atrial fibrillation found that 40% of patients had received outpatient warfarin therapy within 4 weeks of the stroke admission date. Controlling for age and co-morbidities, warfarin was associated with significantly improved survival over a 2 year period following stroke (Hazard Ratio: 0.568, 95% CI: 0.445-0.724) (R Beyth, unpublished). In a separate study, utilizing FY03 data from the Decision Support System lab data, QUERI investigators determined that anticoagulated patients with stroke and AF are in a therapeutic range (International Normalized Ratio, 2-3) approximately 50% of the time (Dr. R Beyth, unpublished). VA is currently conducting a Cooperative Study evaluating home monitoring of anticoagulation vs. traditional laboratory management (D. Matchar, Stroke QUERI Executive Committee Chair, PI).

Carotid Stenosis Management: Several studies have assessed management of carotid stenosis in VAMCs. A study in four VAMCs found that blacks were less likely than whites to have carotid artery imaging after stroke and this difference was not completely ameliorated by consideration of appropriateness of imaging.[159] However, a subsequent study in five VAMCs found no racial difference in receipt of invasive carotid imaging or carotid endarterectomy, (CEA)[160] and further demonstrated that factors associated with lack of receipt of appropriate CEA included lower degree of stenosis, increased patient aversion to surgery, decreased provider perception of surgical efficacy, and asymptomatic stenosis.[161] In the largest study in the VA to date, the VA Stroke Study (VASt) prospectively evaluated stroke procedures and evaluation among 1073 veterans hospitalized from 1995-1997 at 9 VAMCs. VASt demonstrated no race/ethnic differences in carotid ultrasound (64% of whites and 62% of non-whites, p =.057) or CEA (1.5% vs. 0.8%, p =0.38).[162] 30-day outcomes after CEA have also been reported to be similar between blacks and whites in the VA, although the data suggested that Hispanic men receiving CEA after TIA may be at increased 30-day risk of stroke, MI, or death.[163] We are not aware of any more recent studies examining carotid imaging evaluation or appropriateness of CEA among veterans with stroke or TIA. We will evaluate some of these important issues in our OQP Stroke Special Project in FY08.

Transient Ischemic Attack (TIA): In a pilot study of 325 stroke and TIA patients cared for at one of three VAMCs no substantial differences were found in care between the stroke and TIA patients. 50% of the TIA patients were discharged on a statin medication; 58% were discharged on an ACEI, 58% were discharged on aspirin; and 92% were discharged on either an anti-platelet or anti-coagulant medication (QUEST study, unpublished data).

Lipid Management: A study of veterans undergoing either carotid endarterectomy, coronary artery bypass grafting, or percutaneous coronary intervention at five Veterans Administration Healthcare Systems evaluated guideline-recommended control of low-density lipoprotein in 12-month periods before and after a vascular procedure. Compared with the carotid endarterectomy group, the percutaneous coronary intervention group was more likely to achieve optimal control low-density lipoprotein (OR: 1.51, 95% CI: 1.01 to 2.26).[158]

A study of 1487 patients with stroke or TIA included 325 patients cared for at one of three VAMCs found that veterans were more likely to be discharged on a statin medication than patients treated at non-VA hospitals: VA 54% versus non-VA 35%, p<0.0001) (QUEST study, unpublished data).

Similarly, veterans were more likely to be discharged on any lipid lowering medication compared with patients discharged from a non-VA hospital: VA 56% versus non-VA 36%, p<0.0001) (QUEST study, unpublished data).

Tobacco Cessation: A study of 1487 patients with stroke or TIA included 325 patients cared for at one of three VAMCs found the following: (a) veterans are more likely to be current smokers than non-veterans (28% versus 20%, p<0.001); (b) veterans have a higher number of pack-years of smoking use than non-veterans (median pack-years: 60 versus 44); and (c) although still relatively uncommon in either setting, patients cared for at a VAMC were more likely to receive smoking cessation counseling than patients treated at a non-VA hospital: 14% versus 5%, p<0.0001) (QUEST study, unpublished data).

Post-stroke Rehabilitation: Stroke patients should receive an assessment of functional status (using the Functional Independence Measure [FIM]); this assessment was a core performance measure for VAMCs and is currently a supporting indicator. Stroke QUERI investigators have found that 88% of stroke patients received a FIM in FY06 but that this assessment rate decreased to 84% in FY07. Again, wide geographic variation exists with the VISN assessment rate ranging from a low of 68% (VISN 2) to a high of 92% (VISN 3).

Stroke QUERI investigators reviewed the use of rehabilitation services nation-wide and found that by the end of FY07, 30% of all stroke patients in the moderate impairment groups (Functional Related Groups 4-7) are receiving intensive rehabilitation services. Over the course of one year (since EOY06), the total percentage has increased from 22% to 30%. Wide variation exists across VISNs, from a low of 13% (VISN 9) to a high of 48% (VISN 20). In collaboration with Physical Medicine and Rehabilitation Service, Stroke QUERI investigators used the Integrated Stroke Outcomes Data Base (FY03), to analyze access to inpatient and outpatient rehabilitation care for individuals with moderate stroke (FRG 4-7). Our results demonstrated that access to intensive rehabilitation bed unit care varied across VISNs from 9% to 60%. Prior work in the VA Stroke Study (VAST) demonstrated 2-year post-stroke fracture risk of 5-6% and identified this group with moderate impairment as having the highest risk for subsequent fracture.[164] However it is not known if access to rehabilitation services would decrease the fracture risk.

Important prior work in the VA Stroke Study (VASt) documented that although minority veterans experienced neither overall delay in referral for rehabilitation nor decreased receipt of services compared to whites, among those with delay in referral African American veterans had a worse recovery trajectory in the first year post-stroke.[165]

Post-stroke Depression (PSD): Considerable variation has been documented in non-stroke-related depression screening and follow-up in the VA. [166] Although annual screening rates are high and have been increasing with ongoing performance feedback, follow-up within six weeks of a positive screen (a recommended performance measure) occurs much less often. A study in 14 VHA hospitals in the Northeast demonstrated that although adequate antidepressant dosage was achieved in 90% of patients with a major depression diagnosis only 45% had adequate duration of treatment, with younger age, African American veterans, and treatment exclusively in primary care associated with inadequate depression care.[166] Interestingly, overall facility performance scores for continuous quality improvement were not associated with adequate dose or duration of depression treatment in this study, suggesting that disease-specific quality improvement activities may be needed.[167]

Gaps also exist and are likely magnified in the detection and treatment of PSD compared to non-stroke-related depression. Studies done as pilots in the Stroke QUERI have shown:

- Depression was diagnosed in only 27% of veterans in the first three year after stroke, even when outpatient diagnoses and written physician notes were examined.[168]
- PSD is under-treated, with 20% of patients prescribed an antidepressant after stroke receiving only a single prescription.[169]
- Only 1/3 of veterans with recent stroke are screened for depression in primary care during the six months immediately post-stroke. This “accidental” screening occurs only if the annual depression performance measure was due at that visit and is not targeted specifically to this high-risk group of veterans (PSD Implementation Study, unpublished data).

Stroke Caregiving: Compliance with the post acute stroke guidelines for patient and family education is only 36%.[170] Substantial unmet needs have been documented among caregivers of stroke survivors (see Annual Report, Executive Summary). The gaps in the provision of patient and family education are not unique to the VA. Moreover, health care providers often do not have easy access to high-quality patient education materials for stroke survivors and their families. Ideally, as more caregivers are educated regarding pertinent risk factors in stroke, as well as use active coping responses, their stress and burden may be diminished. A study of 115 stroke caregivers performed by the Stroke QUERI found that caregivers who used an adaptive coping response, the sense of coherence, was associated with lower levels of caregiver depression across two years.[171]

1.5 Significant Influences on Current Practices and Outcomes

VA Influences on Stroke Care: The VA does not currently monitor any stroke specific performance measures. The former rehabilitation measure requiring assessment of the FIM during hospitalization in all stroke, traumatic brain injury (TBI) and amputee patients has recently been converted to a supporting indicator. Performance on this measure for stroke patients improved from 65% of all stroke patients in VA at the time of establishment of this measure in FY03 to 88% in FY06. In FY07, after conversion to a supporting indicator, performance dropped to 83%; ongoing monitoring will assess whether successful rates of performance on this important rehabilitation measure are maintained.

In addition to the FIM supporting indicator, there are several relevant EPRP Primary Care performance measures related to management of stroke risk factors or complications (e.g.; LDL at goal, Hgb A1c at goal, blood pressure at goal, smoking cessation and annual screening for depression). To date, we are not aware of programs to target stroke survivors or veterans at especially high risk of stroke for these measures, except for our ongoing implementation project to modify the existing depression annual screening tool to screen and treat veterans with PSD.

One of the Stroke QUERI's key strategic plans in FY07 was to promote the development of a VA stroke "scorecard." Our strategic partnership with OQP has led to the development of the OQP Stroke Special Project, begun during FY07 and to be completed in FY08. This project will be crucial in demonstrating current performance on JC stroke performance measures across all VA facilities, identifying current evidence-practice gaps in VA stroke care, and suggesting key areas for prioritization of QUERI implementation activities. Current plans call for feedback of JC performance measures to all facilities and subsequent discussion around candidate measures for ongoing stroke performance assessment.

Also in FY07, VHA convened a group including neurology, internal medicine, cardiology, emergency medicine, nursing, and other providers to develop guidelines for acute stroke treatment (Dr. Kent, Stroke QUERI Executive Committee member, was clinical champion for this effort); this guideline is currently in review by the Medical Advisory Panel. The confluence of this guideline release and inpatient stroke performance data from our OQP Stroke Special Project will likely will be important new influences on VA stroke care in FY08. Further, the Brain Attack Coalition/NINDS is currently updating the document that is the basis for Primary Stroke Center (PSC) certification; we will evaluate this document when available in light of current and planned VA activities.

External Influences on Stroke Care: Several important national initiatives have resulted in the development of tools to both enhance and evaluate the quality of stroke care. The program that most influences current stroke care was developed by one of the VA Stroke QUERI's strategic

stakeholders, the American Stroke Association (ASA), a division of the American Heart Association, in partnership with the Joint Commission (formerly the Joint Commission on Accreditation of Healthcare Organizations [JCAHO]). Based on recommendations from an ASA task force and the Brain Attack Coalition,[21,172] the ASA and the JC established assessment and credentialing for primary stroke center (PCS) status.[173] This credentialing evaluates key structure and process elements and includes the implementation of quality improvement systems as a necessary component for PSC status. As of November 15, 2007, there were 576 JC certified stroke centers.[174] To our knowledge, no VA facility has obtained JC stroke certification.

The ASA also developed a hospital-based quality improvement program for cardiac and stroke patients, "Get With The Guidelines" (GWTG).[14] Topics covered include heart failure, CAD, and stroke. This program, which received the 2004 Innovation in Prevention Award, includes tools to evaluate the quality of acute stroke treatment delivery, initiate stroke guideline recommended therapies, and deliver patient education at the teachable moment immediately after an acute stroke event, primarily at the point of discharge. As of November 15, 2007, there are 1,100 facilities with GWTG-Stroke signed contracts. Most PSCs are also GWTG-participating hospitals (AHA/ASA Stroke Activity Report). The GWTG program requires the transmission of data from the VA to a civilian, commercial data depot for benchmarking. Due to difficulties in ensuring the secure transfer of data, the only VA facility we are aware of that is an official GWTG program to date is the Bay Pines facility in Tampa FL. As we work with VA facilities during the feedback of inpatient stroke performance measures from the OQP Stroke Special Project, it is possible that GWTG and/or PSC certification will be a potential mechanism some VA facilities may find useful in working to improve their stroke care.

Physician-focused performance improvement indicators have also been developed by a consortium including NCQA, CMS, JC, the American Medical Association (AMA), the American Academy of Neurology, the ASA, and the American College of Radiology. In addition to indicators similar to the existing JC stroke quality of care measures, this set includes assessment of carotid and brain imaging reports and an assessment of overuse of heparin. We have added the imaging report items to our OQP study and will assess heparin use during acute stroke admission so we will have estimated VA benchmarks on these new indicators.

As mentioned previously, some states have enacted legislation requiring that acute stroke patients be preferentially transported by emergency medical services to a certified Primary Stroke Center if one is locally available. This factor has caused the Bay Pines VA facilities in Tampa and the Houston VAMC to consider pursuing PSC certification. If this occurs in other states, it is likely that it would further stimulate VA facilities to seek PSC certification.

Guidelines Related to the Care of Veterans with Stroke or TIA: The mission of the Stroke QUERI is guided by the evidence-based guidelines developed by the Veterans Health Administration, the Department of Defense, and the American Heart Association/American Stroke Association. We review the literature regularly for updates to these guidelines, and with the help of the ASA identify guidelines in the process of modification based on emerging evidence. These guidelines include evidence based recommendations for care of stroke patients across the care continuum. The specific guidelines that form the foundation of the evidence base for the Stroke QUERIs mission and goals are as follows:

1. Veterans Administration/Department of Defense Clinical Practice Guideline for the Management of Adult Stroke Rehabilitation Care [175]
2. Management of Adult Stroke Rehabilitation Care[103]

3. Guidelines for the Prevention of Stroke in Patients with Ischemic Stroke or Transient Ischemic Stroke[43]
4. Guidelines for the Early Management of Adults with ischemic Stroke[24]
5. Coronary Risk Evaluation in Patients with Transient Ischemic Attack and Ischemic Stroke[176]
6. Primary Prevention of Ischemic Stroke[177]
7. Physical Activity and Exercise Recommendations for Stroke Survivors[178]

In addition to these guidelines that are specific to the care of patients with stroke or TIA or about the prevention of stroke or TIA, other evidence-based guidelines are also relevant to the prevention of cerebrovascular disease including:

1. The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure[179]
2. ACC/AHA/ESC 2006 Guidelines for the Management of Patients With Atrial Fibrillation[180]
3. The American Diabetes Association Standards of Medical Care in Diabetes—2007[181]
4. Third Report of the Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults[182]

1.6 Stroke QUERI Center Clinical Goals

Based on the currently available evidence, current knowledge of VA practices, evidence of quality/outcome gaps, and ongoing VA quality improvement activities, we have established the following six core clinical goals that form the basis of our strategic plan:

Goal 1	Improve acute in-patient stroke care
Goal 2	Prevent post-stroke complications
Goal 3	Initiate secondary prevention among veterans with stroke and TIA
Goal 4	Ensure that veterans with stroke receive appropriate and high quality rehabilitation
Goal 5	Screen and treat veterans with stroke for post-stroke depression
Goal 6	Support the reintegration of veterans into family and community life post-stroke

These clinical goals address critical gaps in knowledge and practice and are explicitly framed as direct statements reflecting the best attainable care and outcomes for veterans with ischemic stroke.

Prioritization of Components of Stroke Care: As described previously, the care of patients with cerebrovascular disease is complex and requires a multidisciplinary approach across multiple care providers and settings. The Stroke QUERI must focus our resources and attention on those components of care that: 1) have high level evidence for specific interventions; 2) are most likely to result in direct improvements in care and outcomes for veterans with stroke; and 3) avoid areas where other effective VA programs are in place, such that our additional efforts would represent less added benefit.

With this framework, we prioritize our clinical goals based on an assessment of what aspects of stroke care are most likely to require improvement and will, if successfully addressed, provide the greatest impact on improved stroke outcomes (e.g. reduced risk of stroke, improved stroke outcomes) for veterans. We further prioritize work on the clinical goals based on other ongoing VA priorities and projects. An example of this is the focus on inpatient stroke quality of care

evidenced by the development of the OQP Stroke Special project and by the increasing focus on acute, timely, inpatient care in VA (e.g. ACS performance improvement, VA Acute Care Council). Our prioritization decisions will influence how we will weigh future decisions about use of QUERI resources, plan implementation projects, and develop subsequent RRP submissions for FY08.

Our first priorities are to improve the quality of inpatient stroke care and secondary stroke prevention. We link these two aspects of care since effective secondary prevention is a fundamental part of acute care and is a key part of acute stroke management guidelines (e.g. screening and treatment of risk factors prior to discharge, institution of appropriate antiplatelet or anticoagulant therapy). Prevention of complications is also included in this broad prioritization since many of these activities take place early during hospitalization and are likewise part of guideline-based acute stroke care (e.g. dysphagia screening, DVT prophylaxis). Examples of ongoing Stroke QUERI work supporting these priorities include our assessment of variation in acute stroke care practices (OQP and QUEST), developing a stroke quality improvement decision support tool (SQUIDSS), our FY07 implementation project in dysphagia screening, our FY08 project to engage VISN 11 facilities in a process improvement network addressing JC performance measures for acute stroke care, and our work in identifying and treating risk factors for secondary prevention (e.g. TOOLS, STARS, STOP). As we examine practice and outcome data from the OQP and QUEST projects in the coming year, we will further prioritize work in other specific aspects of acute stroke care as we plan pilot projects/RRPs and other projects.

Secondarily, we prioritize improving aspects of post-acute stroke care, including preventing outpatient complications, ensuring access and quality of rehabilitation, improving depression screening and treatment, and promoting community reintegration post-stroke. Examples supporting this prioritization include our PSD and Telerehabilitation implementation projects, our SDP involving patient education materials on MyHealth*e*Vet, and our work to develop and implement educational tools for patients and caregivers. We wish to emphasize that we remain committed to continuing the strong tradition of the Stroke QUERI in rehabilitation and post-stroke care via these multiple projects and the core investigators they represent. One reason we are currently prioritizing inpatient care is that we are already moving into implementation in the area of rehabilitation and recovery, as evidenced by the above funded projects, and so feel it is important to now prioritize this same kind of movement into implementation for inpatient stroke care quality.

Thirdly, we have decided that we will not currently engage significantly in primary prevention efforts, especially given that several VA groups are already working on vascular risk factor modification for primary prevention of vascular events (e.g., the Ischemic Heart Disease QUERI, the Diabetes QUERI), and since VA/OQP has implemented highly successful and ongoing performance measurement and feedback program in Primary Care for hypertension and diabetes care. As mentioned in our summary statement, we view TIA as a potential long term area of work where we may eventually focus primary/secondary prevention activities. Of the major vascular risk factors, those with the strongest evidence for primary prevention of stroke are treatment of hypertension and atrial fibrillation, thus we will continue our primary prevention projects in atrial fibrillation management and will support an SDP in implementing a successful program for hypertension management in primary care (see *Table 4 Planned Projects*).

The sections below identify the specific clinical issues we will address in the short, medium and long term organized according to our six core clinical goals. Current and planned projects that support the specific short and medium-term goals are noted (details about these projects are

provided in Tables 3 and 4). Long-term goals are framed as functional statements that reflect the ideal stroke care toward which we expect our short and medium term goals to take us.

Clinical Goal No. 1: Improve acute inpatient stroke care

Short-Term Goal:

- Identify evidence-practice gaps and disparities in acute inpatient care (OQP, QUEST, QUEST RRP)

Medium-Term Goals:

- Develop and evaluate interventions to improve inpatient stroke care (Implementation FY08, SQUIDSS)
- All VA facilities will have a policy about the use of thrombolytic therapy or the transfer of patients to outside facilities for emergency stroke care (VISN 11 Initiative)

Long-Term Goals:

- All VA facilities will engage in ongoing inpatient stroke quality performance measurement and improvement
- All veterans presenting within 2 hours of ischemic stroke will have access to thrombolytic therapy either at the VA facility or a nearby non-VA facility

Clinical Goal No. 2: Prevent post-stroke complications

Short-Term Goals:

- Evaluate an intervention to improve the dysphagia screening process (Implementation FY07)
- Evaluate use of DVT prophylaxis in veterans hospitalized with ischemic stroke (OQP, QUEST)

Medium-Term Goal:

- Implement an intervention to improve the dysphagia screening process in several sites (planned SDP)

Long-Term Goals:

- All veterans admitted with stroke will receive an assessment of swallowing function
- All veterans admitted with stroke will receive appropriate DVT prophylaxis

Clinical Goal No. 3: Initiate secondary prevention among veterans with stroke and TIA

Short-Term Goals:

- Identify evidence-practice gaps and disparities in hypertension management among post-stroke and TIA patients (OQP, QUEST RRP)
- Identify evidence-practice gaps and disparities in atrial fibrillation management among post-stroke and TIA patients (OQP, QUEST)
- Identify evidence-practice gaps and disparities in lipid management, carotid stenosis management, and antiplatelet treatment among post-stroke and TIA patients (OQP)
- Conduct formative research to evaluate barriers and facilitators of using existing tools to deliver secondary stroke prevention services in VA (TOOLS)
- Conduct formative research to identify barriers and facilitators of smoking cessation counseling for veterans after stroke (STARS)

Medium-Term Goals:

- Develop and evaluate implementation interventions to improve the delivery of secondary stroke prevention to veterans (SQUIDSS, TOOLS, STOP)
- Develop interventions to improve patient decision making about anticoagulation for atrial fibrillation (clinical decision making, A fib Pt Support)
- Develop tools and evaluate dissemination strategies to promote secondary stroke prevention among veterans (MyHealth*e*Vet, CG Needs, Cg Guidebooks)

Long-Term Goals:

- All eligible veterans admitted with stroke and TIA will receive recommended secondary prevention services at the time of hospital discharge
- All veterans with stroke and TIA will receive recommended outpatient secondary prevention practices

Clinical Goal No. 4: Ensure that veterans with stroke receive appropriate and high quality rehabilitation

Short-Term Goals:

- Identify evidence-practice gaps and profile current practices in acute and post-stroke rehabilitation practices (OQP)
- Identify short- and long-term cost consequences of acute vs. subacute rehabilitation for stroke costs and thereby improve efficiency (Rehab Cost)
- Profile the FIM supporting indicator across VA facilities regarding rehabilitation assessment during acute stroke hospitalization (Supporting Indicator- FIM)
- Estimate the differences in outcomes and utilization between VA stroke patients who use only the VA, those who are Medicare only users, and those who are dual users (VA/NonVA Uts-2)

Medium-Term Goals:

- Determine the effect of telerehabilitation on physical function for stroke patients after discharge to home (Telerehab)
- Identify which VA and non-VA rehabilitation settings are associated with greater cost-effectiveness in terms of quality adjusted life years (Rehab Cost)
- Partner with the Office of Care Coordination (Office of Patient Care Services), to implement telerehabilitation in multiple VISNs and VAMCs to improve rehabilitation access and physical functioning for veteran stroke survivors (planned project FY09)
- Develop a model describing the continuum of post stroke care including both VA and non-VA healthcare utilization by VA stroke patients (Va/NonVa Uts-2)

Long-Term Goals:

- All veterans with stroke, including those who live at considerable travel distances from VA care, will have access to high quality rehabilitation
- Inpatient and outpatient VA stroke rehabilitation will be delivered according to existing evidence-based guidelines and will employ active quality improvement strategies

Clinical Goal No. 5: Screen and treat veterans with stroke for post-stroke depression

Short-Term Goals:

- Identify associations between pre-stroke, in-hospital, and post-stroke depression diagnosis and treatment and patient outcomes (Anti Dp Trt)

- Identify evidence-practice gaps and disparities in depression diagnosis and treatment among post-stroke patients (OQP)
- Evaluate the use of a CPRS-based PSD reminder to improve depression screening and treatment rates post-stroke (PSD)

Medium-Term Goal:
- Implement the PSD reminder across multiple VA sites/VISNs to improve PSD screening and treatment in heterogeneous VA settings (PSD, planned SDP FY09)

Long-Term Goal:
- All veterans with stroke will receive screening for depression in the first six months post-stroke and, if positive, will receive guideline-based depression treatment.

Clinical Goal No. 6: Support the reintegration of veterans into family and community life post-stroke

Short-Term Goals:
- Evaluate the efficacy of a stroke self-management program as an implementation strategy to reintegrate veterans into family and community life post stroke (PSD)
- Identify modifiable barriers to activity and participation post-stroke (Roybal)
- Identify informal stroke caregiver needs via a multi-VISN survey (CG Needs)

Medium-Term Goals:
- Evaluate the dissemination of stroke caregiver guidebooks among informal caregivers of veterans with stroke (CG Guidebooks)
- Develop and evaluate stroke education materials to improve education of stroke survivors and caregivers (WebBased SDP)
- Develop and evaluate an intervention to assist informal stroke caregivers with the stroke survivor's transition from hospital to home (TAP)
- Develop an evidence based occupational therapy program to increase social participation and community reintegration after stroke (Schmid CDA)

Long-Term Goals:
- Veteran stroke survivors will have access to VA programs that support community reintegration
- All informal caregivers of veterans with stroke will successfully manage their stress, reduce their own injuries and illnesses and have improved health-related quality of life

1.7 Plans for Achieving Stroke QUERI Center Goals

QUERI Organization: As described earlier, the scope of the QUERI work is executed by three workgroups:

- Workgroup1 – In-hospital Management (D. Bravata)
- Workgroup 2 – Rehabilitation and Recovery (N. Chumbler and L. Williams)
- Workgroup 3 – Stroke Risk Factor Management (R. Beyth and D. Matchar)

These workgroups are supported by a Methodology Core and our Implementation/Dissemination Core. The overall efforts of the QUERI are guided by our Operations Committee, which is made up of representatives of each workgroup and core, as well as other key participants (see Section 2, Management Plan, for further details).

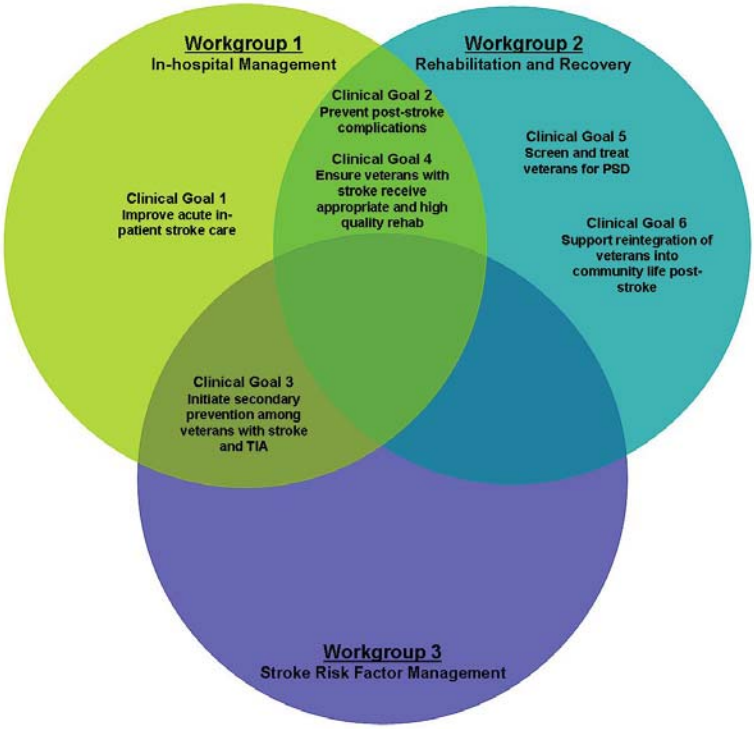
Within these workgroups, and guided by the previously described goals and priorities, each Workgroup follows the six-step QUERI process in using three main approaches to address our clinical goals: (1) evaluate evidence-practice gaps in stroke care; (2) identify and address disparities in stroke care; and (3) develop, implement and evaluate innovative programs to improve the quality of stroke care and patient outcomes.

Each workgroup is responsible for establishing collaborations and developing a portfolio of funded projects that address our clinical and implementation goals. The workgroups are responsible for strategically planning projects that use the Rapid Response Project (RRP) (formerly Locally Initiated Project [LIP]) funding mechanism to test new interventions (QUERI steps 4-6) or provide pilot data (QUERI steps 3 or 4) in support of the Stroke QUERI work toward our clinical and implementation goals. Using these preliminary data, each workgroup is challenged to move from short to medium term goals via funding of active implementation projects.

Since some of our Clinical Goals may reasonably apply to multiple workgroups, and to prevent siloing of information in one sphere of care, workgroup members discuss projects both within and across workgroups (see Figure 7). This ensures that ongoing and planned projects can be informed by the results of previously conducted projects. For example, within Workgroup 1 the SQUIDSS project will incorporate lessons learned from both the QUEST and Dysphagia projects. This cross-fertilization is achieved by having some core investigators serve as a member on more than one Workgroup, by involving Implementation Core leadership participation in all three Workgroups, and by discussion during our biweekly Operations calls.

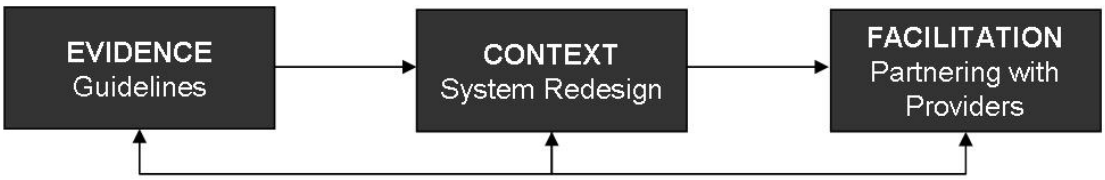
Conceptual Model for Clinical Management of Stroke: Quality stroke care encompasses a wide range of care systems, settings, and providers. The Stroke QUERI, with the encouragement of our Executive Committee, has adopted a clinical Continuum of Care model to guide each Workgroup's planned projects and the overall Stroke QUERI portfolio. The organization of our Workgroups reflects this conceptual model, considering stroke care from primary prevention, through acute hospitalization, to recovery and secondary prevention. Although we recognize that it is beyond the scope of the QUERI to address all stroke care elements across this continuum, we use this model to strategically allocate time and resources to projects and as a platform for outlining important next steps for stroke implementation research.

Figure 7: Workgroup/Clinical Goals



Conceptual Model Guiding Implementation: As in our previous report, we continue to use the Promoting Action on Research Implementation in Health Services (PARIHS) framework as our underlying conceptual model. This model is useful to help understand the complexity of implementing evidence based practices (Figure 8).[183] The PARIHS Model has been used extensively as a conceptual framework to guide implementation efforts among implementation science researchers in the VA and elsewhere.[184] We do not view this model as prescriptive, but also integrate other conceptual frameworks as appropriate to the particular clinical setting, system, or process we are trying to improve. For example, current projects incorporate aspects of the Chronic Care Model in the design of a self-management intervention designed to reduce depression symptoms and improve self-efficacy post-stroke (PSD project).

Figure 8: Conceptual Model Guiding Implementation



The Stroke QUERI incorporates the PARIHS framework to guide its implementation efforts over the continuum of stroke care and through the Classic Six-Step QUERI Process. Our

Implementation efforts are planned across implementing Evidence, understanding the Context of the implementation, and promoting the Facilitation of implementation strategies, tools, and interventions. An example of the use of this model is in our planned FY08 Implementation Project described below.

In addition, the Stroke QUERI contributes to Implementation Science by applying and evaluating Implementation Science models to our specific implementation efforts across the continuum of stroke care as suggested by members of our Executive Committee. We use qualitative and quantitative methods in formative assessment in QUERI steps 3 & 4 projects and in summative assessment evaluating implementation outcomes, lessons learned and informing planned step 5/6 efforts. We actively test the PARIHS and other models in our planned analyses for ongoing projects.

Our overall strategy in this area includes using the PARIHS framework as we increasingly employ two specific types of implementation interventions: 1) Healthcare system redesign/rapid cycle improvement projects; and 2) Information technology (IT)-based tool development and evaluation to support evidence-based practices. Both of these strategies have evolved as the Stroke QUERI has matured and taken shape more fully as we have transitioned to Indianapolis and increased our engagement with the Indianapolis Center on Implementing Evidence-based Practice, which has a strong focus on system redesign and use of health IT.

Healthcare System Redesign Strategies: Our plans for using healthcare system redesign strategies are evidenced by our FY07 and FY08 Implementation Projects. We successfully used system redesign strategies in our FY07 Implementation Project assessing the implementation of the OIG Dysphagia Screening Directive (see the Annual Report, Executive Summary).

In our planned FY08 implementation project, we will employ system redesign strategies focused on improving stroke care in VA by training front line providers on rapid cycle improvement techniques to implement evidence based practices in acute stroke care. This project is based on Dr. Marita Titler's Evidence Based Practice Seminar for nursing practices and on the Iowa Model for implementation.[185] Dr. Titler, a member of our Executive Committee, has agreed to serve as our consultant and granted us permission to adapt her nursing practice program for an interdisciplinary group of VA providers of stroke care. We plan to adopt this seminar structure to target rapid cycle improvement training and coaching for stroke champions at VISN 11 facilities. Key to facilitation, this initiative is strongly supported by VISN leadership including the VISN 11 CMO, Dr. Pamela Reeves.

In FY07, we worked with VISN leadership to identify clinical champions at each facility and began conference calls to plan for VISN-wide stroke improvement initiative. Dr. Damush completed training at Dr. Titler's Advanced Institute for Evidence-based Practices program in Iowa City, Iowa. Building off of the OQP stroke data collected early in FY08 and the VISN 11 stroke initiative begun in FY07, we plan to invite stroke care providers in VA facilities in VISN 11 to participate in rapid cycle change training focused on improving the Joint Commission (JC) inpatient stroke care indicators assessed during our OQP Stroke Special project (please see Annual Report, Executive Summary for a description of this project). We will leverage CIEBP resources and incorporate healthcare systems redesign methods into the training.

We plan to invite clinical administration at each VISN 11 facility to nominate at a minimum one nurse leader and one physician leader of stroke care to attend the multidisciplinary Training Seminar. The Stroke QUERI will inform participants of current implementation strategies, tools,

and toolkits targeting the system, provider and patients in VA to implement evidence based practices in the acute care setting. We will use OQP data to help guide facilities' selection of stroke performance measures on which to focus. Dr. Damush and Ms. Daggett, our Implementation Research Coordinators, will guide facilities in initiating rapid cycle change activities around the chosen stroke performance measures and will provide individual consultation time during the following six months by telephone to ensure we assess the impact of the system redesign activities and the evidence, context, and facilitation variables associated with successful implementation. Our ultimate goal is to refine and expand this training program to provide interdisciplinary training for stroke care providers across VA to implement ongoing performance improvement activities for stroke care to improve processes and outcomes for veterans with stroke. We anticipate that if successful, this could be an effective tool to help facilities improve performance on JC stroke performance indicators.

To evaluate this program, we will resurvey facilities after one year on the structure of stroke care services and resources as we did in FY07. We will also compare change on the process measures over time at the VISN 11 sites to selected control sites. Five key evaluation indicators will measure outcomes associated with the EBP training seminars: (a) participant satisfaction, (b) participant learning, (c) application of learning, (d) impact of learning on patient, process and organizational outcomes, and (e) return on investment (ROI).[186] First, participants will evaluate their satisfaction with training after the didactic session and at the end of the program. Pre-post seminar knowledge testing will measure participant learning. For purposes of comparability, these two indicators will include a modified version of those used by the EBP Advanced Practice Institute at University of Iowa. Next, the application of knowledge and methods learned in training will be measured by the successful completion of an EBP stroke quality improvement project (focused on one or more of the JC inpatient stroke quality indicators) by each participant. Impact on process and organizational outcomes will be determined by evaluating the results of participant projects (e.g. change in rates of appropriate DVT prevention by hospital day two) compared to rates prior to the intervention and compared to control sites. For the last indicator, a ROI analysis will be conducted by each trainee for their EBP project and will include: (a) EBP training cost, (b) cost of poor quality related to project topic, (c) implementation costs, (d) cost avoidance related to reduced risk, and (e) revenue impact for organization (Lean Healthcare Applications, 2006). Thus, our implementation efforts in this goal span Step 3 through Step 6 of the QUERI Six Step Process.[186,187]

Use of Information Technology in Implementation: Another result of our increasing partnership with the CIEBP is our increasing use of IT-based tools in our implementation projects. This trend is evidenced by our ongoing PSD and Rehabilitation Telehealth Projects and our recently funded SQUIDSS project (see Annual Report Executive Summary). We also developed an IT-based tool in our Implementation FY07 Dysphagia project that allows us to pull templated text from notes for rapid analysis. Although we are not explicitly focusing on IT as a means to achieve our clinical goals and are sensitive to the phenomenon of "reminder overload," it is likely we will continue to use this approach as appropriate in our efforts to improve stroke care.

1.8 Changes in the Strategic Plan from FY06

The overall mission of the Stroke QUERI has not changed. Although the substance of our clinical and implementation goals has not substantially changed, we have revised the phrasing of these goals for clarity. We had not previously explicitly articulated short, medium and long term goals nor prioritized our clinical goals, but have done so in this document. We have

extensively updated the section on the evidence base and have added a section on current emerging evidence and controversies in stroke management. We have updated the section on current VA practices for stroke care.

SECTION 2: MANAGEMENT PLAN

Stroke QUERI Roles

Linda S. Williams, MD is the Research Coordinator of the Stroke QUERI. As the former Clinical Coordinator of the Stroke QUERI since the time of its funding in 2004, Dr. Williams worked closely with Dr. Duncan, the former Stroke QUERI Research Coordinator, in the conceptualization and strategic planning of Stroke QUERI goals and direction. In collaboration with the Executive Committee and with Drs. Bravata, Damush, and Ms. Plue, Dr. Williams has continued to develop, refine and execute the Stroke QUERI strategic plan. She leads the Stroke QUERI to achieve its mission, co-leads Workgroup 2, and leads the VISN 11 initiative, and the OQP Stroke Special Project. She serves as a national, regional and local spokesperson for the Stroke QUERI and is PI on the PSD Implementation IIR and co-PI on the SQUIDSS project. Dr. Williams leads the biweekly Operations Committee along with the Co-Clinical Coordinators, Dr. Dawn Bravata and Dr. Linda Hershey.

Dawn M. Bravata, MD assumed the position of the Clinical Coordinator in December 2006. She transferred to the Roudebush VAMC from the West Haven VAMC in Connecticut where she developed and implemented a multidisciplinary stroke clinic for veterans receiving follow up post-stroke care. Dr. Bravata collaborates closely with Dr. Williams in strategic planning and oversees the clinical research activities of the Stroke QUERI. She leads Workgroup 1 and is a member of Workgroup 3. With Dr. Williams, she co-leads the VISN 11 Initiative and the OQP Stroke Special Project. She is PI of the QUEST project and the recently funded GoToSleep Project. She also serves as a national spokesperson for the Stroke QUERI.

As suggested by the R & M Committee, Linda Hershey, MD, PhD joined the Stroke QUERI as a co-Clinical Coordinator late in FY07. Dr. Hershey is Chief of Neurology at the Buffalo VAMC and serves on the Neurology Field Advisory Group in VA. She is a member of the VA Multiple Sclerosis Consortium and is active in multi-site clinical trials in the VA. She has extensive experience working in VA neurology service. She is an active stroke investigator, working in the area of stroke risk factors and vascular dementia. She collaborates with Dr. Bravata and Dr. Williams in strategic planning and leading the Operations Committee. Together with Dr. Bravata, she ensures that the clinical research activities of the Stroke QUERI are informed by and sensitive to the clinical and administrative needs of the VHA. She is also a member of Workgroup 3. She also serves as a national spokesperson for the Stroke QUERI.

Ms. Laurie Plue assumed the position of the Administrative Coordinator in FY07. Ms. Plue has over 15 years experience managing research programs and has worked closely with Dr. Williams in program administration during the past 10 years. Ms. Plue provides daily administrative support for the Stroke QUERI and its coordinators. She is the point of contact for the Stroke QUERI. Ms. Plue oversees the Stroke QUERI budget, development of annual report/strategic plans and project staff. Ms. Plue serves as a liaison with VA Central Office on behalf of the Stroke QUERI. Ms. Plue collaborates in implementation and dissemination efforts and serves on the Implementation and Dissemination Core.

Teresa Damush, Ph.D. serves as the Implementation Coordinator and continued in this capacity in FY07. She oversees implementation goals and efforts, provides methodology consultation to

VA providers and investigators, and actively conducts implementation efforts in concert with the Stroke QUERI's strategic plan. Dr. Damush mentors the Assistant Implementation Coordinator, Ms. Virginia Daggett, leads the Implementation and Dissemination Core and collaborates closely with the Research, Clinical and Administrative Coordinators. She is PI of the TOOLS Project and leads the Implementation Core.

Ms. Virginia Daggett serves as the Assistant Implementation Coordinator. Capitalizing on her VA nurse management experience, Ms. Daggett actively engages with front line VA providers to roll out the Stroke QUERI's active implementation projects. She recently completed training as a LEAN Six Sigma Systems Redesign coach at the Roudebush VAMC. Ms. Daggett works closely with Dr. Damush to execute the implementation goals and strategic plan of the Stroke QUERI.

Neale Chumbler, Ph.D. serves as the "site PI" for Stroke QUERI activities in Gainesville. He is an Associate Research Scientist at the Gainesville Rehabilitation Outcomes Research Center for Veterans with Neurological Impairments and coordinates QUERI activities and communication between the Coordinators and the investigators in Gainesville. He co-leads Workgroup 2, is PI of the Telerehabilitation implementation grant, co-PI of the FY07 Implementation Project (Dysphagia), and a key member of our Operations Committee.

Workgroups

As described previously in the Annual Report Executive Summary, the Stroke QUERI reorganized our Workgroups in FY07 around the clinical continuum of care model. Each workgroup has a leader or co-leader who works to identify and recruit members, set the agenda for monthly conference calls, prioritize research activities and topics, keep abreast of emerging evidence, and ensure the Workgroup activities are advancing our short, medium, and long-term goals. Workgroup membership is shared between workgroups to ensure clinical goals that overlap multiple workgroups are comprehensively and efficiently addressed. An Implementation/Dissemination Core member participates in each Workgroup to ensure continued focus on active implementation activities. Each workgroup meets monthly via conference call.

Implementation/Dissemination Core

In FY07, the Implementation and Dissemination Cores merged, as suggested by the Executive Committee members, to best utilize core resources and focus efforts more directly on implementing strategies that lead to effective change and disseminating these efforts to key audiences to foster spread of innovation in stroke care. Previously, the dissemination core met monthly focusing on the dissemination of products and tools. Currently, members of both cores are merged and meet monthly targeting the implementation efforts across the workgroups and addressing dissemination as embedded into the implementation process. An example of this joint effort is our Post-stroke Depression project, as we developed a toolkit based on Dr. Williams' NINDS-funded care management trial (AIM) and disseminated it using active and passive strategies to VA and non-VA consumers.

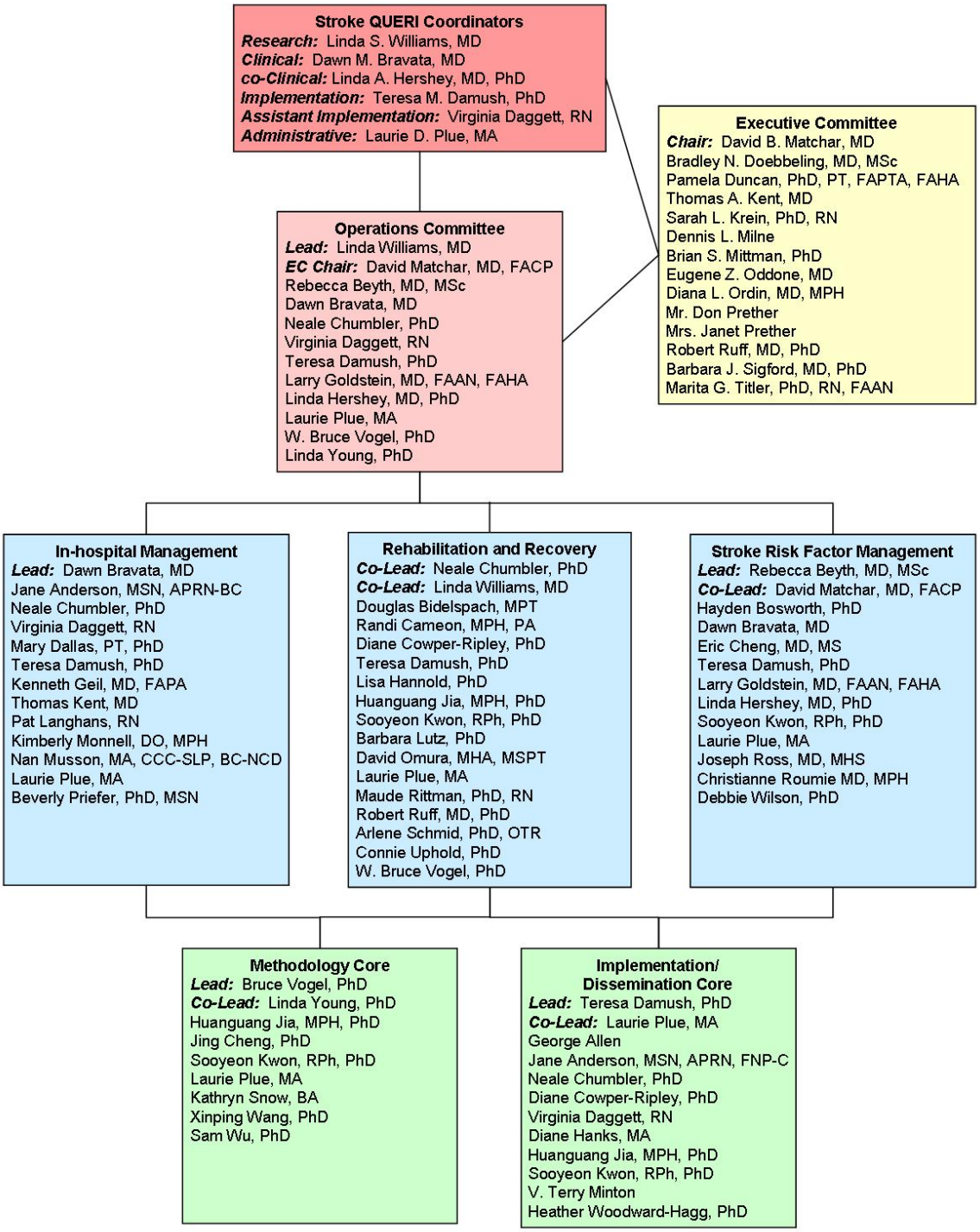
We added members to our Implementation/Dissemination Core in FY07 including Ms. Ginger Daggett, a recent VA Nurse Manager and Ph.D. candidate in Nursing and Professor Heather Woodward-Hagg, a Systems Redesign engineer and investigator at the CIEBP. Recently, Mr. Terry Minton, a retired US Navy public affairs expert, in the HSRD CIEBP, joined our Core to facilitate dissemination efforts for the Stroke QUERI Center.

Methodology Core

The primary function of the QUERI methodology core is to provide assistance to QUERI projects in the areas of statistics and data management. Advice on statistical design and analysis issues is provided by Ph.D. statisticians, and statistical programming and data management tasks are performed by Masters level statisticians for all QUERI projects that require such services.

Over this past year, the Methodology Core has also taken a lead role in the planning for statistical analyses and data management for the OQP Stroke Special Project. Over this upcoming year, the Methodology Core will be responsible for analyses of these chart abstraction data to measure and compare compliance rates for these indicators across VHA facilities. The results of these analyses will be reported to OQP as part of their quality improvement activities in stroke management and prevention. With Stroke QUERI leadership, the Methodology Core will also conduct analyses on the pre- and post-stroke risk factor management data to identify evidence-practice gaps, examine disparities, and obtain valuable data for pilot studies and proposal development related to improving stroke care in the VA.

Figure 9: Stroke QUERI Organizational Chart



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Stroke QUERI

Annual Report

November 2007

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EXECUTIVE SUMMARY

The mission of the VA HSR&D Stroke Quality Enhancement Research Initiative (QUERI) is to reduce the risk of stroke and to foster system, provider, and patient processes that result in the best possible outcomes for veterans with stroke. This mission is accomplished by focusing on six core clinical goals: (1) improve acute in-patient stroke care; (2) prevent post-stroke complications; (3) initiate secondary prevention among veterans with stroke and transient ischemic attack (TIA); (4) ensure that veterans with stroke receive appropriate and high quality rehabilitation; (5) screen and treat veterans with stroke for post-stroke depression; and (6) support the reintegration of veterans into family and community life post-stroke.

We operationalize this mission via work coordinated and conducted by three core Workgroups: 1) In-hospital Management (Dr. Bravata, lead); 2) Rehabilitation and Recovery (Drs. Chumbler and Williams, co-lead); and 3) Stroke Risk Factor Management (Drs. Beyth and Matchar, co-lead).

A. Narrative Summary of Accomplishments

Stroke QUERI Reorganization

In FY07, as a result of key QUERI personnel transitions, the Stroke QUERI reorganized and refined its core work with significant direction and feedback from our Executive Committee. This reorganization served to clarify the clinical goals the QUERI is committed to pursuing and to identify the best internal structure to support continued strategic work toward our goals. We remain committed to our core clinical goals and to the challenge of improving outcomes across a heterogeneous, complex, and time-sensitive condition. We recognized that stroke care takes place in three major clinical arenas: the acute hospital phase, the rehabilitation and recovery phase, and the outpatient risk factor management phase. For this reason, we reorganized our previous four workgroups into three, related to these three clinical settings. As clinicians who care for veterans with stroke, we are sensitive to the potential issue of isolating interconnected aspects of care and so we have intentionally shared workgroup membership, ensuring continual communication between the workgroups and sharing of knowledge about related work. For example, Dr. Bravata and several members of the In-hospital Management Workgroup also participate in the Stroke Risk Factor Management Workgroup. In this way, we coordinate work in risk factor management across the important clinical transition from the inpatient to the outpatient setting. Similarly, several members of the Rehabilitation and Recovery Workgroup participate in the In-hospital Management Workgroup, recognizing that initiation of appropriate rehabilitation care is an important component of acute stroke care. We actively foster dialogue across workgroups to inform each other's work, striving to promote the uptake of high quality stroke care across the many providers and settings inherent in the stroke care continuum.

Another aspect of reorganization is our intentional effort to broaden the membership of our workgroups to include other VA clinicians and researchers interested in improving stroke care in the VA. In addition to Dr. Hershey in our In-hospital Management Workgroup, we have also added individuals whose clinical practice involves acute stroke care including: Dr. Kimberly Monnell (neurology) and Ms. Pat Langhans (nursing) from the Bay Pines VAMC, who have experience implementing the American Stroke Association (ASA) Get With the Guidelines Program within an acute care VA setting; Dr. Beverly at the Madison VAMC, a nurse with experience in acute dysphagia assessment; and Dr. Mary Dallas, a physical therapist at the West Haven VAMC with many years of clinical experience in inpatient stroke rehabilitation. Similarly, our Rehabilitation and Recovery Workgroup has added not only Dr. Robert Ruff, but also Mr. David Omura, the Chief of Physical Therapy at the Gainesville VAMC. We will actively

seek to include other interested clinicians and investigators to these workgroups as we continue to build partnerships in FY08.

Collaboration Between the Stroke QUERI and the CIEBP

One result of the Stroke QUERI relocation to the Indianapolis VAMC is a closer connection to ongoing work at the VA HSR&D Center of Excellent on Implementing Evidence-based Practice (CIEBP). In the past year, this collaboration has brought an infusion of ideas and expertise in system redesign and rapid process improvement strategies into the Stroke QUERI. We have begun to apply these approaches, focusing primarily on rapid system change/Lean Six Sigma methodology in our work as we seek to implement and evaluate practical approaches to improving stroke care (see Healthcare System Redesign section below for a brief description of specific projects). Because the CIEBP faculty also has considerable strength in the use of informatics and information technology (IT) to improve healthcare, the Stroke QUERI/CIEBP collaboration is also evident in our continued and increasing emphasis on the use of IT strategies (see Information Technology section below), including CPRS-based clinical reminder development; decision support tool development; telemedicine interventions; and electronic medical record text searching. Given our shared emphasis on implementation of evidence-based practices and on the evaluation of IT and system redesign strategies to improve care, the Stroke QUERI and the CIEBP are natural partners, poised to benefit from each other's strengths and informing each other's work as we seek to improve care for veterans.

Active Implementation Accomplishments

A key area of accomplishment is in the further migration of our QUERI portfolio into active implementation. Since the Stroke QUERI's inception in 2004, we have been working toward active implementation across the continuum of stroke care and this year successfully launched active implementation projects in each of our three workgroups. The most developed of these projects is our "Implementing Evidence in the Detection and Treatment of Post-stroke Depression" (PSD) project, funded as an Implementation IIR in January 2006. In this ongoing project, we have successfully modified the CPRS-based annual depression screener based on provider input, formed clinical teams at two VA facilities, and implemented the PSD screener for all veterans receiving outpatient follow-up care in the first six months post-stroke. To date, we have demonstrated improvements in the proportion of veteran stroke survivors receiving screening (30% in FY05 vs. 80% during the study period to date at the two study facilities). Further, of the 34% screening positive for depression, 71% have a guideline-adherent provider action (initiating or changing an antidepressant or referring for mental health evaluation).

Inpatient stroke care remains an area for which guidelines for acute treatment and prevention of complications are well known but in which the VA has, to date, not conducted systematic quality measurement or improvement efforts. In FY07 we successfully partnered with the Houston VAMC and Dr. Thomas Kent, VA Acute Stroke Guidelines Clinical Champion, to secure SDP funding for the "Stroke Quality Improvement Decision Support System" (SQUIDSS) project. In this project, which will begin in the second quarter of FY08, we will work with inpatient care providers at three VAMCs to develop a CPRS-based tool to prompt best practices and document acute stroke care processes. The resulting tool will then be implemented and evaluated at the Houston VAMC, with plans for subsequent refinement and larger scale roll-out. SQUIDSS will be evaluated through interviews with front line providers, usability testing, and evaluation of workflow integration. This project dovetails with our OQP Stroke Special Project assessing inpatient stroke care quality (see project details below) and will provide functional tools for VHA to use to improve and monitor inpatient stroke care quality. Another example of

an active implementation project focused on inpatient stroke care is our FY07 Implementation Project, described in the Healthcare System Redesign section below.

In the area of stroke risk factor modification, two projects initiated this year involve the development or implementation of programs to improve secondary stroke prevention. First, Dr. Damush received IIR funding for "Adapting Tools to Implement Stroke Management to Veterans" (TOOLS) in 2007 to adapt existing tools and local resources to implement stroke risk management at the Indianapolis and Houston VAMCs. We have begun to conduct the formative research to gather input and existing tools from key stakeholders. The goal is to implement evidence-based secondary stroke risk factor management as veterans with stroke or TIA transition from hospital to home. Second, Dr. Damush teamed with Dr. Karen Hudmon, a pharmacoepidemiologist and implementation expert, on a RRP for implementing smoking cessation counseling among veterans after stroke (STOP). In the second quarter of FY08, we will conduct a formative evaluation of current smoking cessation counseling and management practices for veterans with recent stroke in three VA facilities. We will then use the results to map an implementation intervention targeted for early FY09.

Information Technology (IT)

The Stroke QUERI continues to expand its work in using IT strategies to implement best practices for stroke care in the VA. In addition to the PSD and SQUIDSS projects, we are also conducting a multi-site project in which telerehabilitation is implemented and compared with usual care in its impact on veterans' functional outcomes post-stroke (Dr. Chumbler, PI). As part of the FY07 QUERI Implementation Project ("Assessment of the Implementation of a Dysphagia Screen for Veterans with Acute Ischemic Stroke"), an IT algorithm was developed to search the VA electronic medical records for text data. This algorithm was used to examine all of the medical records for patients admitted to the Roudebush VAMC for the presence of the nursing assessment dysphagia screening tool and whether any of the specific components of the dysphagia screening tool were "positive" (predictors of dysphagia were present). The algorithm has already been validated on a small sample of records; we are currently validating the results of the algorithm in a larger sample (comparing data from chart review with the administrative algorithm results). If this technique proves a valid and reliable way to search VA electronic text data, especially data that is present in templated notes, this exciting IT approach to data collection has the potential for a wide array of applications. We anticipate continued use of these IT based interventions as we investigate strategies for the effective implementation of evidence in stroke care.

Healthcare System Redesign

Stroke QUERI investigators are increasingly exploring the use of healthcare system redesign principles to improve stroke care. In FY07 these efforts focused on our FY07 QUERI Implementation Project (Dysphagia), and in FY08 we will use these principles as a key component of the didactic training in the planned QUERI FY08 Implementation Project (see Strategic Plan, Section 1.7). In the FY07 Implementation Project (Dysphagia), we partnered with clinical staff at the Gainesville and Indianapolis VAMCs to evaluate the implementation of the Office of the Inspector General (OIG) directive to screen all hospitalized veterans for dysphagia and its impact on stroke care and outcomes. At the Gainesville VAMC, our team members are conducting qualitative research with front line providers to identify barriers and facilitators of dysphagia screening and management. Three main barriers have already been identified: (1) lack of communication between the clinicians performing the initial assessments (e.g., nurses, speech-language pathologists) and the clinicians performing follow-up patient care (e.g., nurses, speech-language pathologists, physicians); (2) a lack of "hands-on" training in dysphagia

assessment (particularly relevant to nurses); and (3) competing VACO policies between nursing, speech-language pathology, and nutrition.

At the Indianapolis VAMC, we engaged a clinical team in a 100-day rapid cycle improvement process to institute and evaluate rapid cycle changes in the inpatient dysphagia screening process. The primary objective of this project is to evaluate the use of a Lean Six Sigma System Redesign strategy for the improvement of the dysphagia evaluation and management processes. The clinical team included representatives from nursing, medical staff, nutrition service, pharmacy, education, IT, and speech/language pathology. The 100-day project involves eight 3-hour weekly project team sessions where clinical staff: describe the use of the screening tool in routine practice; make direct observations of the screening process; identify potential barriers to its implementation; and develop suggestions for improving the implementation. Small to moderate, incremental process changes are made and the changes to the dysphagia screening process are measured. Several outcomes will be evaluated including change (from before the 100-day intervention to after the intervention) in: reliability and validity of the screening tool; patient outcomes (e.g., length of stay, pneumonia rates); and speech-language pathology utilization. A mixed method approach is being used, including semi-structured interviews, human factors analyses, and a retrospective medical record review. The system redesign activity is in progress and has already identified several problems with the dysphagia screening tool including: the length and content of the questionnaire; delays in patient receiving oral medications; confusion regarding diet status; confusion regarding diet taxonomy; access to speech-language pathology on nights/weekends; and inadequate communication of positive screen results among staff members. The process has revealed that the use of dysphagia diets have increased substantially and that general awareness about dysphagia has improved. Data collection regarding additional outcomes is in progress. Products from this 100-day project include: (a) a redesigned nurse admission assessment tool for dysphagia screening (a component of the nursing admission template) that may be used in other VAMCs; (b) a toolkit for evaluating new components to the admission nursing assessment.

Office of Quality and Performance (OQP) Stroke Special Project

Another critical new area in which the Stroke QUERI expanded in FY07 was in a partnership with the VA Office of Quality and Performance (OQP) to conduct a special project assessing quality of stroke care across VHA (Dr. Ordin, OQP and Drs. Bravata and Williams, co-PIs). In the FY06 Stroke QUERI Annual Report, we described our plan, based on our Executive Committee's suggestions, to work toward the development of a "Stroke Scorecard" that would "measure the quality of stroke care across the continuum of care." The OQP Stroke Special Project is the first step in this process of on-going performance measurement of inpatient stroke care quality within VA.

Beginning in January 2007, we worked closely with Dr. Ordin and a team of opinion leaders from Nursing, Rehabilitation, Neurology, Primary Care and Emergency Department services, to assemble existing Joint Commission (JC) inpatient stroke indicators and to define additional inpatient and outpatient stroke data elements that will provide a comprehensive assessment of the quality of stroke care in the VA and of evidence-practice gaps in care. This project involves chart abstraction on 5,000 veterans with an inpatient admission for acute ischemic stroke in the VA during FY07 (approximately 87% of all veterans with inpatient admission for acute ischemic stroke within the VA). The JC-defined inpatient stroke quality indicators form the basis of the performance measurement component of this project and will be reported back to facilities in FY08. In addition to defining critical variables for risk adjustment (including assessment of initial stroke severity), we will also collect data on vascular risk factor management in the year prior to

and the six months following discharge from the stroke admission. These risk factor data include information about the management of: transient ischemic attack; hypertension; diabetes; carotid stenosis; hyperlipidemia; atrial fibrillation; tobacco use; and post-stroke depression diagnosis and treatment . These data will not be reported as performance measures but will be used to identify important evidence-practice gaps in VA stroke care. We anticipate that these data will prompt future implementation projects conducted by the Stroke QUERI and other VA investigators and will help focus this work on the areas with most opportunity for impact and improvement.

The Stroke QUERI will conduct the analyses on the inpatient stroke performance indicators and will work with OQP in the feedback of these data to all VAMCs in FY08. We will also conduct analyses on evidence-practice gaps related to the management of stroke risk factors pre- and post-stroke as well as other process and outcome variables in the inpatient setting. We are designing the FY08 Implementation Project to develop a network of front line clinicians who are trained in quality improvement methodology (especially system redesign strategies). This network will use the OQP data as a critical baseline assessment as sites choose inpatient stroke processes of care to target to improve during this FY08 project. *We view the OQP Stroke Special Project as foundational to developing the next several years of our agenda as we use these data to define and prioritize the critical evidence-practice gaps in VA, examine disparities in the quality of stroke care, and engage with clinicians and administrators about VA stroke care to improve the quality of both inpatient and outpatient stroke care across the VHA.*

Interaction with Other VA Entities

In addition to the new partnership with OQP, the Stroke QUERI has expanded our relationships with the VA Acute Stroke Guidelines Group and the Neurology Field Advisory Group. These strengthened relationships have occurred, in part, as a result of increased interaction with our Executive Committee members, specifically Dr. Thomas Kent, the Clinical Champion for the Acute Stroke Guidelines Committee and the Neurology Care Line executive at the Houston VAMC, and Dr. Robert Ruff, the Neurology Service Chief in Patient Care Services/CO. In addition, the Stroke QUERI is partnering with Dr. Pamela Reeves, VISN 11 CMO, in conducting the VISN 11 Stroke Initiative and planning a VISN 11 Stroke Care Summit meeting for FY08. We plan to use this meeting to review OQP performance data across facilities and plan subsequent stroke quality improvement projects as part of the development of a stroke quality improvement network (see below). As a first step in the VISN 11 Stroke Initiative, we identified and began discussions with stroke clinical champions in all VISN 11 facilities. Based on these discussions, we developed and fielded a survey of current practices and systems of stroke care at these facilities. Preliminary results have already identified opportunities for improvements in stroke care (e.g., although 83% of VISN 11 facilities have 24-hour access to a computed tomography (CT) machine, only 33% have in-house staff trained to perform a non-contrast brain CT).

Development of a Stroke Quality Improvement Network

As described in the Strategic Plan, a long-term objective of the Stroke QUERI is to develop a network of facilities across the VA system that are conducting quality improvement projects in stroke care. This core strategic goal took shape in FY07 with the VISN 11 Stroke Initiative (described above), and will effectively link our work in assessing stroke quality performance in the OQP Stroke Special Project to a regional stroke improvement network planned for our FY08 Implementation Project (see Strategic Plan, Section 1.7), where clinical staff at each VISN 11 facility will be trained and mentored in rapid cycle process improvement methods. Participating staff will select components of inpatient stroke care that will serve as the basis of

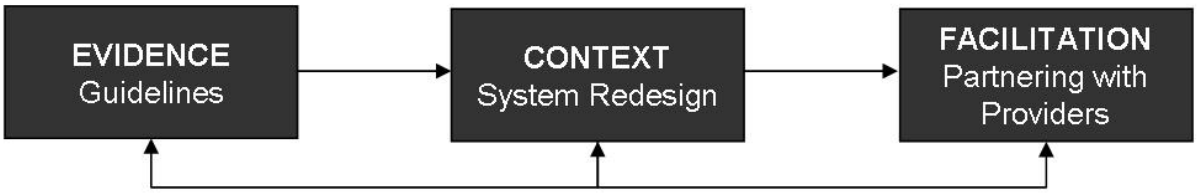
the quality improvement effort. Data from the OQP project will be used as baseline data and we will evaluate the success of the rapid cycle process improvement projects at each participating facility.

B. Implementation Science Goals

Role of Evidence, Context and Facilitation Factors in Implementing Change

As in our FY06 annual report, we continue to use the Promoting Action on Research Implementation in Health Services (PARIHS) framework as our underlying conceptual model (see Strategic Plan, Section 1.8 for further description). The PARIHS model is useful in understanding the complexity of implementing evidence-based practices,[1] and has been employed extensively as a conceptual framework to guide implementation efforts among implementation science researchers in the VA.[2]

Figure 1: Conceptual Model Guiding Implementation



The Stroke QUERI incorporates the PARIHS framework to guide its implementation efforts over the continuum of stroke care and through the Classic Six-Step QUERI Process. The use of this model provides a framework to consider the impact and measurement of factors related to: (1) the evidence for a particular practice (e.g. knowledge, strength of evidence, existing guidelines); (2) the context in which the practice occurs (e.g. organizational structure, culture); and (3) the facilitators of that practice (e.g. tools, engagement with front line providers). We have formulated our Implementation Goals to relate to this model:

Chart 1: Implementation Science Goals

Stroke QUERI Implementation Science Goals	
EVIDENCE	
Goal 1	Increase awareness and use of evidence-based practices by VA providers and stakeholders across the continuum of stroke care.
CONTEXT	
Goal 2	Inform implementation science by identifying multi-level contextual factors that influence the adoption and/or maintenance of evidence-based practices across the continuum of stroke care.
FACILITATION	
Goal 3	Develop, implement, and evaluate innovative interventions, tools and strategies to: facilitate the adoption and maintenance of evidence-based practices within the VHA system (e.g., performance measurement); clinicians (e.g., clinical decision support); and patients (e.g., self-management, direct-to-consumer programs).
IMPLEMENTATION SCIENCE TESTING	
Goal 4	Evaluate and refine implementation science models for implementing evidence-based stroke care across the continuum of stroke care.

Specifically, we use the PARIHS model as we develop implementation interventions, and in ongoing projects will evaluate linkages between the components of this model to identify key relationships within and between the three components. For example, in the TOOLS project we are conducting formative evaluation to identify provider attitudes about the evidence and existing processes for stroke risk factor management, measuring the organizational structure and context at the facilities, and partnering with providers and patients to apply the tailored implementation strategy at each facility. Thus, the Stroke QUERI contributes to Implementation Science by applying and evaluating Implementation Science models to our specific implementation efforts across the components of the continuum of stroke care. As our ongoing active implementation projects mature, we expect to report on these applications over the next several years.

In addition to the PARIHS model as our major underlying model, we use additional implementation and system of care models as appropriate. For example, key efforts in FY07 include the incorporation of healthcare redesign processes into our implementation projects, which includes a rapid-cycle improvement (Plan-Do-Study-Act) model (see Section A, Healthcare System Redesign of this report for a discussion of our work in this area). Another example of additional model use is our planned FY08 Implementation Project which adapts Dr. Marita Titler's Iowa model of evidence-based nursing internships to train and mentor a network of sites conducting stroke quality improvement projects (see Strategic Plan, Section 1.8 for a complete description of this planned project).

Moving from Clinical Research Toward Implementation Research

In past years, the Stroke QUERI investigators have conducted important work to define current practices and to develop interventions to improve care for veterans with stroke or stroke risk factors (work that is classified as clinical research or mainstream health services work). Beginning in FY06 and increasing in FY07, Stroke QUERI investigators and projects have moved toward active implementation.

Active Implementation

As summarized above in sections "Active Implementation Accomplishments" and "Healthcare System Redesign," in FY07 we engaged in several active implementation projects. Importantly, the Stroke QUERI now has active implementation projects underway in all three of our workgroups, representing the spectrum of stroke care from acute care to rehabilitation to risk factor management. These projects primarily address Step 4 of the Six-Step QUERI Process (Implement Improvement Programs) and are conducted at 2 or 3 sites, but evaluative aspects of these projects also address Steps 5/6 of the Six-Step QUERI Process (Evaluate Improvement Programs) as they measure system and patient impacts.

One example of active implementation that is evaluating the intervention in terms of impacts on patient and system outcomes is the post-stroke depression (PSD) study. We modified the current CPRS-based primary care annual depression screening tool to target stroke survivors receiving outpatient primary care or neurology follow-up in the first six months post-stroke and developed a stroke-specific provider reminder for use when patients screen positive for PSD. We also developed a comprehensive stroke self-management manual for the stroke survivor modeled after the Stanford Arthritis Self-Management program. We moved into the field at two VA sites (Indianapolis and Gainesville) and implemented: (a) the modified CPRS-based depression screener and provider reminder in outpatient neurology and primary care clinics and (b) the stroke self-management program. This project thus includes both system-based and

direct to consumer interventions to implement evidence for best practices in PSD detection and treatment. The evaluation outcomes include: (a) system process outcomes (screening and treatment rates); and (b) patient outcomes (depression symptoms and self-efficacy).
Other examples of our active implementation work that consist of both implementation and evaluation of interventions include: (a) the Telerehabilitation Program (Dr. Chumbler, PI) which began in 4 VA facilities in FY07; and (b) the Stroke QUERI Implementation Project for FY07 (Section A, Healthcare System Redesign) that is evaluating a 100-day rapid cycle implementation strategy to improve the dysphagia screening process at the Indianapolis VAMC.

Finally, in an ongoing national evaluation project (Step 5 of the Six-Step QUERI Process), the Stroke QUERI continued to dedicate resources toward monitoring and mapping the rehabilitation supporting indicator (FIM assessment).

Pre-Implementation

In FY07, the Stroke QUERI also set the stage for future active implementation projects through important pre-implementation work. Therefore, in addition to the active implementation projects described above, our pre-implementation research (Step 3 of the Six-Step QUERI Process: Measure and Diagnose Quality/Performance Gaps) included a major project to assess and compare inpatient stroke quality at three VA and two non-VA facilities (Dr. Bravata, QUEST project), and a project to define racial disparities in blood pressure management for veterans with stroke (Dr. Bravata, Hypertension RRP). The RRP project includes formative research with VA opinion leaders to understand the disparity gaps in blood pressure management post-stroke from front line providers' perspectives and to develop intervention strategies to address any observed racial disparities in blood pressure management. Another example is seen in the Rehabilitation and Recovery Workgroup, where Dr. Schmid conducted pre-implementation work among rehabilitation therapists to assist with mapping an evidence-based occupational therapy intervention to increase social participation and community reintegration after stroke. In this survey, Dr. Schmid found that many OTs in VISN 11 are not familiar with VA/DoD Guidelines for Stroke Rehabilitation and that patients' fear of falling and depression are perceived barriers to successful community reintegration. In the Stroke Risk Factor Management Workgroup, Dr. Damush is conducting the "Adapting Tools to Implement Stroke Risk Management to Veterans" (TOOLS) project, which is in the field collecting pre-implementation data on existing stroke risk factor management tools and practices at two VA facilities (Indianapolis, IN and Houston, TX). We have matched two VA facilities on secondary stroke prevention practices to serve as control sites (West Haven, CT and Bay Pines, FL). The site investigators are QUERI investigators and are front line providers. Also in the Stroke Risk Factor Management Workgroup, Ms. Jane Anderson (nursing, Houston) is conducting pre-implementation work (the STOP clinic project) to refine a CPRS-based reminder dialogue tool for use in providing and documenting post-stroke risk factor management.

Implementation Training

The Stroke QUERI has invested resources into training VA providers and implementation researchers. In 2007, we added VA Neurologist, Dr. Eric Cheng, to our core workgroups. He was recently awarded a NIH career award to develop a secondary stroke prevention program in VA and will partner with the QUERI in the development of this program. We also have included Dr. Christiana Roumie, a VA HSR&D CDA awardee from the Nashville VA in our core workgroups. Dr. Roumie is focusing on hypertension management quality. The inclusion of these career development awardees allows us to help mentor investigators in implementation

methods and implementation science as we expand our core investigators to more fully reflect the continuum of stroke care.

In addition, the Stroke QUERI added Virgina Daggett RN, a Ph.D. candidate. to its implementation core in the Indianapolis VAMC. Dr. Damush is mentoring Ms. Daggett in implementation science and methodology and together they devote 100% effort toward implementation research coordination for the Stroke QUERI. As described above, Ms. Daggett was formerly a front line nurse manager at the Illiana VAMC. Ms. Daggett recently completed training as a Rapid Cycle Redesign Coach for the Roudebush VAMC and is part of the systems redesign team for the FY07 Implementation Project about dysphagia screening at the Roudebush VA. Another VA front line nurse and Ph.D. candidate, Ms. Jane Anderson, is the Associate Director of the Stroke Center at the Houston VAMC; she participates in the In-hospital Management Workgroup and the Implementation Core. Drs. Damush and Williams have mentored Ms. Anderson on implementation science and methodology for the SQUIDSS implementation project. In addition, Ms. Anderson received VA nursing funding for stroke pilot work testing a stroke outpatient follow-up clinic for secondary prevention (STOP).

We have also mentored rehabilitation professionals. Dr. Arlene Schmid, OTR, Ph.D. recently completed a postdoctoral fellowship at the VA HSR&D CIEBP under Drs. Williams' and Damush's mentorship. During this fellowship, she completed a survey of VISN 11 therapists about their use of VA/DoD Stroke Rehabilitation Guidelines and received pilot funding for a project examining the impact of depression and anxiety on fear of falling and participation post-stroke. Dr. Schmid's recently submitted RR&D Career Development Award focuses on implementation of evidence-based occupational therapy to increase participation post-stroke and was recently awarded funding. In FY07 Dr. Bravata served as a mentor and thesis advisor to Dr. Mary Dallas Ph.D., PT. Dr. Dallas' doctoral thesis demonstrated the prognostic importance of pre-stroke mobility impairment across a variety of post-stroke outcomes. Dr. Dallas is collaborating with Dr. Damush by serving as the site-PI for the TOOLS implementation project at the West Haven VAMC.

Finally, our planned FY08 Implementation Project is focused on improving stroke care in VA by training front line providers on rapid cycle improvement techniques to implement evidence-based practices in acute stroke care. (Please see Section 1.7 of the Strategic Plan for a description of this project). Dr. Damush completed training at Dr. Marita Titler's successful Advanced Institute for Evidence-based Practices program in Iowa City, Iowa. Dr. Titler, a member of our Executive Committee, has agreed to serve as our consultant and granted us permission to adapt her nursing practice program for an interdisciplinary group of VA providers of stroke care. Our ultimate goal with this project is to provide interdisciplinary training for stroke care providers across VA to develop a stroke quality improvement network that will implement ongoing performance improvement activities for stroke care and improve processes and outcomes for veterans with stroke.

In summary, the Stroke QUERI activities for this past year that may advance the field of implementation science include testing implementation models in our ongoing projects and evaluating a system redesign implementation strategy to improve an inpatient process of care (dysphagia screening). Our planned FY08 Implementation Project will further advance this work by evaluating the effectiveness of a program to train clinical staff to conduct quality improvement projects throughout VISN 11.

Cross-QUERI Efforts

The Stroke QUERI continues to collaborate with the Mental Health QUERI on the post-stroke depression detection and treatment project. In addition, Dr. Damush collaborated with Dr. Nina Sayer from Polytrauma Blast Injury and Dr. Phil Ulrich from Spinal Cord Injury to disseminate the QUERI Six-Step Process to the field of Rehabilitation Psychology in response to a call for new rehabilitation methodology. A manuscript,[3] entitled "Implementation Science Methodology: Applications of the US Veteran Administration Quality Enhancement Research Initiative (QUERI) Six Step Process", is under review at *Rehabilitation Psychology*.

Another demonstration of the Stroke QUERI efforts towards improving implementation science is through cyberseminars. Dr. Damush collaborated with Phil Ulrich Ph.D. and Diane Hanks from CIDER to plan and align implementation scientists for the Implementation Series of Cyberseminars in 2007 including: Dr. Marita Titler and Ms. Cullen, Dr. Ian Graham, and Dr. Dawn Stacy from the University of Ottowa and the Knowledge Transformation Association of the Canadian Institutes of Health.

We anticipate that as our stroke implementation efforts expand we may increase partnership with the IHD QUERI given the clinical parallels between caring for acute stroke and acute myocardial infarction. For example, Dr. Bravata has begun to collaborate with Dr. Paul Heidenreich, the Research Coordinator of the IHD QUERI, in a project examining serious cardiac events (e.g., cardiac arrest, myocardial infarction) among patients with acute ischemic stroke. In the QUEST project we will examine the quality of care that patients with concomitant cerebrovascular and cardiovascular disease receive in three VAMCs compared with two non-VA hospitals.

Within our local VAMC community, Drs. Damush and Williams contributed lectures on implementation methodology in the Implementation Science Course offered through the HSRD CIEBP, Indianapolis to health care provider trained fellows.

C. Diversity

The QUERI has been working to identify disparities in care across the care continuum. Specifically, we have identified disparities in stroke care based on age, race, geography, and comorbidity within the VA. We have also identified disparities in stroke care within the VA compared with non-VA settings. The majority of the FY07 Stroke QUERI work related to disparities has focused on Step No. 3 in the Six-Step QUERI process (Measure and Diagnose Quality/Performance Gaps). In FY08, the OQP data (see project description in Section A, Office of Quality and Performance Stroke Special Project) will provide comprehensive information regarding age, gender, race, geographic, and facility-volume related disparities in stroke care across the stroke care continuum with the VA system nationwide as we move our disparities-related work toward Step Nos. 5/6 in the Six-Step QUERI Process (Evaluate Improvement Programs).

Age-Related Disparities. QUERI investigators (Drs. Bravata and Brass) demonstrated that very old stroke patients (those aged 85 years or older) constitute approximately 20% of stroke hospitalizations. Hospitalizations for very old patients are more likely to end in death or discharge to a long-term care facility than hospitalizations for younger patients (71% vs. 48%). The pattern of geographic disparity in post-stroke adverse outcomes (commonly referred to as "the Stroke Belt") differs between younger and very old patients. Moreover, older patients appear to receive less interventions than younger patients. For example, Stroke QUERI

Investigators (Drs. Bravata and Goldstein) found that even among ideal candidates the oldest stroke patients (those aged 85 years or older) were less likely to receive anti-platelet medications either during the acute hospital period or at discharge; deep vein thrombosis prophylaxis; or anticoagulation for atrial fibrillation. For example, among stroke patients with atrial fibrillation patients who were ideal candidates for warfarin therapy, increasing age is associated with decreasing warfarin use at hospital discharge: age 65-74 years, 88.8%; age 75-84 years, 85.7%; age ≥85 years, 76.0%; $p<0.0001$.

Race/Ethnicity-Related Disparities. A QUERI Rapid Response Project (RRP) entitled "Racial Disparities in Blood Pressure Management Among Stroke Patients" (DM Bravata, PI) seeks to examine whether racial differences exist in the management of blood pressure within the VA: (1) in the one-year prior to hospitalization for acute ischemic stroke, (2) in the acute stroke period (the first 48 hours after admission to the hospital), (3) at the time of discharge from the hospital, and (4) in the one year after discharge from the stroke hospitalization. This project includes three components: (a) a secondary analysis of a HSR&D funded cohort study entitled "Quality Evaluation in Stroke and Transient Ischemic Attack" (QUEST), (b) a medical record review of veterans included in the QUEST project including data from the one year pre-stroke and one year post-stroke, (c) the identification of barriers and opportunities to improving blood pressure management and the development of rapid cycle implementation strategies to facilitate the implementation of programs to address any identified gaps or disparities in blood pressure care within the VA sites. Although this project is still in the data collection phase, racial disparities in blood pressure management have already been identified in the in-patient setting such that 31% of Black and 43% of non-Black veterans had guideline-adherent inpatient blood pressure management. This racial disparity in blood pressure care persisted even after comprehensive risk adjustment (adjusted odds ratio for guideline-discordant care 1.7, 95%CI 1.3-2.6). No racial disparities in blood pressure management have been identified in the out-patient setting.

The Stroke QUERI has continued our work in examining and addressing race/ethnicity barriers in veterans receiving care in Puerto Rico. Stroke QUERI investigators (Drs. Rittman and Sberna) have demonstrated that informal caregivers of stroke survivors often do not have the information necessary to adequately manage the recovery process at home. Moreover, they have found that caregivers in Puerto Rico have much higher unmet information needs compared with Mainland caregivers. For example, Puerto Rican caregivers have higher unmet information needs about: keeping the veteran with stroke safe at home (Puerto Rican 60% vs. Mainland 19%); managing challenging behaviors (Puerto Rican 43% vs. Mainland 23%); and managing fall risk (Puerto Rican 49% vs. Mainland 18%). Dr. Rittman is following-up on this important finding by implementing projects that seek to alleviate information disparities in Puerto Rico. Specifically, she is distributing stroke caregiving workbooks that are available in both Spanish and English, to sites in Puerto Rico and the mainland (TAP, Rittman PI).

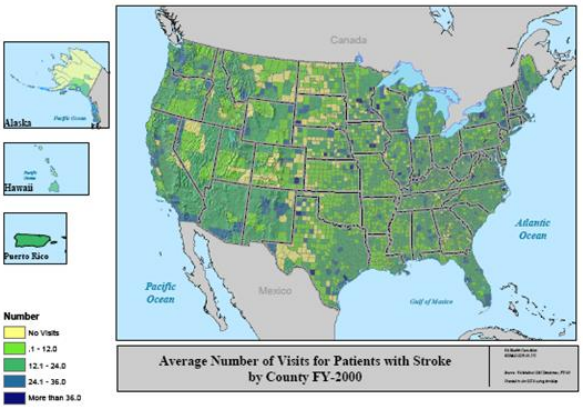
Socioeconomic Status. In a recently completed study on VHA stroke patients living in Florida who used VHA-only versus those who used multiple sources of care (VHA-Medicare, VHA-Medicaid, and VHA-Medicare-Medicaid), a QUERI Investigator (Dr. Jia) identified several important differences in demographic characteristics among the three groups. For example, the VA-Medicare group had a significantly larger proportion of patients who were white and older. On the other end of the spectrum, the VHA-Medicaid group was significantly younger. A separate study (Dr. Jia) of 1,818 veterans who survived a stroke event similarly identified differences in age among the three insurance groups: patients who were ≤ 60 years old were most likely to be VHA-only and VHA-Medicaid users, while the patients who were ≥ 80 years old were most likely to be VHA-Medicare and triple users.

Dr. Jia, using this VA, Medicare, and Medicaid data, has identified an important methodological problem when examining disparities within the VA. Specifically, he found that no disparities were present in post-stroke depression detection were present if one assessed VA-only care but that significant geographic variation was present if VA and Medicare data were combined.

Post-Stroke vs. Post-MI Disparities. A QUERI investigator (Dr. Roumie) compared hypertension management among veterans one-year after stroke with veterans one-year after myocardial infarction (MI) finding that stroke patients were less likely to have their blood pressure at goal compared with MI patients (36% vs. 42%). Moreover, fewer stroke patients were on at least two antihypertensive medications compared with MI patients (59% vs. 74%).

Similarly, a QUERI Investigator (Dr. Cheng) demonstrated that patients undergoing carotid endarterectomy were less likely to receive optimal control of both blood pressure and low-density lipoprotein compared with patients receiving percutaneous coronary intervention or coronary artery bypass grafting (CABG). Specifically, compared with the carotid endarterectomy group, the percutaneous coronary intervention group was more likely to achieve optimal control of blood pressure (OR 1.9, 95%CI 1.4-2.6) and low-density lipoprotein (OR 1.5, 95%CI 1.01-2.3) and the CABG group was more likely to achieve optimal control of blood pressure (OR 1.5, 95%CI 1.4-2.6). The Stroke QUERI has several active projects aimed at improving processes of stroke care that could lessen these observed disparities.

Figure 2: Average Number of Visits for Patients with Stroke by County FY2000



Geographic Disparities. The Stroke QUERI (Dr. Cowper) provides quarterly geographic mapping in the use of the Functional Independence Measure (FIM); this process is a supporting quality indicator for the VA. These data demonstrate wide variation across VISNs in terms of the proportion of veterans who received both the FIM and inpatient rehabilitation services. Similarly, the VA Healthcare Atlas (Dr. Cowper-Ripley) demonstrates great geographic variation in the number of clinic visits made by veterans with stroke.

We are committed to moving our disparities work from measuring disparities to active implementation of improvement programs. As described above, we anticipate that national data about disparities in stroke care that will be obtained from the OQP Stroke Special Project will greatly inform this work by identifying areas of stroke care to target to reduce stroke care disparities. We are already moving toward implementation in other disparity related projects. For example, as part of the RRP "Racial Disparities in Blood Pressure Management Among Stroke Patients" described above, once the data analysis phase is completed, multi-disciplinary staff from each of the three participating VA facilities will develop strategies to address the observed disparities in blood pressure care. In other work, a QUERI investigator is implementing several approaches to improving hypertension control in the outpatient setting (e.g., clinician pocket cards with HTN guideline information; distributing wall posters with a HTN flowchart; and distributing patient wallet cards). These various approaches will be included in the armamentarium of suggestions provided to facilities motivated to reducing disparities in blood pressure management. Finally, Mr. Dennis Milne, Vice President of the American Stroke Association, and Vice President, Patient Education of the American Heart Association has joined our Executive Committee. He has

encouraged the Stroke QUERI to disseminate the ASA The Power to End Stroke Campaign Program. This patient education and patient motivation program targets African Americans for stroke risk factor reduction.[4] Similarly, QUERI investigators also are conducting an SDP directed at improving My Healthe*V*et's services for veterans post-stroke and their caregivers. This work is likely to provide an additional tool for improving care and reducing disparities (especially the caregiver information need disparities described above).

As the spectrum of veterans entering VA care changes, it is important to consider whether the Stroke QUERI is addressing the needs of these returning veterans. Although the returning OIF/OEF veterans are generally younger than the typical age group at risk for stroke, the increased number of reservists deployed in these operations makes it likely that some of these returning veterans will be older and more likely to have existing or to soon develop vascular risk factors. The Stroke QUERI is attempting to evaluate veterans' concerns about vascular risk factors in conjunction with identifying other health needs in returning veterans to the VA Puerto Rico health system (Dr. Rittman, RRP). Our recently funded SDP to develop stroke risk factor awareness materials for MyHealthe*V*et is also of relevance to the OIF/OEF population who are expected to be more easily reached through web-based strategies than prior groups of returning veterans. Although not specifically targeted at returning OIF/OEF veterans, our work in identifying and promoting best practices in stroke rehabilitation is also relevant to the returning veterans with traumatic brain injury, and we expect to increase our collaboration with the Polytrauma QUERI in this area as we share findings about the system and outcomes of stroke rehabilitation in the VA.

Management Plan

As described in the Strategic Plan management Plan Section, the stroke QUERI underwent significant change in personnel in FY07 as it transitioned primarily to the Center on Implementing Evidence-based Practice at the Roudebush VAMC in Indianapolis. The QUERI maintained its connection to the Rehabilitation Outcomes Research Center for Veterans with Neurological Impairments with co-leadership in Workgroup 2, Methodology Core leadership and core support for ongoing monitoring and feedback to VACO of rehabilitation supporting indicators all remaining in Gainesville. As we have worked to clearly enunciate and prioritize our goals, we have organized our workgroups from the prior four groups to three groups structured around our clinical care model, as described in Section 1.7 of our Strategic Plan. In response to suggestions from our Executive Committee, we have merged our Implementation and Dissemination Cores into a single unit working to shape implementation science, stimulate and support the Workgroups to move into active implementation, and disseminating findings to the appropriate audiences to foster continued improvements.

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Table 1. Impacts, Contributions and Products

Table 1 details our impacts during FY07. Some of our roles and contributions have helped develop tools that we may use in subsequent implementation activities. For example, Dr. Williams collaborated with medicine, nursing, and pharmacy staff at the Roudebush VAMC to develop an algorithm for clinical pharmacist optimization of hypertension management in patients with blood pressure above target. This algorithm could be evaluated in future stroke implementation projects. This table also documents our expanding efforts with other front line providers and groups in the VA, as well as our interaction with key partners on a national level (e.g. American Stroke Association, National Stroke Association). Finally, this table illustrates our impacts in the field of health IT as it relates to conducting implementation research. Impacts with significant planned future extension include:

- Completion of the PSD implementation grant in FY09 with planned further expansion to other VAs/VISNs
- Implementation of a CPAP intervention in a newly-funded IIR to more fully evaluate the impact of CPAP on post-stroke morbidity and mortality
- Expansion of our work in healthcare system redesign in our planned FY08 Implementation Project
- Completion of the OQP Stroke Special Project with assessment and feedback of JC inpatient stroke indicators and further analysis of pre- and post-stroke risk factor management to inform subsequent RRPs/SDPs
- Implementation of tools to lessen stroke caregiver burden via multiple funded projects directed at providers and caregivers

Table 1. Impacts, Contributions and Products

Description	Project Label and Center Goal	Workgroup	Clinical Goals	Implementation Goals
IMPACTS				
Process-of-care/performance improvements				
Depression screening increased from 30% to 80% in the first 6 months post-stroke in two facilities	PSD	2	5	2
Improved performance at the Roudebush VAMC via participation in the Hypertension Performance	Core	3	3	3
Improvement workgroup (improved performance on four out of four hypertension performance measures from below target to above target in FY07)	Core	3	3	3
In FY07, the percentage of all stroke patients in the moderate stroke impairment group receiving intensive rehabilitation services increased from 22% to 30% (FIM Supporting Indicator Mapping)	Core	2	4	1
Morbidity performance improvements				
Increased 12-week PSD remission from 28% to 39% in care management randomized trial	AIM	2	4	3
Demonstrated that CPAP therapy is associated with a trend in improvement of recurrent vascular events in the TIA population: 11% control patients versus 3% CPAP patients (p=0.18).	RWJ	1	3	3
Demonstrated that stroke patients receiving CPAP therapy were less likely to experience neurological worsening (defined as a decrement on neurological functioning of ≥ 2 points on the NIH Stroke Scale): 0% CPAP patients versus 14% control patients (p=0.033).	RWJ	1	1,2	3
Improved daytime sleepiness among TIA patients with sleep apnea, by prescribing continuous positive airway pressure (CPAP). Patients had substantial improvements in daytime sleepiness (4 point improvement in the Epworth Sleepiness Scale) in a dose-response relationship with increasing numbers of hours of CPAP use: <=1 hour per night use CPAP use, 0% of patients with improvement; 1 to <=4 hours per night CPAP use, 20% of patients with improvement; and >=4 hours per night CPAP use, 60% of patients with improvement.	RWJ	1	2	3
Mortality performance improvements				
Quality of life improvements				
Demonstrated improved QoL in the acute TIA period with treatment for sleep apnea with continuous positive airway pressure (CPAP); (mean improvement in Stroke Specific Quality of Life scale of 0.07 in the control group versus 0.3 in the CPAP group; p=0.046).	RWJ	1	1	3
Cost/utilization savings				
Other patient and system impacts				

Table 1. Impacts, Contributions and Products

Description	Project Label and Center Goal	Workgroup	Clinical Goals	Implementation Goals
Engaged in 100-day healthcare system redesign process with front line providers to evaluate and improve the current dysphagia screening process	Dysphagia	1	2	2,3
Redesigned and implemented standardized protocols in a multidisciplinary stroke clinic in VISN 1	ARCDA	2,3	2-6	3
CONTRIBUTIONS				
Contributions to VHA activities/entities				
• **Local**				
Dr. Williams is a member of the Roudebush VAMC Hypertension Improvement Workgroup.	Core	3	3	3
Dr. Roumie is the Chair of Tennessee Valley Healthcare System Hypertension Performance Improvement Committee.	Core	3	3	3
• **VISN**				
Distributed a report of VISN 8 & 11 Key Informant Survey on Systematic Delivery of Stroke Education to VISN leadership and VA facilities	Core	2	1-3	1
VISN 11 Stroke Care Initiative to identify clinical champions at all VISN 11 facilities and to engage in stroke quality improvement projects including a survey of structures of care	VISN 11	1,2,3	1-4	2,3
Collaborated with NF/SG VHA Service Chief and Office of Care Coordination/Office of Patient Care Services to implement and test the feasibility of a disease management dialogue tailored specifically for stroke patients	Telehealth Dialogues	2	4-6	3
• **National**				
Worked with Office of Quality Performance to measure and report JCAHO stroke quality indicators in the VA	OQP	1	1	1
Worked with OQP to define and measure stroke risk factor management strategies and outcomes in veterans hospitalized with ischemic stroke	OQP	1,2,3	1-5	1
Collaborated with Office of Care Coordination and EES about the development of a caregiver burden training module designed for care coordinators	Caregiver Role	2	6	3
Collaborated with VA Office of Patient Care Services, Caregiver Network to develop Caregiver calendars for US mainland and Puerto Rico caregivers to be distributed through the Office of Patient Care Services during Caregiver Appreciation month (November)	Pilot Caregivers	2	6	3

Table 1. Impacts, Contributions and Products

Description	Project Label and Center Goal	Workgroup	Clinical Goals	Implementation Goals
Collaborating with CHD QUERI on serious cardiac events among patients hospitalized with acute ischemic stroke. Analysis will focus on (a) identifying clinical characteristics of patients with serious cardiac events and (b) evaluate the quality of care that these stroke patients receive compared with the quality of care that patients without these cardiac events receive.	QUEST	1	1-3	1
Collaborated with Spinal Cord Injury and Polytrauma Blast QUERI centers to introduce the QUERI Six-step Implementation Process to the field of Rehabilitation Psychology	Implementation/ Dissemination Core	-	4-6	4
Coordinated QUERI Implementation Cyberseminars with Diane Hanks at VA CIDER: Marita Titler-Advanced Practice Institute for EBP, July 2007; Ian Graham-Implementation Sustainability, September 2007.	Implementation/ Dissemination Core	-	-	4
Consultation efforts				
Collaborated and consulted with investigators in VA Caribbean Health Care System to promote research in stroke recovery and caregivers to disseminate findings from studies involving Puerto Rican veterans	TAP	2	6	3
Drs. Damush and Williams delivered lectures on implementation and dissemination methods to health care providers enrolled in a Graduate Course on Implementation and Translation G610 at Indiana University Department of Medicine/Roudebush VAMC HSRD/CIEBP.	Implementation/ Dissemination Core	Core	-	4
Other contributions				
• **Local**				
Ms. Plue is the Focus Group Moderator for the VISN 11 OIF/OEF Seamless Transition Team at Roudebush VAMC.	Core	-	-	2
Dr. Bravata served on the State of Connecticut Department of Public Health, Connecticut Stroke Care Committee.	Core	-	-	1
Dr. Bravata served as the Director of the Multidisciplinary Stroke Clinic, VA Connecticut Health Care System West Haven.	Core	-	-	1, 3
Dr. Williams is Chief of Neurology at the Roudebush VAMC and the Director of the Stroke Clinic.	Core	-	-	-
Dr. Linda Hershey is the Chief of Neurology at the West New York VA Healthcare System in Buffalo, NY.	Core	-	-	-
Dr. Williams is on the advisory panel for Drs. Liana Fraenkel and Terri Fried's (West Haven VA) Donoghue Foundation Atrial Fibrillation Decision Support Project.	Core	-	-	-

Table 1. Impacts, Contributions and Products

Description	Project Label and Center Goal	Workgroup	Clinical Goals	Implementation Goals
• **VISN**				
Drs. Williams, Bravata, Damush and Ms. Plue serve on the VISN 11 Stroke Initiative: Development of a facility survey and planning committee of VISN 11 Stroke Summit to be held in March 2008.	Core	-	1-3	1-2
• **National**				
Drs. Williams and Bravata participate in the Stroke Council, American Heart Association, Writing Group: Metrics for Measuring Quality of Care in Comprehensive Stroke Centers.	Core			1
Drs. Williams and Bravata serve as co-chairs on the VA Office of Quality and Performance (OQP) Special Stroke Project: Stroke Quality of Care Evaluation.	Core	1-3	1-6	1
Drs. Williams and Bravata are on the American Stroke Association International Stroke Conference, Abstract Grading Subcommittee.	Core	-	-	-
Dr. Chumbler is a member American Heart Association, Telestroke Committee.	Core	-	-	-
Drs. Williams, Bravata, Damush, Chumbler, Jia, Hannold, Vogel and Roumie were members of the 2007 VA HSRD Scientific Abstract Selection Committee.	Core	-	-	-
Drs. Vogel, Chumbler, Jia, Damush and Uphold chaired various committees at the HSR&D 2007 National Meeting.	Core	-	-	-
Drs. Beyth, Chumbler, Damush, Jia, Rittman, Uphold, Kwon, Duncan and Vogel were members of the Planning Committee of the VA Health Services Research and Development 2007 National Meeting.	Core	Core	-	4
Dr. Beyth served as chair of the VA HSRD 2007 Career Development Award National Meeting.	Core	-	-	-
Drs. Williams and Bravata trained 95 VA EPRP chart abstractors for the OQP Stroke Special Project.	OQP	1-3	1-6	-
Dr. Bravata serves on the American Heart Association Professional Education Committee of the Stroke Council.	Core	3	3	1
Drs. Damush and Bosworth are members of the VA HSRD Scientific Merit Review Board: Chronic Disease Study Section.	Core	-	-	4
Drs. Cowper-Ripley and Chumbler are reviewers on the VA HSRD Implementation and Management Science Scientific Merit Review Board.	Core	-	-	4
Dr. Bravata serves on the National Stroke Association Prevention Advisory Board.	Core	3	3	1
Dr. Damush is a member of the Special Panel Review of the Centers for Disease Control and Prevention (CDC) study section: “Improving Public Health Practice through Translation Research, CD07-005”.	Core	-	-	4

Table 1. Impacts, Contributions and Products

Description	Project Label and Center Goal	Workgroup	Clinical Goals	Implementation Goals
CLINICAL PRACTICE PRODUCTS				
Clinician education materials				
Developed and disseminated PSD toolkit for clinician's use in activating and monitoring antidepressant treatment and symptoms	AIM	2	5	3
Developed posters to educate providers and nurses on use of electronic depression screening reminder	PSD	2	5	1,3
Developed an on-line training module for nurse care coordinators regarding caregiver burden. It was accessed by 1,042 VA employees during FY07.	Telehealth Dialogues	2	6	1,3
Developed standardized care manager dialogues for stroke self-management focusing on topics: stroke secondary prevention; expectations after stroke; coping with depression, anger and fear; relaxation techniques; moving more; rehabilitation; fatigue; sleep problems and doctor patient communication	PSD	2	3,6	3
Distributed pockets cards to all primary care providers (N=150) with DoD HTN guidelines	Roumie CDA	3	1-3	3
Distributed 20,000 patient blood pressure wallet cards	Roumie CDA	3	1-3	3
Created and distributed (created by Medical Media) clinic posters with DoD HTN flowchart	Roumie CDA	3	1-3	3
Assisted with the development of a medication algorithm for use by clinical pharmacists to improve hypertension management in the outpatient setting at the Roudebush VAMC	Core	3	3	3
Patient education materials				
Developed and evaluated a caregiver guidebook for informal caregivers of veterans post-stroke. The guidebook will be implemented and evaluated as part of an intervention to assist caregivers during the transition from hospital to home.	CG Guidebooks	2	3,6	3
Created a post-stroke self-management manual including an action plan checklist to facilitate patient goal setting and behavior change post-stroke	PSD	2	3,5,6	3
Other clinical practice support tools				
Development of electronic clinical depression screening reminder for post-stroke depression at 2 VA sites	PSD	2	5	3
Developed an algorithm to search and identify text within the VA electronic medical record	Dysphagia	1	2	3
Developed, implemented, and tested the feasibility of a management dialogue tool, which collected information on the prevalence of patient falls, depression and functional stats post stroke and assessed the needs of caregivers	Telehealth Dialogues	2	6	3

Table 1. Impacts, Contributions and Products

Description	Project Label and Center Goal	Workgroup	Clinical Goals	Implementation Goals
Demonstrated the feasibility and useful application of a clinical decision making aid for atrial fibrillation (AF) management in the veteran population	Clinical Decision Making	3	3	3
Drs. Williams and Bravata and Ms. Plue developed the Retrospective NIH Stroke Scale Training Toolkit for use in the OQP Stroke Special Project.	Core	1-3	2	3
Developed a self-management reminder dialogue template for post-stroke care	STOP	3	3	3
RESEARCH PRODUCTS				
Qualitative interviews indicated that finding and using the appropriate type of home-based therapy program more effectively managed the residual effects of stroke. A home-based, post-stroke home-telehealth program could be devised to include activities that improve functional mobility and exercise programs tailored for stroke survivors. This and other results appeared in Mar-Apr 2007 issue of *Topics in Stroke Rehabilitation.* The findings were also used as preliminary data for an ongoing RR&D trial.	Telehealth Dialogues	2	4	2
Developed PSD case-finding algorithm for use with VA administrative data	Core	2	5	3
Identified optimal strategies for case ascertainment of ischemic stroke in VA administrative data (VISN 8)	Anti Dr Trt	2	5	3
Identified risk factors for developing PSD	AIM	2	5	2
Identified active coping responses used by caregivers of veteran stroke survivors were associated with lower levels of CG depression across 2 years post-stroke	CG Needs	2	6	2
Described geographic variation in PSD assessment and post-stroke utilization patterns	VA/Non VA Uts-1	2	5	1
Found differential PSD diagnosis rates in veterans with VA only vs. dual VA-Medicare use post-stroke	VA/Non VA Uts-1	2	5	2
Interim analysis from the QUEST study demonstrates that among 1487 patients admitted to a hospital with a stroke or transient ischemic attack, 1175 (79%) were white, 234 (16%) were black, 46 (3%) were Hispanic, and 32 (2%) were of other or unknown race	QUEST RRP	1	1	2
During inpatient stays, among patients who were eligible for stroke guideline-based hypertension management: 142/206 (69%) of blacks and 674/1174 (57%) of whites had blood pressure management that was disconcordant with guideline recommendations (p=0.002).	QUEST RRP	1	1	2

Table 1. Impacts, Contributions and Products

Description	Project Label and Center Goal	Workgroup	Clinical Goals	Implementation Goals
Black race was independently associated with guideline discordant care even after adjustment for the following: age; co-morbidity; pre-admission symptom course; pre-stroke functional status; baseline code status; baseline stroke severity; baseline non-neurological physical examination abnormalities; baseline chest radiograph abnormalities; baseline electrocardiographic abnormalities; modified APACHE; and admission brain imaging findings. The adjusted odds ratio for guideline discordant care for black race versus all other races was 1.9 (95%CI 1.3 to 2.6) overall; 1.9 (95% CI 0.9 to 3.8) within the VA; and 1.9 (95%CI 1.3 to 2.7) outside of the VA.	QUEST RRP	1	1	2
Three processes of care were independently associated with a reduction in the combined outcome in-hospital mortality, discharge to hospice and discharge to skilled nursing facility after adjusting for quality of care and after risk adjustment (adjusted OR, 95%CI): swallowing evaluation 0.63, 0.43-0.93; DVT prophylaxis 0.59, 0.37-0.95; and treating all episodes of hypoxia with supplemental oxygen 0.25, 0.09-0.71).	QUEST	1	1	2
Determined age-related disparities in anti-thrombotic and anti-platelet medication use among eligible patients. For in-hospital anti-platelet medication use: age 65-74, 74.4%; age 74-84, 70.7%; and age ≥85, 64.5%; p<0.001. For in-hospital warfarin for atrial fibrillation: age 65-74, 88.8%; age 74-84, 85.7%; and age ≥85, 76.0%; p<0.001. For anti-thrombotics at discharge: age 65-74, 75.2%; age 74-84, 72.8%; and age ≥85, 68.4%; p<0.001.	Process Outcomes Links	3	1-3	2
Examining 5 year follow-up data for readmissions and deaths following acute ischemic stroke, over half had died or been readmitted at least once during the first year following discharge (1388/2603, 53.3%), and less than 15% survived admission-free for five years (372/2603, 14.3%). The reasons for hospital readmission varied over time, with stroke remaining a leading cause for readmission (3.9 - 6.1% of patients annually). Acute myocardial infarction accounted for a comparable number of readmissions (4.2-6.0% of patients annually). The most common diagnostic category associated with readmission, however, was pneumonia or respiratory illnesses, with an annual readmission rate between 8.2 and 9.0% throughout the first five years post-stroke.	ARCDA	1	2	-
Pre-stroke mobility dependence was independently associated with increased odds of: post-stroke mobility impairment, in-hospital mortality, discharge to a skilled nursing facility (SNF) and the combination of in-hospital death or discharge to a SNF. Pre-stroke mobility dependence was independently associated with decreased odds of having a plan for PT. These data demonstrate the strong association between dependence in pre-stroke mobility and adverse outcomes among elderly stroke patients. Clinicians should screen patients for pre-stroke mobility impairment to identify patients at greatest risk for adverse events.	Nat'l Stroke Project	1	2, 4	2

Table 1. Impacts, Contributions and Products

Description	Project Label and Center Goal	Workgroup	Clinical Goals	Implementation Goals
Among the very old patients, factors that were independently associated with in hospital mortality and discharge to a skilled nursing facility outcome included: age, female gender, atrial fibrillation, acute myocardial infarction, respiratory failure, and teaching hospital admission. Among 15,020 stroke hospitalizations, 20.4% were for very old patients. We conclude that the very old constitute a substantial proportion of stroke hospitalizations and are more likely to have adverse outcomes that younger patients.	ARCDA	1	1	-
Among stroke patients without MI or CHF present upon admission: 151/1363 (11%) had ventricular tachycardia, arrest, MI or CHF during the hospitalized period. The combined outcome of serious cardiac events or death was present among 201/1363 (14.8%).	QUEST	1	1	-
Half of the veterans and their caregivers indicated that they had issues or concerns immediately post-discharge, and 90% indicated that care coordinator initial contact would have benefited them when they first returned home from the hospital. More than two-thirds of the stroke survivors recognized the signs, symptoms, and risk factors of stroke, and 87% of them found the information about signs and symptoms of stroke helpful.	Telehealth Dialogues	2	6	3
Detected a 10% lower post stroke cost when patients are rehabilitated in an acute rehabilitation bed section rather than a subacute rehab bed section. This has critical implications for the VA for at least two reasons: (1) prior research has shown that guideline compliance is higher in acute rehab units, which suggests that acute rehab units provide better care, and (2) the VA has, over the past decade, been opening new subacute rehab units and closing acute rehab units. Our results suggest that the VA should reconsider this trend on grounds of both quality of care and efficiency.	Acute vs. Subacute	2	4	3

Table 2. Publications and Presentations

Author(s)	Title	Journal/Presentation	Project Label	QUERI Activity Code						
				1	2	3	4	5/6	M	C
Research Publications										
Amarenco AP, Bogousslavsky J, Callahan A, Goldstein LB, Hennerici M, Rudolph AE, Sillesen H, Simunovic LM, Szarek M, Welch KMA, Zivin JA	High-dose atorvastatin after stroke or transient ischemic attack	*New England Journal of Medicine* 2006; 355: 549-559.	Core			X				X
Amarenco AP, Goldstein LB, Szarek M, Sillesen H, Rudolph AE, Callahan A, Hennerici M, Simunovic LM, Zivin JA, Welch KMA	Efficacy and safety of intense LDL-C reduction in patients with stroke or transient ischemic attack: on-treatment analysis from the Stroke Prevention by Aggressive Reduction in Cholesterol Levels (SPARCL) trial	*Stroke* 2007; (In press).	Core			X				X
Bakas T, Champion V, Perkins SM, Farran CJ, Williams LS	Psychometric testing of the revised 15-item Bakas Caregiving Outcomes Scale	*Nursing Research* 2006; 55(5): 346-355.	Core							X
Barnett TE, Chumbler NR, Vogel WB, Beyth RJ, Qin H, Kobb R	The Effectiveness of a Care Coordination/Home-Telehealth Program for Veterans with Diabetes: A Two Year Follow-Up	*The American Journal of Managed Care*, 12(8): 467-474.	Telehealth Dialogues				X	X		
Barnett TE, Chumbler NR, Vogel WB, Beyth RJ, Ryan P, Figueroa S	The cost-utility of a care coordination/home-telehealth program for Veterans with diabetes	*Journal of Telemedicine and Telecare*, 13(6): 318-321.	Telehealth Dialogues				X	X		
Bayliss EA, Bosworth HB, Noel PH, Wolff JL, Damush TM, McIvor L	Supporting self-management for patients with complex medical needs: Recommendations of a working group	*Chronic Disease* 2007; (In Press).	Core							X
Boylstein C, Rittman M, Hinojosa R	Metaphor shifts in stroke recovery	*Health Communications* 2007; 21(3): 279-87.	Cultural Models			X				

Table 2. Publications and Presentations

Author(s)	Title	Journal/Presentation	Project Label	QUERI Activity Code						
							4	5/6	M	C
Research Publications										
Bravata DM, Ho SY, Meehan TP, Brass LM, Concato J	Readmission and death after hospitalization for acute ischemic stroke: 5-year follow-up in the Medicare population	*Stroke* 2007; 38: 1899-1904.	Process Outcomes Links			X				
Bruno A, Kent TA, Coull BM, Shankar RR, Saha C, Becker KJ, Kissela BM, Williams LS	Treatment of hyperglycemia in ischemic stroke (THIS) A randomized pilot trial	*Stroke*, (In press).	Core							X
Bushnell CD, Griffin J, Newby LK, Goldstein LB, Mahaffey KW, Graffagnino CA, Harrington RA, White HD, Simes RJ, Califf RM, Topol EJ, Easton JD	Statin use and sex-specific stroke outcomes in patients with vascular disease	*Stroke* 2006; 37: 1427-1431.	Core			X				X
Cheng EM, Chen A, Cunnigham W	The impact of English proficiency on disparities of healthcare services	*Journal of General Internal Medicine* (In press).	Core			X				
Cheng EM, Fung C	Quality indicators for the care of stroke and atrial fibrillation in vulnerable elders	*Journal of the American Geriatrics Society* 2007; 55: S431-S437.	Core			X				
Cheng EM, Jolly D, Jones L, Cohen S	Modest improvement in risk factor control after admission for a stroke or transient ischemic attack	*Journal of Stroke and Cerebrovascular Disease* 2005; 14(4): 174-178.	Core			X				
Chumbler NR, Rittman MR, Wu SS	Associations in sense of coherence and depression in caregivers of stroke survivors across two years	*Journal of Behavioral Health Services and Research* 2007; Sept 12 (Epub ahead of print).	Cultural Models			X				
Damush TM, Jia H, Ried LD, Qin H, Cameron R, Plue L, Williams L	Case-finding algorithm for post-stroke depression among patients in the veterans health administration	*International Journal of Geriatric Psychiatry* 2007; (In press).	Core						X	
Damush TM, Plue L, Bakas T, Schmid A, Williams LS	Barriers and facilitators to exercise among stroke survivors	*Rehabilitation Nursing* 2007; (In press).	Core			X				

Table 2. Publications and Presentations

Author(s)	Title	Journal/Presentation	Project Label	QUERI Activity Code						
				1	2	3	4	5/6	M	C
Research Publications										
Eisenstein EL, Anstrom KJ, Kong DF, Shaw LK, Tuttle RH, Mark DB, Kramer JM, Harrington RA, Matchar DB, Kandzari DE, Peterson ED, Schulman KA, Califf RM	Clopidogrel use and long-term clinical outcomes after drug-eluting stent implantation	*JAMA* 2007; 297(2): 159-168.	Core							X
Fletcher GF, Bufalino V, Costa F, Goldstein LB, Jones D, Smaha L, Smith SC, Stone N	Efficacy of drug therapy in the secondary prevention of cardiovascular disease and stroke	*American Journal of Cardiology* 2007; 99: 1E-35E.	Core							X
Goldstein LB	10 Questions about statins and stroke	*The Neurologist* 2007; (In press).	Core		X					
Goldstein LB	Contemporary reviews in cardiovascular medicine. Acute ischemic stroke treatment in 2007	*Circulation* 116: 1504-1514.	Core		X					
Goldstein LB	Stroke code chest radiographs are not useful	*Cerebrovascular Diseases* 2007; 24:460-462.	Core		X					
Goldstein LB, Amarenco P, Szarek M, Callahan A, Sillesen H, Hennerici M, Zivin JA, Welch KMA	Secondary analysis of hemorrhagic stroke in the Stroke Prevention by Aggressive Reduction in Cholesterol Levels (SPARCL) Study	*Neurology* 2007; (In press).	Core			X				X
Goldstein LB, Adams R, Alberts MJ, Appel LJ, Brass LM, Bushnell CD, Culebras A, DeGraba TJ, Gorelick PB, Guyton JR, Hart RG, Howard G, Kelly-Hayes M, Nixon JV, Sacco RL	Primary prevention of ischemic stroke: a guideline from the American Heart Association/American Stroke Association Stroke Council	*Stroke* 2006; 37: 1583-1633.	Core		X					
Goldstein LB, Hankey GJ	Advances in Stroke 2005: Primary prevention of stroke	*Stroke* 2006; 37:317-319.	Core		X					
Goldstein LB, Rothwell PM	Advances in stroke 2006: Primary prevention and health services delivery	*Stroke* 2007; 38:222-224.	Core		X					X

Table 2. Publications and Presentations

Author(s)	Title	Journal/Presentation	Project Label	QUERI Activity Code						
				1	2	3	4	5/6	M	C
Research Publications										
Haun J, Rittman MR, Sberna M	Continuum of connectedness/isolation	*Journal of Aging Studies*, 22/3, Fall 2008 (accepted 3/07).	CG Needs			X				
Haun J, Rittman MR, Sberna M	Ethnic variations in social isolation, depressive symptoms and instrumental daily activities	*Topics in Stroke Rehabilitation* 2006; (Accepted).	CG Needs			X				
Hershey LA	Cerebrovascular disease	In "Practice of Geriatrics", 4th edition, edited by EH Duthie, PR Katz, ML Malone, Saunders/Elsevier, Philadelphia, PA, pp 373-380, 2007.	Core	X						
Hinojosa MS, Rittman MR	Stroke caregiver information needs: A comparison of mainland and puerto rican caregivers	*Journal of Rehabilitation Research and Development* 2007; 44(5): 649-58.	CG Needs			X				
Jia H, Zheng Y, Cowper DC et al	VA and non-VA healthcare utilization by veterans with stroke	*Federal Practioner*, 23(6): 21-24.	VA/NonVA Uts-1			X				
Jia H, Zheng YE, Reker DM, Cowper DC et al	Multiple system utilization and mortality for veterans with stroke	Stroke 37(11):2786-801.	VA/NonVA Uts-1			X				
Johnson EA, Bakas T, Williams LS	Post-stroke depression: Recognition and treatment	*Geriatrics and Aging* (In press).	AIM			X				
Lutz BJ, Chumbler NR, Roland K	Care coordination/home telehealth for veterans with stroke and their caregivers: Addressing an unmet need	*Topics in Stroke Rehabilitation* 2007; 14(2): 32-42.	Tele-health dialogues			x				
Muus I, Williams LS, Ringsberg KC	Validation of the Stroke-Specific Quality of Life Scale (SS-QOL): Test of reliability and validity of the danish version (SS-QOL-DK)	*Clinical Rehabilitation* 2007; 21(7): 620-7.	Core							x
Patwardhan MB, Sarria-Santamera A, Matchar DB	Improving the process of developing technical reports for health care decision makers: using the theory of constraints in the evidence-based practice centers	*International Journal of Technology Assessment in Health Care* 2006; 22(1): 26-32.	Core				X			

Table 2. Publications and Presentations

Author(s)	Title	Journal/Presentation	Project Label	QUERI Activity Code						
				1	2	3	4	5/6	M	C
Research Publications										
Ried LD, Cameon, R, Jia H, Findley K, Hinojosa MS, Wang X, Tueth M.	Identifying veterans with acute strokes using a high specificity ICD-9 algorithm with VA automated records and medicare claims data	*JRR&D* (In press, accepted for publication).	Anti Dp Trt			X			X	
Rittman MR, Boylstein C, Hinojosa R, Sberna M, Haun J	Transition experiences of stroke survivors following discharge home	*Topics in Stroke Rehabilitation*, 14(2): 21-31.	Cultural Models			X				
Roumie CL, Elasy TA, Greevy R et al	Improving blood pressure control in veterans through provider education, provider alerts, and patient education	*Annals of Internal Medicine* August 1, 2006; 145(3): 165-176.	Roumie CDA				X			
Roumie CL, Elasy TA, Wallston K et al	Clinical Inertia: A Common Barrier to Changing Provider Prescribing Behavior	*Joint Commission Journal on Quality and Patient Safety* 2007; May; 33(5): 277-85.	Roumie CDA			X				
Roumie CL, Mitchel E, Gideon PS, Varas-Lorenzo C, Castellsague J, Griffin MR	Validation of ICD-9 codes with a high positive predictive value for incident strokes resulting in hospitalization using Medicaid health data.	*Pharmacoepidemiology and Drug Safety* published online, November 2007; (ePub ahead of print).	Roumie CDA						X	
Sacco RL, Adams R, Albers G, Alberts MJ, Benavente O, Furie KL, Goldstein LB, Gorelick P, Halperin J, Harbaugh RE, Johnston SC, Katzan I, Kelly-Hayes M, Kenton EJ, Marks M, Schwamm LH, Tomsick T	Guidelines for prevention of stroke in patients with ischemic stroke or transient ischemic attack. A statement for healthcare professionals from the American Heart Association/ American Stroke Association Council on Stroke	*Stroke* 2006; 37: 577-617.	Core		X					
Saver JL, Goldstein LB	The new standing guideline committee policy of the American Stroke Association Stroke Council	*Stroke* 2006; 37: 753 (Editorial).	Core		X					
Schmid A, Duncan PW, Studenski S, Min Lai S, Richards L, Perera S et al	Improvements in speed-based gait classifications are meaningful	*Stroke* May 17, 2007.	Core			X				

Table 2. Publications and Presentations

Author(s)	Title	Journal/Presentation	Project Label	QUERI Activity Code						
				1	2	3	4	5/6	M	C
Research Publications										
Schmid A, Rittman M	Fear of falling: an emerging issue after stroke	*Top Stroke Rehabil*. 2007; 14(5): 46-55.	Roybal			X				
Tabereaux PB, Brass LM, Concato J, Bravata DM	Hospital admissions for stroke among the very old in the United States	*Neuroepidemiology*, (Accept with revisions).	National Stroke Project			X				
Uphold CR, Va Puymbroeck M, Rittman M, Sberna M, Young L	Predictors of positive aspects of caregiving and depression among informal caregivers of stroke survivors	*Journal of American Geriatrics Society*, 55(4): Suppl. S1-S146, Abstract D151, S215.	CG Needs			X				
Williams LS, Bakas T, Brizendine EJ, Plue LD, Tu W, Hendrie H, Kroenke K.	How valid are family proxy assessments of stroke patients' health-related quality of life?	*Stroke* 2006; 37(8): 2081-2085.	AIM							X
Williams LS, Kroenke K, Bakas T, Plue LD, Brizendine E, Tu W, Hendrie H	Care-management of post-stroke depression: A randomized controlled trial	*Stroke* 2007; 38(3): 998-1003.	AIM				X			
Non-Research Publications										
Presentations										
Bakas T, Farran CJ, Austin JK, Given BA, Johnson EA, Williams LS	"Program evaluation outcomes from the Telephone Assessment and Skill-Building Kit (TASK) for stroke family caregivers"	Poster Presentation, American Academy of Nursing, Washington DC, November 8-10, 2007.	AIM					X		
Bravata DM	"Quality Evaluation in Stroke and Transient Ischemic Attacks (QUEST) project"	VA HSR&D Career Development Conference, Arlington, VA, February 2007.	QUEST			X				
Bravata DM, Goel P, Wells CK, Concato J	"Pre-stroke antiplatelet medication use is associated with decreased stroke severity"	Poster Presentation, ASA International Stroke Conference. San Francisco, CA, February, 2007.	ARCDA			X				
Bravata D, Kapoor JR, Peixoto AJ, Williams LS	"Orthostasis among patients with cerebrovascular disease"	Poster Presentation, ASA International Stroke Conference. San Francisco, CA, February, 2007.	Core			X				

Table 2. Publications and Presentations

Author(s)	Title	Journal/Presentation	Project Label	QUERI Activity Code						
				1	2	3	4	5/6	M	C
Non-Research Publications										
Presentations										
Bruno A, Williams LS, Shankar RR, Saha C, Kent TA, Coull BM, Kissela B, Becker K	"Treatment of Hyperglycemia in Ischemic Stroke (THIS) Trial"	Poster presentation, ASA International Stroke Conference, San Francisco, CA, February 2007.	Core							X
Chumbler NR, Barnett TE, Vogel WB, Beyth RB, & Kobb R	"The effectiveness of a patient-centered care coordination/home-telehealth chronic disease management program for veterans after diabetes: A four-year follow-up"	The Academy Health 2007 Annual Meeting, Orlando, FL, June 2007.	Telehealth Dialogues					X		X
Cowper D	"Veteran, multiple system use, and stroke rehabilitation: Who gets what from where?"	Poster Presentation, HSR&D National Meeting, Arlington, VA, February, 2007.	Core			X				
Damush TM, Plue L, Schmid A, Williams LS	"A qualitative analysis of stroke survivors' barriers, facilitators, and preferences for physical activity and self-management"	Poster Presentation, ASA International Stroke Conference, San Francisco, CA, February, 2007.	Core				X			
Goldstein LB	"Advances in the prevention and treatment of stroke"	Cardiology 2006: 14th Annual Cardiology Update Conference, Palm Harbor, FL.	Core		X					
Goldstein LB	"Anticoagulants and antiplatelet agents in acute ischemic stroke"	2007 American Academy of Neurology, Annual Meeting Using AAN guidelines and best current evidence in daily practice: stroke (CME Course).	Core			X				X
Goldstein LB	"Health services research: Quality of care and outcomes research"	2007 America Academy of Neurology, Annual Meeting Clinical Research Methods (CME Course).	Core			X				X
Heiber B, Troche M, Musson N	"Combined treatments for dysphagia: A case study"	Poster Presentation, American Speech-Language-Hearing Association annual Convention. Boston, MA, November 16, 2007.	Core							X

Table 2. Publications and Presentations

Author(s)	Title	Journal/Presentation	Project Label	QUERI Activity Code						
				1	2	3	4	5/6	M	C
Non-Research Publications										
Presentations										
Huang RL, Speroff T, Dittus RS, Elasy TA, Roumie CL	"Multifactorial intervention to Improve hypertension performance"	Poster Presentation at the VA Health Services Research Annual Meeting, Arlington VA, February 22, 2007.	Roumie CDA				X			
Koch D, Woodward H, Brown D, Manning M, Montgomery K	"Improving process throughput of cardiac catheterization using six sigma training"	Proceedings of the 2007 American Society of Engineering Education Indiana/Illinois Section Conference, Indianapolis, IN, March 2007.	Core				X			
Lutz BJ, Chumbler NR, Roland K, Johnson K	"Meeting the needs of caregivers and veterans with stroke using a home-based telehealth program"	International Stroke Conference 2007, San Francisco, CA February 2007.	Telehealth Dialogues					X		X
Lutz BJ, Chumbler NR, Roland K, Johnson K	"Piloting a home-based telehealth intervention for veterans with stroke and their caregivers"	Association of Rehabilitation Nurses 32nd Annual Education Conference, Chicago, IL Oct. 2006.	Telehealth Dialogues					X		X
Musson N	"Evidence based practice: A clinical perspective in the treatment of dysphagia"	Jacksonville Area Speech Pathology Association, May 2007, Jacksonville, FL.	Core							X
Roumie Cl, Greevy R, Maney M, Findley T	"Prevalence of inadequate hypertension control among veterans after a major cardiovascular event"	Poster Presentation at the Society of General Internal Medicine Annual Meeting, Toronto, Canada, April 27, 2007. *also* Poster Presentation at the VA Health Services Research Annual Meeting, Arlington, VA, February 22, 2007.	Roumie CDA			X				
Scachitti S, Woodward-Hagg H, Mapa L	"Healthcare quality partnerships: An emerging education frontier for industrial engineering technology programs"	Proceedings of the 2006 American Society for Engineering Education Annual Conference, Chicago, IL, June 2006.	Core				X			
Schmid A, Damush TM, Bakas T, Subramanian U, Williams LS	"Self-management of blood pressure after stroke"	Poster Presentation, Academy of Health Annual Research Meeting, Orlando, FL, June 2007.	Core			X				

Table 2. Publications and Presentations

Author(s)	Title	Journal/Presentation	Project Label	QUERI Activity Code						
				1	2	3	4	5/6	M	C
Non-Research Publications										
Presentations										
Schmid A, Rittman M	"The impact of fear of falling on activity and participation after stroke"	American Occupational Therapy Association, St. Louis, MO, April 2007.	Roybal			X				
Uphold CR	"Health marketing research on stroke prevention and OEF/OIF readjustment"	Presentation to the Fellows and Geriatrics/Long-term Care Staff at the VA Caribbean Healthcare System, January 12, 2007.	Core				X			
Williams LS	"Treatment of post-stroke depression"	Invited Symposium Speaker, ASA International Stroke Conference, San Francisco, CA, February 2007.	Core			X				
Williams LS, Bakas T, Brizendine E, Tu W Hendrie H, Kroenke K	"Psychological and physical factors related to developing post-stroke depression"	Oral Presentation, ASA International Stroke Conference, San Francisco, CA, February 2007.	AIM			X				
Williams LS, Bakas T, Plue L, Brizendine E, Tu W, Hendrie H, Kroenke K	"Patient and family caregiver characteristics that predict development of post-stroke depression"	Poster Presentation, HSR&D National Meeting, Washington DC, 2007.	AIM			X				
Williams LS, Bravata D, Plue L, Brizendine E, Tu W, Bakas T, Hendrie H, Kroenke K	"Medical comorbidity and its relationship to post-stroke depression"	Oral Presentation, HSR&D National Meeting, Washington, DC, 2007.	AIM			X				
Woodward-Hagg H, El-Harit J, Vanni C, Scott P	"Application of lean six sigma techniques to reduce workload impact during implementation of patient care bundles within critical care-A case study"	Proceedings of the 2007 American Society of Engineering Education Indiana/Illinois Section Conference, Indianapolis, IN, March 2007.	Core				X			
Workman-Germann J, Woodward-Hagg H	"Implementing lean six sigma methodologies in the radiology department of a hospital healthcare system"	Proceedings of the 2006 American Society for Engineering Education Annual Conference, Chicago, IL, June 2006.	Core				X			

Table 2. Publications and Presentations

Author(s)	Title	Journal/Presentation	Project Label	QUERI Activity Code						
				1	2	3	4	5/6	M	C
Other Dissemination/Publicity Efforts										
Damush T, Plue L	Case Manager Stroke Self Management Manual	Available per email requests.	PSD				X	X		
Goldstein LB	Clinical trials report. Effect of constraint-induced movement therapy on upper extremity function 3 to 9 months after stroke	Current Atherosclerosis Reports 2007: 259-260 (Editorial Comment).	Core							X
Goldstein LB	Improving the clinical diagnosis of stroke	Stroke 2006; 37: 754-755 (Editorial).	Core						X	
Goldstein LB	Low LDL-cholesterol, statins and brain hemorrhage: should we worry?	Neurology 2007; 68: 719-720 (Editorial).	Core							X
Goldstein LB	Stroke recovery and rehabilitation	Handbook of Clinical Neurology Vol 3. Elsevier, Edinburgh (In Press). Bogousslavksy J, and Fisher M. eds.	Core							X
Hanjian J	QUERI Newsletter	Stroke QUERI Center Newsletter.	Core			X	X			
Kobb R, Chumbler NR	Home-TeleHealth for Veterans	Home-Telehealth: Connecting Care Within the Community. London, UK (In press).	Telehealth Dialogues				X			
Plue L., Waterman B	AIM Provider Depression Toolkit	Currently made available via email requests.	AIM			X	X			
Rittman, M	Mixed Methodology: Combining Qualitative and Quantitative Approaches	February 21-23, 2007, HRS&D National Meeting, Arlington, VA Workshop.	Core						X	
Roumie, C	Blood Pressure Pocketcards	Distributed to PCPs within the Tennessee Valley Healthcare System.	Roumie CDA				X	X		
Roumie, C	Blood Pressure Clinic posters	Distributed to PCPs within the Tennessee Valley Healthcare System.	Roumie CDA				X	X		
Williams L, Bravata D, Plue L	Retrospective NIH stroke scale coding training manual	Training manual for NIHSS-R.	Core			X				

Table 2. Publications and Presentations

Author(s)	Title	Journal/Presentation	Project Label	QUERI Activity Code						
				1	2	3	4	5/6	M	C
Other Dissemination/Publicity Efforts										
Williams LS	Diagnosis and treatment of post-stroke depression	"Sound Medicine" NPR Radio Broadcast, WFYI, Indianapolis.	Core							X
Williams LS	Optimizing post-stroke depression treatment	Physician's Weekly 2007; 24 (31).	AIM							X
Wilson DL, Beyth RJ, Bautista M, Sberna M, Mueller M, Kwon S	Improved clinical decision-making for stroke prevention	March, 2007. American Pharmacist Association 2007 Annual Meeting Contributed Poster Session.	Clinical Decision Making				X			

Table 3. Active and Completed Projects

Table 3 illustrates the breadth of projects we are conducting to inform and improve the quality of stroke care.

In Workgroup 1 (In-hospital Management), we are completing analyses on the 5-year QUEST project. This project will provide critical information about care processes associated with inpatient mortality and will estimate differences in VA and non-VA care. The FY07 Implementation Project (Dysphagia) is in final stages of data collection, and so in FY08 we will have important information about the process and outcomes of implementing the OIG dysphagia screening mandate at two facilities. With OQP data as a background, we have plans to use these data in a FY08 SDP submission to extend quality improvement activities around dysphagia screening to additional facilities and/or VISNs. Our VISN 11 Stroke Initiative in Workgroup 1 is extending into our planned FY08 Implementation Project (see Strategic Plan, Section 1.7 for more detail).

In Workgroup 2 (Recovery and Rehabilitation), we will continue work on our two active implementation IIRs in telerehabilitation (to be completed in FY10) and post-stroke depression detection and treatment. We expect the PSD study to be completed in FY09 and plan a SDP at that time to extend PSD screening to other facilities. It is also possible that the PSD reminders developed in this study would be selected as tools to improve stroke care at facilities participating in ongoing stroke quality improvement initiatives, although our planned work in FY08 is focusing on improving inpatient stroke care. We have an active portfolio of projects aimed at improving functioning in caregivers of veterans with stroke: this work has built from several RRP projects in FY06 and FY07 to a recently-funded SDP to get evidence-based materials on line for veterans and caregivers via MyHealtheVet, and to a transition-assistance intervention to reduce stress in stroke caregivers. These projects are recently underway so impacts will likely not be assessed until FY09. Important preliminary data from the Acute vs. Subacute Rehabilitation Project suggest that for patients with moderate stroke, inpatient rehabilitation may be associated with better outcomes and less cost than sub-acute rehabilitation (preliminary analyses). If confirmed, this would be important data that could impact policy for stroke rehabilitation and the Stroke QUERI would work to effectively disseminate this finding.

In Workgroup 3 (Risk Factor Management), we have two RRPs nearing completion involving tools to improve patient decision making regarding anticoagulation for atrial fibrillation. We anticipate that data from these projects will be used to submit a SDP in FY08. An important project to reduce provider inertia around risk factor management is recently underway. Finally, we are conducting an implementation project (TOOLS) to improve risk factor management in the transition from discharge to home. This targets both stroke and TIA patients at two facilities, and may use CPRS-based templates developed as part of the STOP project as one of the strategies to improve care.

Table 3. Active and Completed Projects

Project ID and Center Goal	Project Label	Project Title	Principal Investigator	Type/ Source	Current FY Amount	Total Amount	Start – End Dates and Status	QUERI Activity Code						
								1	2	3	4	5/ 6	M	C
Clinical Goal 1: Improve acute in-patient stroke care														
RRP 07-293 **Workgroup 1**	QUEST RRP	Racial Disparities in Blood Pressure Management Among Stroke Patients	D. Bravata	HSR&D RRP	$75,000	$75,000	07/01/07-12/31/07 Data Collection			X				
5R03AG022075 **Workgroup 1**	Nat'l Stroke Project	Impact of Aging on Stroke Care: A National Perspective	L. Brass (deceased) J. Lichtman	NIH/NIA	$0	$100,000	09/01/03-08/31/08 Analysis			X				
ARCD 00-039-1 **Workgroup 1**	ARCDA	Improving the Quality of Care for Patients with Acute Ischemic Stroke	D. Bravata	HSR&D ARCDA	$179,865	$539,595	07/01/04-06/30/07 Analysis			X				
1RO1 HS013940-01 **Workgroup 1**	Process Outcomes Links	Process Outcome Links in the National Stroke Project	L. Brass (deceased) J. Lichtman	AHRQ	$0	$98,372	09/01/03-08/31/08 Manuscripts			X				
QUERI Core **Workgroup 1**	VISN 11 Initiative	VISN 11 Stroke Initiative	L. Williams D. Bravata	Core	$0	$0	09/07-10/08 Data Collection			X	X			
CDA 04-342-2 **Workgroup 3**	Roumie CDA	Targeted Evidenced-based Improvements to Overcome Clinical Inertia	C. Roumie	HSR&D CDA	$178,560	$535,680	07/01/06-12/09 Data Collection			X	X			
IIR 01-104-3 **Workgroup 1**	QUEST	Quality Evaluation in Stroke and TIA (QUEST) Project	D. Bravata	HSR&D	$0	$600,784	070/1/03-06/30/06 Analysis			X				X
ACC010023543 **Workgroup 3**	STOP	Developing the Self-management to Prevent (STOP) Stroke Tool	J. Anderson	HSR&D NRI	$0	$9,050	Data Collection				X			
RRP 07-295 **Workgroup 1**	Glycemic2	Optimizing Glycemic Control	J. Walsh	HSR&D RRP	$68,000	$68,000	09/07-01/08 Start-up Activities				X	X		

Table 3. Active and Completed Projects

Project ID and Center Goal	Project Label	Project Title	Principal Investigator	Type/ Source	Current FY Amount	Total Amount	Start – End Dates and Status	QUERI Activity Code						
								1	2	3	4	5/ 6	M	C
Clinical Goal 1: Improve acute in-patient stroke care (continued)														
No assigned # **Workgroup 2**	TAP	A Transition Assistance Program (TAP) to Improve Self-efficacy and Reduce Strain in Stroke Caregivers	M. Rittman	Office of Patient Care Services	$572,090	$572,090	10/07-10/08 Start-up Activities				X	X		
STR 03-168 **Workgroup 1**	Implementation FY07 Project (Dysphagia)	Assessment of the Implementation of a Dysphagia Screen for Veterans with Acute Ischemic Stroke	N. Chumbler D. Bravata	HSR&D RRP	$100,000	$100,000	04/01/07-12/31/07 Data Collection				X	X		
RWJ 051081 **Workgroup 1**	RWJ	Robert Wood Johnson Generalist Physician Faculty Scholars Award Program	D. Bravata	RWJ	$0	$299,999	07/04-06/08 Manuscripts				X	X	X	
Clinical Goal 2: Prevent post-stroke complications														
P30 AG024967 **Workgroup 2**	Roybal	The Exploration of the Development of Fear of Falling After Stroke	A. Schmid	Roybal Center	$50,000	$50,000	Completed			X				X
CSP 481 **Workgroup 3**	THINRS	The Home International Normalized Ratio (INR) Study (THINRS)	D. Matchar	VA Cooper-ative Study	$68,226	$12,000,000	04/03-04/08 Data Collection							X

Table 3. Active and Completed Projects

Project ID and Center Goal	Project Label	Project Title	Principal Investigator	Type/ Source	Current FY Amount	Total Amount	Start – End Dates and Status	QUERI Activity Code						
								1	2	3	4	5/ 6	M	C
Clinical Goal 3: Initiate secondary prevention among veterans with stroke and TIA														
RRP 07-305 **Workgroup 3**	Shared Decision Making	Intervention Development for Shared Decision Making in Stroke Prevention	C. Uphold	HSR&D RRP	$75,000	$75,000	11/01/07-04/20/08 Start-up Activities			X				
RRP 07-294 **Workgroup 3**	STARS	Stop Tobacco Attributable Risk	T. Damush	HSR&D RRP	$75,000	$75,000	01/08-06/08 Start-up Activities			X	X			
QLP 71-003 **Workgroup 2**	Telehealth Dialogues	Home-based Tele-Health Stroke Care: Validation of Evidence-based Disease Dialogues	N. Chumbler	HSR&D RRP	$0	$49,412	05/01/05-04/30/06 Completed			X	X			
IAB 05-297-2 **Workgroup 3**	Tools	Adapting Tools to Implement Stroke Risk Management to Veterans	T. Damush	HSR&D	$100,000	$775,000	10/07-10/10 Start-up Activities			X	X	X		
RRP 06-153 **Workgroup 3**	Clinical Decision Making	Improved Clinical Decision Making	R. Beyth	HSR&D RRP	$0	$35,538	10/06-09/07 Analysis				X			
B3887R **Workgroup 2**	Telehealth Trial	Home-based Telehealth Stroke Care: A Randomized Trial for Veterans	N. Chumbler	RR&D IIR	$182,771	$790,020	01/01/07 12/31/09 Start-up Activities				X	X		
1RO1 HL70-794-01 **Workgroup 3**	Anti-Thromb	Improving Anti-Thrombotic Use in Stroke Prevention	R. Beyth	NIH	$346,658	$793,925	07/01/05-08/31/07 Analysis				X			X

Table 3. Active and Completed Projects

Project ID and Center Goal	Project Label	Project Title	Principal Investigator	Type/ Source	Current FY Amount	Total Amount	Start – End Dates and Status	QUERI Activity Code						
								1	2	3	4	5/ 6	M	C
Clinical Goal 4: Ensure that veterans with stroke receive appropriate and high quality rehab														
B5-4346R **Workgroup 2**	Rehab Cost	Cost Effectiveness of Stroke Rehabilitation Settings in the VA	B. Vogel	HSR&D IIR	$267,599	$623,915	03/07-02/09 Other: IRB			X				
06-108-02 **Workgroup 2**	VA/Non VA Uts-2	VA and Non VA Healthcare Utilization and Outcomes by Veterans with Stroke	H. Jia	HSR&D IIR	$45,998	$414,050	10/07-01/10 Start-up Activities			X				
RRP 06-184 **Workgroup 2**	Acute v. Subacute	VHA Costs of Acute Versus Subacute Rehabilitation Care for Stroke	B. Vogel	HSR&D RRP	75,000	75,000	04/07-12/07 Analysis			X				
Core **Workgroup 2**	Supporting Indicator- FIM	Supporting Indicator National Rollout	D. Cowper-Ripley	QUERI Core	$12,091	$450,000	10/1/02-ongoing						X	
Core **Workgroup 2**	Supporting Indicator Rehab	VA National Supporting Indicator – Rehab	D. Cowper-Ripley	QUERI Core	$12,091	$450,000	10/1/05-ongoing						X	
NRI 98-183 **Workgroup 2**	Cultural Model	Culturally Sensitive Models of Stroke Recovery and Caregiving after Discharge Home	M. Rittman	NRI	$0	$292,500	10/00-3/06 Completed			X				
03-151 **Workgroup 2**	VA/Non VA Uts-1	VA and Non VA Healthcare Utilization and Outcomes by Veterans with Stroke	H. Jia	HSR&D IIR	$0	$376,052	07/04-05/06 Complete						X	

Table 3. Active and Completed Projects

Project ID and Center Goal	Project Label	Project Title	Principal Investigator	Type/ Source	Current FY Amount	Total Amount	Start – End Dates and Status	QUERI Activity Code						
								1	2	3	4	5/ 6	M	C
Clinical Goal 5: Screen and treat veterans for PSD														
IMV 04-096 **Workgroup 2**	PSD	Implementing Evidence in the Detection and Treatment of Post Stroke Depression	L. Williams	HSR&D IIR	$250,000	880,000	01/06-12/08 Data Collection				X	X		X
RO1INS39571-01 **Workgroup 2**	AIM	AIM: A Randomized Trial of Treatment for PSD	L. Williams	NIH/ NINDS	$0	$1,500,000	09/00-09/05 Manuscripts				X	X		X
D3487R **Workgroup 2**	Anti DpTrt	Depressed Mood and Antidepressant Treatment Among Post-stroke Veterans	D. Ried	RR&D	$150,000	$592,811	05/05-10/08 Analysis				X			X
Clinical Goal 6: Support the reintegration of veterans into community life post-stroke														
NRI 05-246 **Workgroup 2**	CG Needs	Survey of Informal Caregivers of Veterans with Stroke	M. Rittman	RR&D IIR	$82,559	$309,000	04/06-03/08 Manuscripts			X				
SDR 07-304 **Workgroup 2**	CG Guidebooks	Evaluation of Caregiver Guidebooks	M. Rittman	HSR&D RRP	$75,000	$75,000	07/07-01/08 Data Collection			X	X			X
SDP 06-237 **Workgroup 2**	Web-based SDP	Web-based Informational Materials for Caregivers of Veterans Post-stroke	C. Uphold	QUERI SDP	$0	$591,008	Other: IRB, OMB, Waiting for Funding Disbursement				X	X		
Workgroups 1, 2, 3	OQP	Stroke Performance Indicators Across VA	L. Williams D. Bravata	OQP	$100,000	$100,000	10/06-10/07 Data Collection			X				

Table 4. Planned Projects

Table 4 illustrates our efforts in FY07 to prioritize improvement in inpatient health care and stroke risk factors, as suggested by the R&M Committee and by our Executive Committee. We are working to improve inpatient stroke care via our recently funded SQUIDSS project and our planned FY08 Implementation Project and Dysphagia SDP. As we work with sites to develop a stroke quality improvement network, we will continue to conduct projects like SQUIDSS to provide needed tools to improve stroke care. We are also increasing our efforts in stroke risk factor management as evidenced by the planned projects to improve decision making in atrial fibrillation and stroke risk factor management post-stroke and by the recently funded project assessing the effect of sleep apnea treatment on blood pressure post-stroke and TIA.

Future Plans: Although not included in this table, we are planning to eventually seek funding for a multi-site evaluation of a multidisciplinary stroke clinic. This was a FY06 RRP that had important cost and outcome impacts, and as Dr. Bravata has transitioned to Indianapolis and further refined the components of the clinic we would like to evaluate it further as a means to improve post-stroke care, possibly in FY09. Similarly, we would like to see a project conducted to implement guideline-adherence in VA inpatient rehabilitation units, since important QUERI work by Drs. Duncan and Reker demonstrated that outcomes were improved as adherence to rehabilitation guidelines improved. We are seeking to stimulate investigator interest in such a project in FY08.

Table 4. Planned Projects

Project ID and Center Goal	Project Label	Project Title or Description	Principal Investigator	Type/ Source	Status	QUERI Activity Code						
						1	2	3	4	5/6	M	C
Clinical Goal 1: Improve acute in-patient stroke care												
SDP 06-004 **Workgroup 1**	SQUIDSS	The Development and Feasibility Test of Implementing SQUIDSS: Stroke Quality Improvement Decisions Support System	T. Kent	HSR&D	Waiting for disbursement				X			
Workgroup 2	Dysphagia SDP	Implementation of a System Redesign Strategy to Improve Dysphagia Screening	N. Chumbler	QUERI SDP	Plan to submit FY08				X	X		
Clinical Goal 2: Prevent post-stroke complications												
Workgroup 3	A-fib Pt Supp	Atrial Fibrillation Patient Decision Support	B. Beyth	HSR&D IIR	Plan to submit FY08				X	X		
IIR 06-233-2 **Workgroup 3**	GoToSleep	Diagnosis and Treatment of Sleep Apnea in Cerebrovascular Disease	D. Bravata	HSR&D IIR	Waiting for disbursement				X	X		
Clinical Goal 3: Initiate secondary prevention among veterans with stroke and TIA												
Workgroup 3	Group Visits	Eric Cheng's IIR	E. Cheng	HSR&D	Plan to submit FY08				X			
Workgroup 3	V-stitch SDP	Disseminating V-Stitch in VA for Patients with Hypertension	H. Bosworth	QUERI SDP	LOI accepted				X	X		
Workgroup 3	TZDs	The Association of TZDs and Vascular Disease	C. Roumie	HSR&D	Plan to submit 12/07						X	
Clinical Goal 4: Ensure that veterans with stroke receive appropriate and high quality rehab												
Clinical Goal 5: Screen and treat veterans for PSD												
Clinical Goal 6: Support the reintegration of veterans into community life post-stroke												
D6174W **Workgroup 2**	CDA SocPart	CDA: Re-establishing Social Participation After Stroke	A. Schmid	RR&D	Fundable score			X				
Cross-cutting projects												
Workgroup 1	SQUIN	FY08 Implementation Project: Building a Stroke Quality Improvement Network	L. Williams D. Bravata	QUERI Core	Start-up activities			X	X	X		

Table 5. Staff and Executive Committee Roster

Center Leadership						
Name	**QUERI Role**	**Institution/Facility**	**Address ***	**Telephone**	**Fax**	**E-mail**
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Table 5. Staff and Executive Committee Roster

Executive Committee Membership						
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Table 5. Staff and Executive Committee Roster

Other Key Center and Project Staff						
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Table 5. Staff and Executive Committee Roster

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Table 5. Staff and Executive Committee Roster

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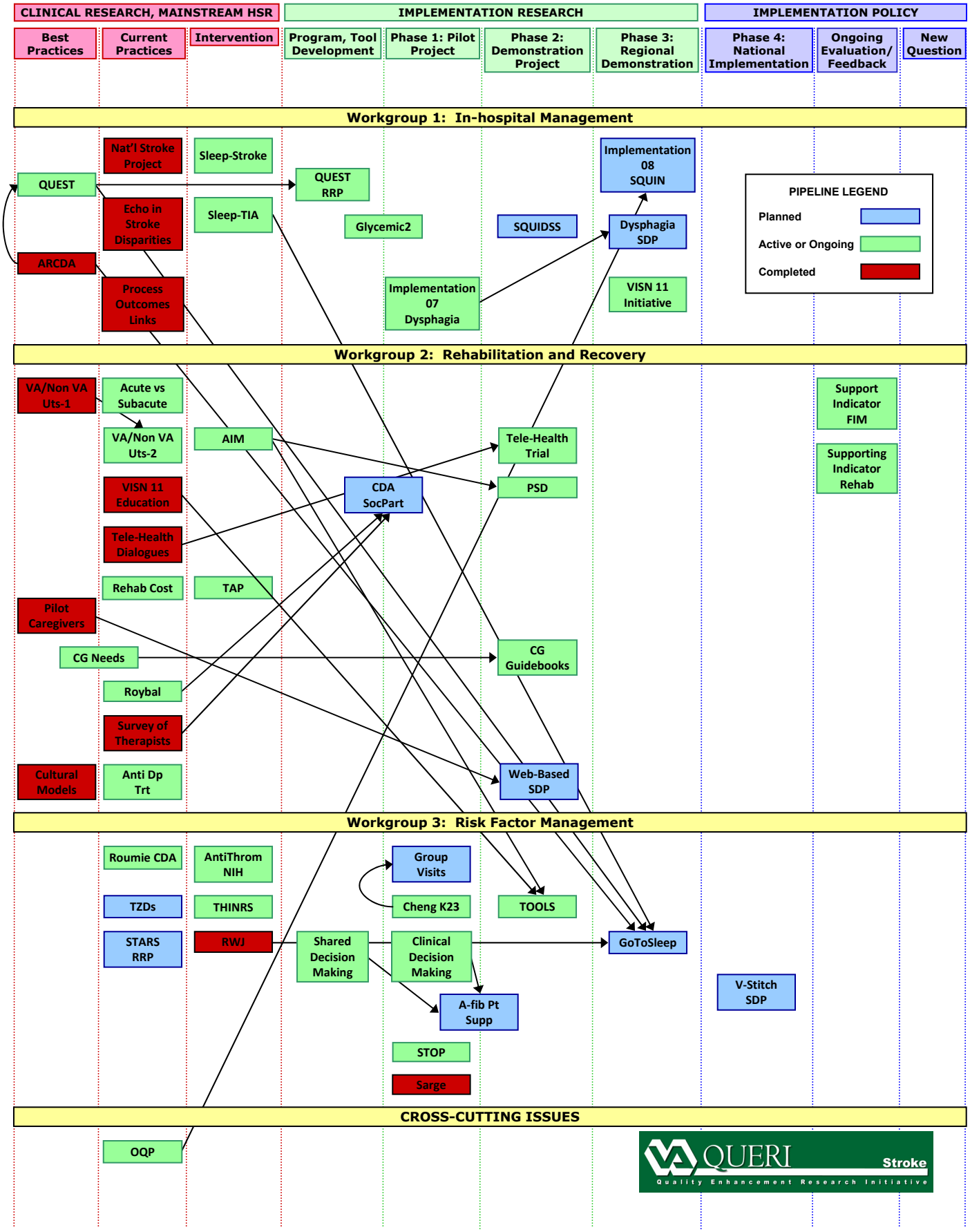
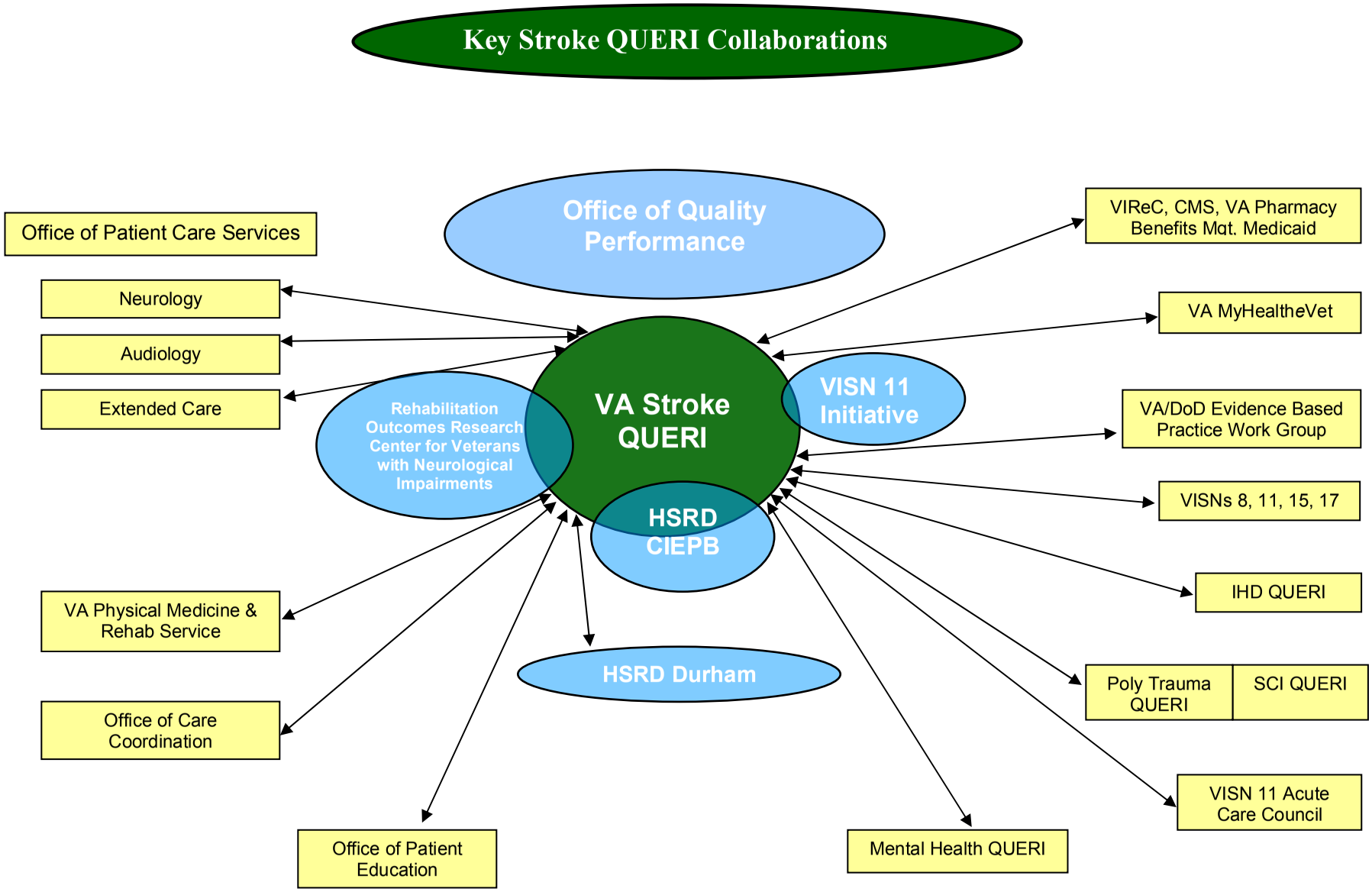
Appendix A. Stroke QUERI's Research/Implementation Pipeline



Appendix B. Wiring Diagram



Appendix C. General Acronyms

Acronym	Full Name	Context
AC	Administrative Coordinator for a QUERI Center	QUERI
AGS	American Geriatrics Society	Private
AHRQ	Agency for Healthcare Research & Quality	Federal
AI	Associate Investigator Program	ORD
AMA	American Medical Association	Private
AO	Administrative Officer	ORD
ART	Annual Reporting Template	VA
ATP III	Adult Treatment Panel	VA
Campbell	Campbell Collaboration	Private
CBOC	Community Based Outpatient Clinic	VA
CC	Clinical Coordinator for a QUERI Center	QUERI
CDA	Career Development Award	ORD
CDC	Centers for Disease Control and Prevention	Federal
CHF	Chronic Heart Failure QUERI Center	QUERI
CIO	Chief Information Officer	VA
CME	Continuing Medical Education	Generic
CMO	Chief Medical Officer	VISN
CMS	Centers for Medicare and Medicaid	Federal
CO	Central Office	VA
Cochrane	Cochrane Collaboration	Private
COE	Center of Excellence	HSRD
COLA	Cost of Living Allowance	Generic
CP	Concept Paper	VA
CPAP	Continuous Positive Airway Pressure	Generic
CPG Council	VA/DoD National Clinical Practice Guidelines Council (NCPGC)	VA
CPRS	Computerized Patient Record System	VA
CRADO	Chief Research and Development Officer	ORD
CRC	Colorectal Cancer QUERI Center	QUERI
CSP	Cooperative Studies Program	ORD
DHCP	Decentralized Hospital Computer Program	VA
DHHS	Department of Health and Human Services	Federal
DIWG	Data Issues Work Group	QUERI
DM	Diabetes Mellitus QUERI Center	QUERI
DoD	Department of Defense	Federal
DUSH	Deputy Under Secretary for Health	VA
EBM	Evidence Based Medicine	Generic
ED	Emergency Department	Generic
EES	Employee Education System	VA
EOY	End of Year	Generic
EPC	Evidence-based Practice Center	AHRQ
EPOC	Effective Practice and Organization of Care Cochrane Group	Private
ERIC	Epidemiology Research and Information Center	HSRD
FDA	Food and Drug Administration	Federal

GRECC	Geriatric Research Education and Clinical Center	VA
HAIG	Health Analysis and Information Group	VA
HERC	Health Economics Resource Center	HSRD
HIPAA	Health Insurance Portability and Accountability Act	Generic
HIV	HIV/AIDS QUERI Center	QUERI
HSR&D	Health Services Research and Development Service	HSRD
I&E	Implementation and Education Subcommittee (of NCPGC)	VA
IAA	Inter-Agency Agreement	Federal
ICU	Intensive Care Unit	Generic
IDP	Information Dissemination Program	ORD
IHD	Ischemic Heart Disease QUERI Center	QUERI
IIR	Investigator Initiated Research	HSRD
IoM	Institute of Medicine	Private
IPA	Inter-Governmental Personnel Act	VA
IRB	Institutional Review Board	Generic
IRC	Implementation Research Coordinator for a QUERI Center	QUERI
IRM	Information Resources Management	VA
IT	Information Technology	Generic
JC	Joint Commission	Federal
JCAHO	Joint Commission on Accreditation of Healthcare Organizations	Private
LIP	Locally Initiated Project	HSRD
LOI	Letter of Intent	ORD
MDRC	Management Decision Research Center	HSRD
METRIC	Measurement Excellence and Training Resource Information Center	VA
MH	Mental Health QUERI Center	QUERI
MIRECC	Mental Illness Research, Education and Clinical Center	VA
MREP	Merit Review Entry Program	HSRD
NAC	National Advisory Council	QUERI
NCI	National Cancer Institute	Federal
NCPGC	National Clinical Practice Guidelines Council	VA
NCQA	National Committee for Quality Assurance	Private
NHS	National Health Service (United Kingdom)	International
NIA	National Institute of Aging	Federal
NIH	National Institutes of Health	Federal
NINDS	National Institute of Neurological Disorders and Stroke	Federal
NLB	National Leadership Board	VA
NLM	National Library of Medicine	Federal
NQF	National Quality Forum	Private
OI	Office of Information	VA
OQP	Office of Quality and Performance	VA
ORD	Office of Research and Development	VA
OT	Occupational Therapy	Generic
PADRECC	Parkinson's Disease Research, Education and Clinical Center	VA
PCS	Patient Care Services	VA
PHS	Public Health Service	Federal
PI	Principal Investigator	Generic

PIMS	Project Information Management System	ORD
QI	Quality Improvement	Generic
QMIC	Quality Management Integration Council	VA
QMO	Quality Management Officer	VISN
QoL	Quality of Life	Generic
QUERI	Quality Enhancement Research Initiative	QUERI
QuIC	Quality Interagency Coordination Task Force	Federal
R&D	Research and Development	Generic/VA
R&M	Research and Methodology Committee	QUERI
RC	Research Coordinator for a QUERI Center	QUERI
RDIS	Research and Development Information System	HSRD
REAP	Research Enhancement Award Program	HSRD
RFA	Request for Applications	Generic
RORC	Rehabilitation Outcomes Research Center	HSRD/RRD
RRD	Rehabilitation Research and Development Service	ORD
RWJ	Robert Wood Johnson Foundation	Private
SAS	Statistical Analysis System	Private
SCI	Spinal Cord Injury QUERI Center	QUERI
SDP	Service Directed Project	QUERI
SDR	Service Directed Research	HSRD
SGIM	Society for General Internal Medicine	Private
SHG	Strategic Healthcare Group (within PCS)	VA
SOE	Strength of Evidence	Generic
SOTA	State of the Art Conference	HSRD
SPO	Special Projects Office	HSRD
SQ	Sub cutaneous	Generic
SREB	Scientific Review and Evaluation Board	HSRD
STARS	Stop Tobacco Attributable Risk	QUERI
SUD	Substance Use Disorder QUERI Center	QUERI
TA	Technology Assessment	Generic
TAP	Transition Assistance Program	QUERI
TREP	Targeted Research Enhancement Program	HSRD
TRIP	Translating Research into Practice	Generic
USH	Under Secretary for Health	VA
VA	Department of Veterans Affairs	VA
VACO	Veterans Affairs Central Office	VA
VAMC	Veterans Affairs Medical Center	VA
VANTS	VA Nationwide Teleconferencing System	VA
VHA	Veterans Health Administration	VA
VHACO	Veterans Health Administration Central Office	VA
VIReC	Veterans Information Resource Center	HSRD
VISN	Veterans Integrated Service Network	VA
WOC	Without Compensation Appointment	VA

Appendix D. Stroke QUERI Center-Specific Acronyms

Acronym	Full Name
ACC	American College of Cardiology
ACEI	ACE Inhibitor
ACS	Acute Coronary Syndrome
AF	Atrial Fibrillation
AHA	American Heart Association
AHCA	Florida Agency for Health Care Administration
AIM	Activate, Initiate, Monitor
ASA	American Stroke Association
ATHENA	Assessment and Treatment of Hypertension
BRFSS	Behavioral Risk Factor Surveillance System
BWST	Body Weight-Supported Treadmill
CABG	Coronary Artery Bypass Grafting
CAD	Coronary Artery Disease
CAS	Carotid Artery Stenting
CBOC	Community Based Outpatient Clinic
CCHT	VA Care Coordination/Home TeleHealth
CEA	Carotid Endarterectomy
CHARISMA	Clopidogrel for High Atherothrombotic Risk and Ischemic Stabilization, Management, and Avoidance
CHD	Coronary Heart Disease
CI	Confidence Internal
CIDER	Center for Information Dissemination and Education Resources
CIEBP	Center Of Excellence On Implementing Evidence-Based Practice
CIMT	Constraint-Induced Movement Therapy
CMS	Centers for Medicare and Medicaid Services
CREST	Carotid Revascularization Endarterectomy Versus Stenting Trial
CT	Computed Tomography
Decide	Duke Developing Evidence to Inform Decisions about Effectiveness
DIGAMI	The Diabetes Mellitus Insulin-Glucose Infusion in Acute Myocardial Infarction
DVT	Deep Vein Thrombosis
EBP	Evidence Based Practice
EPRP	External Peer Review Process
ESC	European Society of Cardiology
FIM	Functional Independence Measure
FRG	Function-related Group
FY	Fiscal Year
GIS	Geographical Information System
GWTG	Get With The Guidelines
Hgb	Hemoglobin
Hgb A1c	Glycosylated Hemoglobin
HTN	Hypertension
LDL	Low-density Lipoprotein
MI	Myocardial Infarction
Mm/Hg	Millimeters of Mercury
MOVE	Managing Overweight/Obese Veterans Everywhere

NCEP	National Cholesterol Education Program
NCP	National Center for Health Promotion and Disease Prevention
NF/SGVHS	North Florida/South Georgia Veterans Health System
NRI	Nursing Research Initiative
NSA	National Stroke Association
OCC	Office of Care Coordination
OIF/OEF	Operation Iraqi Freedom/Operation Enduring Freedom
OIG	Office of Inspector General
OR	Odds Ratio
PARIHS	The Promoting Action on Research Implementation in Health Services
PHQ-2	Patient Health Questionnaire-2
PHQ-9	Patient Health Questionnaire-9
PROTECT	Preventing Recurrence of Thromboembolic Events through Coordinated Treatment
PSC	Primary Stroke Center
PSD	Post-Stroke Depression
QUEST	Quality Evaluation in Stroke and Transient Ischemic Attack
RCT	Randomized Clinical Trial
ResDAC	Research Data Assistant Center
ROI	Return On Investment
RORC	Rehabilitation Outcomes Research Center
RR	Relative Risk
RRP	Rapid Response Project
SJVAMC	San Juan VA Medical Center
SPARCL	The Stroke Prevention by Aggressive Reduction in Cholesterol Levels
SQUIDSS	Stroke Quality Improvement Decision Support System
SQUIN	Stroke Quality Improvement Network
STOP	Developing the Self-Management to Prevent (STOP) Stroke Tool
TBI	Traumatic Brain Injury
TIA	Transient Ischemic Attack
TOOLS	Adapting Tools to Implement Stroke Risk Management to Veterans
t-PA	Tissue Plasminogen Activator
VA ED	VA Education
VAST	VA Stroke Study
VIReC	VA Information Resource Center
WG	Workgroup
WVMI	West Virginia Medical Institute

STR 03-168 **High-Dose Atorvastatin after Stroke or Transient Ischemic Attack**

Amarenco P, Bogousslavsky J, Callahan A 3rd, Goldstein LB, Hennerici M, Rudolph AE, Sillesen H, Simunovic L, Szarek M, Welch KM, Zivin JA; Stroke Prevention by Aggressive Reduction in Cholesterol Levels (SPARCL) Investigators.

New England Journal of Medicine, 2006 Aug, 355, 549-559.

ABSTRACT:

BACKGROUND:
Statins reduce the incidence of strokes among patients at increased risk for cardiovascular disease; whether they reduce the risk of stroke after a recent stroke or transient ischemic attack (TIA) remains to be established.

METHODS:
We randomly assigned 4731 patients who had had a stroke or TIA within one to six months before study entry, had low-density lipoprotein (LDL) cholesterol levels of 100 to 190 mg per deciliter (2.6 to 4.9 mmol per liter), and had no known coronary heart disease to double-blind treatment with 80 mg of atorvastatin per day or placebo. The primary end point was a first nonfatal or fatal stroke.

RESULTS:
The mean LDL cholesterol level during the trial was 73 mg per deciliter (1.9 mmol per liter) among patients receiving atorvastatin and 129 mg per deciliter (3.3 mmol per liter) among patients receiving placebo. During a median follow-up of 4.9 years, 265 patients (11.2 percent) receiving atorvastatin and 311 patients (13.1 percent) receiving placebo had a fatal or nonfatal stroke (5-year absolute reduction in risk, 2.2 percent; adjusted hazard ratio, 0.84; 95 percent confidence interval, 0.71 to 0.99; P=0.03; unadjusted P=0.05). The atorvastatin group had 218 ischemic strokes and 55 hemorrhagic strokes, whereas the placebo group had 274 ischemic strokes and 33 hemorrhagic strokes. The five-year absolute reduction in the risk of major cardiovascular events was 3.5 percent (hazard ratio, 0.80; 95 percent confidence interval, 0.69 to 0.92; P=0.002). The overall mortality rate was similar, with 216 deaths in the atorvastatin group and 211 deaths in the placebo group (P=0.98), as were the rates of serious adverse events. Elevated liver enzyme values were more common in patients taking atorvastatin.

CONCLUSIONS:
In patients with recent stroke or TIA and without known coronary heart disease, 80 mg of atorvastatin per day reduced the overall incidence of strokes and of cardiovascular events, despite a small increase in the incidence of hemorrhagic stroke.

STR 03-168 **Psychometric testing of the revised 15-item Bakas Caregiving Outcomes Scale**

Bakas T, Champion V, Perkins SM, Farran CJ, Williams LS.
Nursing Research, 55, 346-355.

ABSTRACT:

BACKGROUND AND PURPOSE:
Family caregivers of stroke survivors experience a variety of negative social, emotional, and health-related outcomes as a result of providing care.

OBJECTIVES:
To psychometrically test the revised 15-item Bakas Caregiving Outcomes Scale (BCOS) measuring life changes specifically resulting from providing care. The original 10-item BCOS was improved by adding five items addressing financial well-being, level of energy, role functioning, physical functioning, and general health.

METHODS:
Psychometric testing of the revised 15-item BCOS using a sample of 147 family caregivers of stroke survivors approximately 4 months after stroke was conducted to determine the quality of the items, internal consistency reliability, test-retest reliability, construct validity, and criterion-related validity. Most caregivers were women (78.9%), White (68.0%) or African American (29.9%), and either spouses (60.1%) or adult children (31.3%).

RESULTS:
Satisfactory evidence of internal consistency (alpha = .90) and 2-week test-retest reliability (intraclass coefficient [ICC] = .66; 95% confidence interval [CI] = 0.42-0.81) was provided, with item-to-total correlations ranging from .41 to .74. Unidimensionality was supported by confirmatory factor analysis with indices, indicating a good fit. Using hierarchical multiple regression, 36% of the BCOS variance was explained by constructs in the conceptual model [$F(11,132) = 6.72$, $p < .001$]. Criterion-related validity was supported by correlations with the 36-item Short Form (SF-36) General Health Subscale ($r = .32$, $p < .001$) and a criterion variable measuring how caregivers' lives had changed overall ($r = .67$, $p < .001$).

CONCLUSION:
The revised 15-item BCOS has evidence of satisfactory reliability and validity in family caregivers of stroke survivors. The BCOS is a valuable measure in research and can be used to identify priority areas for nursing interventions designed to improve caregivers' outcomes.

QLP 71-003 The Effectiveness of a Care Coordination/Home Telehealth Program for Veterans with Diabetes Mellitus: a 2-Year Follow-up

Barnett TE, Chumbler NR, Vogel WB, Beyth RJ, Qin H, Kobb R.
The American Journal of Managed Care, 2006, 12(8):467-474.

ABSTRACT:

OBJECTIVES:
To assess healthcare use among veterans with diabetes mellitus (DM) enrolled in a Department of Veterans Affairs (VA) Care Coordination Home Telehealth (CCHT) program during 24 months and to contrast this utilization with the service use of a comparison group of veterans with DM not enrolled in the program.

METHODS:
This is a two-year, retrospective, concurrent matched cohort study design. The VA CCHT program included older veterans with type 2 DM at high risk for multiple VA inpatient and outpatient visits. Healthcare utilization (hospitalizations, length of stay, and outpatient visits by type) was assessed at baseline and at 24 months after intervention for the treatment (n = 400) and comparison (n = 400) groups. Propensity scores were used to improve the balance between the treatment and comparison groups. A difference-in-differences approach was used to control for selection bias and for intervening time factors.

RESULTS:
Two years after enrollment, the treatment group exhibited a statistically significant reduction in the likelihood of all-cause and DM-related hospitalizations. In a subgroup analysis in which we controlled for patients' baseline glycosylated hemoglobin levels, the treatment group had a lower likelihood of having any care coordinator-initiated primary care clinic visits (in which the care coordinator initiated referral to primary care based on health information received from patients' CCHT technology).

CONCLUSION:
After controlling for selection bias and for intervening time factors, the VA CCHT program reduced avoidable healthcare services for DM (such as hospitalizations) and reduced care coordinator-initiated primary care clinic visits.

QLP 71-003 **The Cost Utility of a Care Coordination/Home Telehealth Programme for Veterans with Diabetes**

Barnett TE, Chumbler NR, Vogel WB, Beyth RJ, Ryan P, Figueroa S.

Journal of Telemedicine and Telecare, 13, 318-321

ABSTRACT:

OBJECTIVES:
We examined the cost-effectiveness of a care coordination/home telehealth (CCHT) programme for veterans with diabetes.

METHODS:
We conducted a retrospective, pre-post study which compared data for a cohort of veterans (n=370) before and after the introduction of the CCHT programme for two periods of 12 months. To assess the cost-effectiveness, we converted the patients' health-related quality of life data into Quality Adjusted Life Year (QALY) utility scores and used costs to construct incremental cost-effectiveness ratios (ICERs).

RESULTS:
The overall mean ICER for the programme at one-year was $60,941, a value within the commonly-cited range of cost-effectiveness of $50,000-100,000.

CONCLUSIONS:
The programme was cost-effective for one-third of the participants. Characteristics that contributed to cost-effectiveness were marital status, location and clinically relevant co-morbidities. By targeting the intervention differently in future work, it may become cost-effective for a greater proportion of patients.

NRI 98-183 **Metaphor Shifts in Stroke Recovery**

Boylstein C, Rittman M, Hinojosa R.

Health Communication, 2007, 21(3), 279-87.

ABSTRACT:

BACKGROUND AND PURPOSE:
An illness event like stroke is generally believed to produce a biographical disruption in the individual, resulting in a reconstruction of one's self identity. One method of narrative reconstruction is the use of personal metaphor. Although previous research has illustrated a variety of illness metaphors, including that of war, there has been little research conducted on how these metaphors shift throughout a person's recovery period.

RESULTS:
The authors' present data that indicate an intricate connection exists among changes in individuals' physical functioning, self-reported depression level, self-identity, and the metaphors they use to describe the stroke and stroke recovery experience. As the metaphor one uses to describe one's stroke experience shifts, so does one's sense of self. As one's self-identity changes, one's level of self-reported depression may also increase.

1RO1 HS013940 01 Readmission and Death After Hospitalization for Acute Ischemic Stroke
5-Year Follow-Up in the Medicare Population

Bravata DM, Ho SY, Meehan TP, Brass LM, Concata J.
Stroke, 2007 May 17, 38, 1899-1904.

ABSTRACT:

BACKGROUND AND PURPOSE:
Stroke is a leading cause of hospital admission among the elderly. Although studies have examined subsequent vascular outcomes, limited data are available regarding the full burden of hospital readmission after stroke. We sought to determine the rates of hospital readmissions and mortality and the reasons for readmission over a 5-year period after stroke.

METHODS:
This retrospective observational cohort study included Medicare beneficiaries aged greater than 65 years who survived hospitalization for an acute ischemic stroke (International Classification of Diseases, Ninth Revision, Clinical Modification codes 434 and 436) and who were discharged from Connecticut acute care hospitals in 1995. This population was followed from discharge in 1995 through 2000 using part A Medicare claims and Social Security Administration mortality data. The primary outcome was hospital readmission and mortality and readmission diagnosis.

RESULTS:
Among 2603 patients discharged alive, more than half had died or been readmitted at least once during the first year after discharge (1388/2603, 53.3%), and _15% survived admission-free for 5 years (372/2603, 14.3%). The reasons for hospital readmission varied over time, with stroke remaining a leading cause for readmission (3.9 to 6.1%of patients annually). Acute myocardial infarction accounted for a comparable number of readmissions (4.2 to 6.0% of patients annually). The most common diagnostic category associated with readmission, however, was pneumonia or respiratory illnesses, with an annual readmission rate between 8.2% and 9.0% throughout the first 5 years after stroke.

CONCLUSIONS:
Few stroke patients survive for 5 years without a hospital readmission. Between the acute care setting and readmission to the hospital, a window of opportunity may exist for interventions, beyond prevention of recurrent vascular events alone, to reduce the huge public health burden of post stroke morbidity.

STR 03-168 **Statin Use and Sex-Specific Stroke Outcomes in Patients with Vascular Disease**

Bushnell CD, Griffin J, Newby LK, Goldstein LB, Mahaffey KW, Graffagnino CA, Harrington RA, Harvey, D, White HD, Simes RJ, Califf RM, Topol EJ, Easton JD.

Stroke, 2006, 37,1427-1431.

ABSTRACT:

BACKGROUND AND PURPOSE:
Although statins reduce the risk of stroke in patients with coronary heart disease, possible differing effects of statins on stroke outcomes based on sex remain uncertain. We investigated the relationships between statin use and sex-specific stroke incidence, severity, and mortality.

METHODS:
Data from 3 trials of oral glycoprotein IIb/IIIa inhibitors (first and second Sibrafiban versus aspirin to Yield Maximum Protection from ischemic Heart events postacute cOroNary sYndromes [SYMPHONY] and Blockade of the glycoprotein IIb/IIIa Receptor to Avoid Vascular Occlusion [BRAVO]) were pooled and stroke outcomes compared among 8191 baseline statin users versus 14,752 nonusers. Time-to-event data were modeled with proportional hazards regression. Stroke severity was assessed retrospectively with the Canadian Neurological Scale (CNS) based on records with scoreable neurological examinations.

RESULTS:
A total of 217 subjects had strokes (0.95%). Statin users had a lower risk of stroke in unadjusted (hazard ratio [HR], 0.69; 95% CI, 0.51 to 0.92) and risk-adjusted models (HR, 0.72; 95% CI, 0.53 to 0.97). There was no difference in stroke mortality with statin use (P=0.8). CNS scores could be assigned to 106 of the subjects, with no difference in severity among statin users and nonusers (median CNS=10.5 in users versus CNS=9.75 in nonusers; P=0.14). Women had more severe strokes than men (median CNS=10.5 in men versus 9.5 in women; Poisson regression P=0.035). Women had more severe strokes after adjustment for statin use (P=0.03) and the combination of statin use, atrial fibrillation, and age (P=0.03).

CONCLUSIONS:
In patients included in these clinical trials of oral glycoprotein IIb/IIIa inhibitors, statin use is associated with a reduced risk of stroke but not severity or mortality. Women had more severe strokes than men, a difference that was not explained by baseline characteristics or statin use.

STR 03-168 **Quality Indicators for the Care of Stroke and Atrial Fibrillation in Vulnerable Elders**

Cheng EM, Fung CH.

Journal of the American Geriatric Society, 2007; 55: S431-437.

BACKGROUND AND PURPOSE:
Stroke is the third leading cause of death in the United States and a leading cause of disability. This article proposes quality indicators (QIs) that could be applied when treating vulnerable elders (VEs) for stroke and reviews the data supporting each indicator.

METHODS
A total of 228 articles were considered in this review: 40 identified via a Web search, 143 through reference mining, and 41 through the Assessing Care of Vulnerable Elders (ACOVE)-3 literature searches. Four additional articles were included after peer review.

RESULTS
Of the 30 potential QIs, the expert panel process judged 21 to be valid; nine were rejected. Literature summaries supporting each indicator judged to be valid according to the expert panel process are provided.

STR 03-168 **Modest Improvement in Risk Factor Control after Admission for a Stroke or Transient Ischemic Attack**

Cheng EM, Jolly D, Jones LA, Cohen SN.

Journal of Stroke and Cerebrovascular Diseases, 14(4), 174-178.

BACKGROUND:
Although guidelines recommend control of risk factors for secondary stroke prevention, few studies examine the level of risk factor control achieved in a poststroke population.

METHODS:
We examined medical records of 99 consecutive patients admitted for ischemic stroke or transient ischemic attack to the Department of Veterans Affairs (VA) West Los Angeles Healthcare Center who were still alive 1 year later. Values for blood pressure, low-density lipoprotein, hemoglobin A1c, and body mass index were collected from a time period of up to 6 months before admission and compared with a time period 6 to 13 months after admission.

RESULTS:
For the entire sample, improvements in risk factor control were detected only in diastolic blood pressure (5 mm Hg) and hemoglobin A1c (0.9%) ($P < .05$). When analyzing just the subset of patients with suboptimal control before hospitalization, improvements were detected for systolic blood pressure (12 mm Hg), diastolic blood pressure (12 mm Hg), low-density lipoprotein (29 mg/dL), and hemoglobin A1c (1.4%) (all $P < .01$). However, a majority of patients with suboptimal control of systolic blood pressure, low-density lipoprotein, and body mass index before admission failed to achieve optimal control of that risk factor in the year after admission. Only 23 patients had all relevant risk factors measured in the VA system during the period after admission and had the final measurements of those risk factors in the optimal range.

CONCLUSIONS:
Although modest improvements were detected, there remains room for improvement in optimizing control of risk factors after a stroke.

NRI 98-183 **Associations in Sense of Coherence and Depression in Caregivers of Stroke Survivors Across Two Years**

Chumbler NR, Rittman MR, Wu SS.

The Journal of Behavioral Health Services and Research, 2007, Sep, (Epub ahead of print)

ABSTRACT:

OBJECTIVES:
The objective of this longitudinal study was to detect the relationship between the sense of coherence (SOC), which is an adaptive coping response, and depression in informal caregivers of stroke survivors across 2 years.

METHODS:
One-hundred-fifteen veterans, who were hospitalized after experiencing an acute stroke, and their informal caregivers were enrolled prior to discharge. Data were collected via face-to-face in-home interviews at 1, 6, 12, 18, and 24 months after discharge. A linear mixed model was fitted to estimate the effects of the time-dependent covariates (SOC) while considering the dependence of outcome measures at repeated times.

RESULTS:
Based on the linear mixed model, caregivers with a stronger SOC were associated with lower levels of caregiver depression across 2 years following a stroke ($p < 0.0001$). SOC seems to be an important aspect of a caregiver's capacity to cope after tending to the needs of a stroke patient.

STR 03-168 **Case-finding Algorithm for Post-stroke Depression in the Veteran's Health Administration**

Damush TM, Jia H, Ried LD, Qin H, Cameon R, Plue L, Williams LS.

International Journal of Geriatric Psychiatry, 2007 Nov 14, early view-published online

ABSTRACT:

OBJECTIVES:
Post-stroke depression (PSD) is prevalent, often undiagnosed, and undertreated. The accuracy of detecting patients with post-stroke depression in administrative databases has not been examined. The objective was to validate a case-finding algorithm for post-stroke depression (PSD) among veteran stroke survivors.

METHODS:
We conducted a retrospective cohort study of veterans admitted to two VHA facilities for an inpatient episode of care for acute ischemic stroke. Our cohort included all patients from two medical centers who were identified in the fiscal year (FY) 2001 VHA inpatient database using high specificity stroke ICD-9 codes. FY 2002 VHA and Medicare inpatient, outpatient, and pharmacy data were used to examine the patients' 12-month PSD status by using ICD-9 depression codes and antidepressant use. We assessed our accuracy about patients' PSD from the administrative databases through standardized chart reviews.

RESULTS:
Of our 185 subject cohort, 50 (27%) were identified as having PSD. The most sensitive case-finding algorithm for PSD included having an ICD-9 code diagnosis for depression or receiving a prescription for an approved-dosage of antidepressant medication. However, the algorithm of receiving an ICD-9 code for primary or secondary diagnoses of depression revealed the largest positive predictive value.

CONCLUSIONS:
A case-finding algorithm using outpatient ICD-9 codes or medication was the most sensitive in identifying cases of PSD. The use of ICD-9 codes alone may be adequate for characterizing a cohort with PSD. Intention for use should be considered when choosing an algorithm to detect PSD.

STR 03-168 **Clopidogrel Use and Long-Term Clinical Outcomes after Drug-Eluting Stent Implantation**

Eisenstein EL, Anstrom KJ, Kong DF, Shaw LK, Tuttle RH, Mark DB, Kramer JM, Harrington RA, Matchar DB, Kandzari DE, Peterson ED, Schulman KA, Califf RM.

Journal of the American Medical Association, 2006, 21: 235-241.

ABSTRACT:

BACKGROUND AND PURPOSE:
Recent studies of drug-eluting intracoronary stents suggest that current antiplatelet regimens may not be sufficient to prevent late stent thrombosis.

OBJECTIVE:
To assess the association between clopidogrel use and long-term clinical outcomes of patients receiving drug-eluting stents (DES) and bare-metal stents (BMS) for treatment of coronary artery disease.

METHODS: An observational study examining consecutive patients receiving intracoronary stents at Duke Heart Center, a tertiary care medical center in Durham, NC, between January 1, 2000, and July 31, 2005, with follow-up contact at 6, 12, and 24 months through September 7, 2006. Study population included 4666 patients undergoing initial percutaneous coronary intervention with BMS (n = 3165) or DES (n = 1501). Landmark analyses were performed among patients who were event-free (no death, myocardial infarction [MI], or revascularization) at 6- and 12-month follow-up. At these points, patients were divided into 4 groups based on stent type and self-reported clopidogrel use: DES with clopidogrel, DES without clopidogrel, BMS with clopidogrel, and BMS without clopidogrel. Main Outcome Measures: Death, nonfatal MI, and the composite of death or MI at 24-month follow-up.

RESULTS:
Among patients with DES who were event-free at 6 months (637 with and 579 without clopidogrel), clopidogrel use was a significant predictor of lower adjusted rates of death (2.0% with vs 5.3% without; difference, -3.3%; 95% CI, -6.3% to -0.3%; P = .03) and death or MI (3.1% vs 7.2%; difference, -4.1%; 95% CI, -7.6% to -0.6%; P = .02) at 24 months. However, among patients with BMS (417 with and 1976 without clopidogrel), there were no differences in death (3.7% vs 4.5%; difference, -0.7%; 95% CI, -2.9% to 1.4%; P = .50) and death or MI (5.5% vs 6.0%; difference, -0.5%; 95% CI, -3.2% to 2.2%; P = .70). Among patients with DES who were event-free at 12 months (252 with and 276 without clopidogrel), clopidogrel use continued to predict lower rates of death (0% vs 3.5%; difference, -3.5%; 95% CI, -5.9% to -1.1%; P = .004) and death or MI (0% vs 4.5%; difference, -4.5%; 95% CI, -7.1% to -1.9%; P<.001) at 24 months. However, among patients with BMS (346 with and 1644 without clopidogrel), there continued to be no differences in death (3.3% vs 2.7%; difference, 0.6%; 95% CI, -1.5% to 2.8%; P = .57) and death or MI (4.7% vs 3.6%; difference, 1.0%; 95% CI, -1.6% to 3.6%; P = .44).

CONCLUSIONS:
The extended use of clopidogrel in patients with DES may be associated with a reduced risk for death and death or MI. However, the appropriate duration for clopidogrel administration can only be determined within the context of a large-scale randomized clinical trial.

STR 03-168 **Efficacy of Drug Therapy in the Secondary Prevention of Cardiovascular Disease and Stroke**

Fletcher GF, Bufalino V, Costa F, Goldstein LB, et al.

American Journal of Cardiology, 2007; 99: 1E-35E.

ABSTRACT:

BACKGROUND:
The proper secondary prevention of cardiovascular disease (CVD) and stroke can have a significant impact on recurrent events. Central to this is the importance of appropriately prescribed drug therapy at the time of an event at the hospital and at the time of discharge. This report relates details of the efficacy of such therapy on the basis of clinical trials and studies.

METHODS:
Mechanisms of action, effects on morbidity and mortality, recurrent events, patient adherence and safety, and other issues related to drug therapy are discussed.

CONCLUSION:
The proper use of appropriate drug therapy can be enhanced with broad and in-depth knowledge of the mechanisms of action and various effects of these drugs.

STR 03-168 **Acute Ischemic Stroke Treatment in 2007 [Contemporary Reviews in Cardiovascular Medicine]**

Goldstein, LB.

Circulation, 116:1504-1514.

ABSTRACT:

BACKGROUND AND PURPOSE:
A variety of interventions have proven effective in reducing the risk of a first stroke. Nevertheless, each year, more than 700 000 Americans have strokes and more than 150 000 die, making stroke the country's third-leading cause of death. More than 25% of stroke survivors older than age 65 years are disabled 6 months later. On the basis of the results of prospective randomized clinical trials and other studies performed over the past decade, the general approach to the management of acute stroke has evolved from nihilism to active intervention.

RESULTS:
A large volume of experimental studies delineates the various aspects of the ischemic cascade. The results of the single laboratory study provide a conceptual framework that guides the current clinical approach to patients with acute ischemic stroke. The experiment, performed in awake monkeys, shows that focal symptoms (in this case, paralysis) develop when local cerebral blood flow drops below a certain threshold (in this experiment, $<23\ mL \cdot 100\ g^{-1} \cdot min^{-1}$). The hatched area between the development of symptoms and infarction is a graphic representation of the so-called penumbra, an area of brain that is functionally inactive but structurally intact and potentially salvageable.

CONCLUSION:
Neurological function is completely recoverable if local cerebral blood flow is restored promptly. For a given level of reduced blood flow, the likelihood of sustaining irreversible injury (ie, ischemic stroke) increases as a function of time. This essential biology is the basis of the mantra, “Time lost is brain lost.” Timely restoration of blood flow to ischemic brain offers the chance of reversing or limiting the injury.

STR 03-168 **Stroke Code Chest Radiographs are Not Useful**

Goldstein LB.
Cerebrovascular Diseases, 2007,24, 460-462.

ABSTRACT:

BACKGROUND:
Routine chest radiographs at the time of hospital admission are not recommended for stroke patients in the absence of pulmonary symptoms. The usefulness of the test in patients being evaluated by a stroke team for hyperacute stroke symptoms was assessed.

METHODS:
Demographic information, chest radiograph results, and the impact of the test on the emergency department (ED) management of a consecutive series of patients evaluated by a stroke code team between 2005-2006 were retrospectively collected and analyzed.

RESULTS:
Chest radiographs were obtained in the ED for 92% of patients (n = 113). The sole indication for the test was 'stroke' in 91% (one patient had a normal study performed for chest pain; the remainder were performed in association with endotracheal intubation). Chest radiographs were completely normal in 70% with 25.2% having incidental and 3.8% having potentially relevant findings. No patient had a finding that otherwise affected their ED management.

CONCLUSION:
Routine chest radiographs obtained as part of the emergent evaluation of patients with acute stroke symptoms rarely provide useful information, expose the patient to unnecessary radiation, add costs, and can interfere with other more critical parts of the patient's emergent assessment.

STR 03-168 **Primary Prevention of Ischemic Stroke: A Guideline From the American Heart Association/American Stroke Association Stroke Council: Cosponsored by the Atherosclerotic Peripheral Vascular Disease Interdisciplinary Working Group; Cardiovascular Nursing Council; Clinical Cardiology Council; Nutrition, Physical Activity, and Metabolism Council; and the Quality of Care and Outcomes Research Interdisciplinary Working Group: *The American Academy of Neurology affirms the value of this guideline.* [AHA/ASA Guideline]**

Goldstein LB, Adams Robert A, Appel M, Brass L†, Bushnell CD, Culebras AG, Gorelick TJ, Philip B, Guyton JR, Hart RG, Howard G, Kelly-Hayes M, Nixon JV. The authors provided equivalent contributions to this guideline and are listed in alphabetical order.

The views expressed in this article are those of the authors and do not necessarily reflect the official policy or position of the Department of the Navy, the Uniformed Services University of Health Sciences, the Henry M. Jackson Foundation for the Advancement of Military Medicine, Inc, the Department of Defense, or the US Government.
†Deceased

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This statement was approved by the American Heart Association Science Advisory and Coordinating Committee on December 23, 2005. A single reprint is available by calling 800-242-8721 (US only) or writing the American Heart Association, Public Information, 7272 Greenville Ave, Dallas, TX 75231-4596. Ask for reprint No. 71-0356. To purchase additional reprints: up to 999 copies, call 800-611-6083 (US only) or fax 413-665-2671; 1000 or more copies, call 410-528-4121, fax 410-528-4264, or E-mail kramsay@lww.com. To make photocopies for personal or educational use, call the Copyright Clearance Center, 978-750-8400.
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http://www.americanheart.org/presenter.jhtml?identifier=3023366 .

ABSTRACT:
BACKGROUND AND PURPOSE:
This guideline provides an overview of the evidence on various established and potential stroke risk factors and provides recommendations for the reduction of stroke risk.

METHODS:
Writing group members were nominated by the committee chair on the basis of each writer's previous work in relevant topic areas and were approved by the American Heart Association Stroke Council's Scientific Statement Oversight Committee. The writers used systematic literature reviews (covering the time period since the last review published in 2001 up to January 2005), reference to previously published guidelines, personal files, and expert opinion to summarize existing evidence, indicate gaps in current knowledge, and when appropriate, formulate recommendations based on standard American Heart Association criteria. All members of the writing group had numerous opportunities to comment in writing on the recommendations and approved the final version of this document. The guideline underwent extensive peer review before consideration and approval by the AHA Science Advisory and Coordinating Committee.

RESULTS:
Schemes for assessing a person's risk of a first stroke were evaluated. Risk factors or risk markers for a first stroke were classified according to their potential for modification (nonmodifiable, modifiable, or potentially modifiable) and strength of evidence (well documented or less well documented). Nonmodifiable risk factors include age, sex, low birth weight,

race/ethnicity, and genetic factors. Well-documented and modifiable risk factors include hypertension, exposure to cigarette smoke, diabetes, atrial fibrillation and certain other cardiac conditions, dyslipidemia, carotid artery stenosis, sickle cell disease, postmenopausal hormone therapy, poor diet, physical inactivity, and obesity and body fat distribution. Less well-documented or potentially modifiable risk factors include the metabolic syndrome, alcohol abuse, drug abuse, oral contraceptive use, sleep-disordered breathing, migraine headache, hyperhomocysteinemia, elevated lipoprotein(a), elevated lipoprotein-associated phospholipase, hypercoagulability, inflammation, and infection. Data on the use of aspirin for primary stroke prevention are reviewed.

CONCLUSION:
Extensive evidence is available identifying a variety of specific factors that increase the risk of a first stroke and providing strategies for reducing that risk.

STR 03-168 **Advances in Primary Stroke Prevention [Advances in Stroke 2005]**

Goldstein LB, Hankey GJ.
Stroke, 2006, 37, 317-319.

ABSTRACT:

BACKGROUND AND PURPOSE:
Because [almost equal to] 75% of strokes are first-ever strokes, it is likely that effective prevention in persons with established risk factors who have not had a stroke (ie, primary prevention) can have as great or a greater impact on reducing the burden of the disease as effective prevention of recurrent stroke. The cost associated with inadequate primary prevention is at least as great as that resulting from inadequate secondary prevention. There were several important studies published over the last year providing new data addressing primary stroke prevention.

RESULTS:
Blood Pressure–Lowering
Lowering systolic blood pressure by 10 mm Hg is associated with a reduction in the risk of stroke by about one third, irrespective of baseline blood pressure (BP) levels. It remains uncertain whether long-acting dihydropridine calcium-channel blockers (CCBs), angiotensin-converting enzyme inhibitors, or angiotensin II receptor blocker (ARBs) are more effective than other classes of antihypertensive drugs, and whether the very elderly benefit from treatment.
The Anglo-Scandinavian Cardiac Outcomes Trial–Blood pressure Lowering Arm (ASCOT-BPLA) randomly allocated 19 257 individuals aged 40 to 79 years with hypertension and at least 3 other cardiovascular risk factors to an amlopidine-based (amlodipine 5 to 10 mg adding perindopril 4 to 8 mg as required) as compared with an atenolol-based drug regimen (atenolol 50 to 100 mg adding bendroflumethiazide 1.25 to 2.5 mg and potassium as required). After 5.5 years median follow-up, the amlopidine-based regimen was associated with lower rates of stroke (hazard ratio [HR]=0.77, 95% CI: 0.66 to 0.89), coronary events (HR=0.86, 95% CI: 0.77 to 0.96) and new-onset diabetes (HR=0.70, 95% CI: 0.63 to 0.78). The CCB-angiotensin-converting enzyme inhibitor regimen may be associated with a greater reduction in pulse pressure and better patient compliance (ie, fewer adverse effects), but stroke reduction was at least partially attributable to lower BPs among patients randomized to the amlodipine-based regimen (mean difference: 2.7/1.9 mm Hg).
Although not a primary prevention study, the MOrbidity and mortality after Stroke, Eprosartan compared with nitrendipine for Secondary prevention (MOSES) trial randomly assigned 1405 patients to treatment with an ARB (eprosartan) or a CCB (nitrendipine). There was a reduction in cerebrovascular events (incidence density ratio: 0.75; 95% CI: 0.58 to 0.97) among those treated with the ARB during 2.5 years (mean) follow-up with no significant difference in BP between the 2 groups. Caveats of the MOSES trial are that it was a pilot study, treatment allocation was not masked, 53 patients were excluded from the analyses because they withdrew consent after randomization, and the analysis was based on the number of outcome events, which could include double counting of patients, rather than an actuarial analysis of time to first event (with censoring).
The benefits of lowering BP in the very elderly are supported by the results of the Study on Cognition and Prognosis in the Elderly (SCOPE) that randomly assigned 4964 patients aged 70 to 89 years with mild to moderate hypertension to double-blind treatment with candesartan 8 to 16 mg daily or placebo. Open-label antihypertensive therapy (mostly thiazide diuretics) was added as needed to control the BP. Assignment to candesartan was associated with a 27.8% (95% CI: 1.3% to 47.2%) relative risk reduction of nonfatal strokes, and a nonsignificant reduction of all strokes (relative risk reduction=23.6%, 95% CI: -0.7% to 42.1%) as compared with placebo. This was achieved with a lower mean BP (mean difference: 3.2/1.6 mm Hg) in the active treatment group. The results were consistent among different subgroups with the exception of those with isolated systolic hypertension and a previous stroke, for whom the benefit appeared greater.
Taken together, these studies suggest that there may be marginal cerebrovascular benefits for regimens that include an ARB and CCB, but the available data are not definitive. Hypertension should be treated in the very elderly to reduce their risk of nonfatal stroke.

Antithrombotic Therapy for Atrial Fibrillation

Patients with atrial fibrillation (AF) and coronary heart disease (CHD) are commonly prescribed both an anticoagulant (to reduce the risk of cardiogenic ischemic stroke) and antiplatelet therapy (to reduce the risk of atherothrombotic ischemic coronary events or stroke). The National Study for Prevention of Embolism in Atrial Fibrillation (NASPEAF) trial randomly assigned 714 intermediate risk AF patients to receive antiplatelet therapy (triflusal 600 mg/day; n=242), anticoagulation (acenocumarol, international normalized ratio [INR] range 2 to 3; n=237) or combination therapy (triflusal 600 mg/d+acenocumarol, INR 1.25 to 2.00; n=235). After 2.7 years (median) follow-up, the primary outcome of stroke, systemic embolism or vascular death was lower among patients assigned combination therapy (0.92%) as compared with triflusal (3.8%) or anticoagulation (2.7%) alone (HR=0.33, 95% CI: 0.12 to 0.91; *P*=0.02). There was no excess of severe bleeding with combination therapy (0.92% versus 1.80% with anticoagulation and 0.35% with antiplatelet therapy alone). The primary outcome plus severe bleeding was lower with combination therapy (1.48% versus 3.78% with anticoagulation and 3.82% with antiplatelet therapy; *P*<0.05). The study suggests that intermediate risk patients with AF who are also at risk for atherothrombotic events benefit from combined therapy.

Based on the promising results of the open-label Stroke Prevention using an ORal Thrombin Inhibitor in atrial Fibrillation (SPORTIF) III trial, the double-blind SPORTIF V trial randomly assigned 3922 patients with nonvalvular AF to ximelagatran (36 mg twice daily) or dose-adjusted warfarin (INR 2.0 to 3.0). As compared with warfarin, ximelagatran treatment was associated with a similar annual rate of stroke and systemic embolic events (1.2% warfarin versus 1.6% ximelagatran, absolute rate ratio [RR]=0.45%, 95% CI: -0.13% to 1.03%), fewer major and minor bleeding events (47% versus 37% per year, 95% CI: -14% to -6%), but a greater proportion of patients with abnormalities of liver function tests (defined as serum alanine aminotransferase levels increased to >3 times the upper limit of normal; 0.8% versus 6.0%; *P*<0.001). Abnormal liver function tests typically occurred within 6 months and declined, whether or not ximelagatran was continued, but 1 patient had fatal liver disease and another suggestive case occurred. Despite the similar efficacy of ximelagatran as compared with warfarin for patients with atrial fibrillation, concerns remain about potential long-term risks of hepatic toxicity and difficulty identifying which patients may be at risk.

Lipid-Lowering Therapy

Supporting an earlier meta-analysis (primarily in those with CHD or major CHD risk) that demonstrated a reduction in stroke with statin treatment (odds ratio [OR]=0.79, 95% CI: 0.73 to 0.85 with reductions of low-density lipoprotein cholesterol (LDL-C) explaining 33% to 80% of the benefit), a new meta-analysis revealed a 12% proportional reduction in all-cause mortality per mmol/L reduction in LDL-C (RR=0.88, 95% CI: 0.84 to 0.91; *P*<0.0001). There was a 21% reduction in the rate of major vascular events (RR=0.79, 95% CI: 0.77 to 0.81; *P*<0.0001) including a 17% reduction in fatal and nonfatal stroke (RR=0.83, 95% CI: 0.78 to 0.88; *P*<0.0001). The Treating to New Targets (TNT) trial prospectively randomized 10 001 patients with stable CHD and an LDL-C <130 mg/dL (3.4 mmol/L) to double-blind treatment with either 10 mg or 80 mg of atorvastatin daily to assess the efficacy and safety of lowering LDL-C to <100 mg/dL (2.6 mmol/L). Subjects were followed for a median of 4.9 years for a primary end point of the occurrence of a first major cardiovascular event (CHD death, nonfatal nonprocedure–related MI, resuscitated cardiac arrest, or fatal or nonfatal stroke). High-dose atorvastatin lowered LDL-C to a mean of 77 mg/dL (2.0 mmol.L) versus 101 mg/dL (2.6 mmol/L) with low-dose atorvastatin. High-dose treatment was associated with a reduction in the primary event rate from 10.9% to 8.7% (HR=0.78, 95% CI: 0.69 to 0.89; *P*<0.001). This included reductions in cerebrovascular events (HR=0.77, 95% CI: 0.64 to 0.93; *P*=0.007), major coronary events (HR=0.80, 95% CI: 0.69 to 0.92; *P*=0.002), any coronary event (HR=0.79, 95% CI: 0.73 to 0.86; *P*<0.001), and any cardiovascular event (HR=0.81, 95% CI: 0.75 to 0.87; *P*<0.001), but no reduction in mortality (HR=1.01, 95% CI: 0.85 to 1.19; *P*=0.92). Persistent elevations in liver aminotransferase levels were more frequent in the high-dose group (1.2% versus 0.2%; *P*<0.001). Consistent with the meta-analyses, the TNT study shows greater reductions in stroke and cardiovascular events in patients with stable CHD treated to a target LDL-C below 100 mg/dL (2.6 mmol/L), but with a greater risk of hepatic toxicity.

Aspirin for Primary Stroke Prevention in Women

The Women's Health Study (WHS) randomized 39 876 initially asymptomatic women >=45 years of age to receive 100 mg of aspirin on alternate days or placebo. The women were followed for 10 years for the occurrence of a first major vascular event (nonfatal MI, nonfatal stroke or

cardiovascular death). The study was negative for the primary end point (RR=0.91, 95% CI: 0.80 to 1.03; *P*=0.13). However, treatment was associated with an overall reduction in stroke (RR=0.83, 95% CI: 0.69 to 0.99; *P*=0.04) including a 24% reduction in ischemic stroke (RR=0.76, 95% CI: 0.63 to 0.93; *P*=0.009), and a nonsignificant increase in hemorrhagic stroke (RR=1.24, 95% CI: 0.82 to 1.87; *P*=0.31). The stroke rates were 0.11% per year in aspirin-treated and 0.13% per year in placebo-treated women (absolute RR=0.02% per year, number needed to treat=5000). Even this low dose of aspirin was associated with an increased risk of gastrointestinal hemorrhage requiring transfusion (RR=1.40, 95% CI: 1.07 to 1.83; *P*=0.02). The risk of major cardiovascular events was reduced among women >=65 years of age at study entry (RR=0.74, 95% CI: 0.59 to 0.92; *P*=0.008), but without a reduction in the overall risk of stroke (RR=0.71, 95% CI: 0.57 to 1.08; *P*=0.13). Other subgroup analyses showed a reduction in stroke for those women with a history of hypertension (RR=0.76, 95% CI: 0.59 to 0.98; *P*=0.04), hyperlipidemia (RR=0.62, 95% CI: 0.47 to 0.83; *P*=0.001), diabetes (RR=0.46, 95% CI: 0.25 to 0.85; *P*=0.01), or having a 10-year cardiovascular risk >=10% (RR=0.54, 95% CI: 0.30 to 0.98; *P*=0.04). The study supports the use of aspirin in women over age 65 and those who are at increased risk of atherothrombotic events.

Hormone Replacement Therapy

Observational studies suggested a protective effect of estrogens on cardiovascular risk among women receiving postmenopausal hormone replacement therapy. A meta-analysis identified 28 relevant randomized trials with 39 769 subjects addressing this question. Hormone replacement therapy–use was associated with increases in total stroke (OR=1.29, 95% CI: 1.13 to 1.47), nonfatal stroke (OR=1.23, 95% CI: 1.06 to 1.44), fatal or disabling stroke (OR=1.56, 95% CI: 1.11 to 2.20), ischemic stroke (OR=1.29, 95% CI: 1.06 to 1.56), with a trend toward more fatal strokes (OR=1.28, 95% CI: 0.87 to 1.88) and no increase in hemorrhagic stroke (OR=1.07, 95% CI: 0.65 to 1.75). Hormone replacement therapy cannot be recommended for the primary stroke prevention and likely increases risk.

STR 03-168 **Primary Prevention and Health Services Delivery [Advances in Stroke 2006]**

Goldstein LB, Rothwell PM.

Stroke 2007, 38, 222-224.

ABSTRACT:

BACKGROUND AND PURPOSE:
Stroke remains the third leading cause of death in the US and other Western countries, and at least 1 population-based study found that the incidence of stroke was greater than that of acute coronary syndromes. Although there have been substantial falls in stroke incidence in some countries over the last 2 decades, a large US study found that the advances in stroke prevention during the 1990s were not associated with decreases in the rate of stroke hospitalizations or in case-fatality rates between 1993 and 1999. Moreover, based solely on demographic changes in the population of selected countries within the European Union, the World Health Organization predicts a 27% increase in stroke events between the years 2000 and 2025. The proportion of deaths attributed to stroke is even higher in Asian countries. Although much of stroke risk may be related to socioeconomic factors, more effective prevention strategies are critical. Several studies have contributed to the body of knowledge related to primary stroke prevention over the last year.

RESULTS:
Numerous studies support an association between elevated homocysteine levels and atherosclerotic disease. The B vitamins (folic acid, B_{12}, and B_6) reduce homocysteine serum levels raising the hope that treatment would be associated with reduced risk. That hope was diminished with publication of results of the Vitamin Intervention for Stroke Prevention (VISP) trial in 2004. Although a secondary rather than a primary stroke prevention trial, VISP had compared high- and low-dose B-vitamin supplementation and found no treatment effect on the risk of recurrent stroke (risk ratio [RR] 1.0; 95% CI, 0.8 to 1.3), or in the combined risk of any stroke, coronary heart event, or death (RR, 1.0; 95% CI, 0.8 to 1.1). The difference in homocysteine levels between treatment groups, however, was small (2 µmol/L). The results of 2 additional randomized trials of homocysteine-lowering are now available. The Norwegian Vitamin (NORVIT) trial evaluated the efficacy of B-vitamin supplementation on the prevention of recurrent myocardial infarction, stroke and sudden death (primary end point) in patients who had an acute myocardial infarction. Despite a 27% reduction in homocysteine levels among patients given folic acid plus vitamin B_{12}, there was no reduction in these combined risks (RR, 1.08; 95% CI, 0.93 to 1.25) and no reduction in stroke (10.2/1000 observation-years with treatment versus 9.7 with placebo; RR, 1.02; 95% CI, 0.68 to 1.51). Based on the primary end point, there was a suggestion of a harmful effect in those given the combination of folic acid, vitamin B_{12}, and vitamin B_6 (RR, 1.22; 95% CI, 1.00 to 1.50), and no effect on stroke (RR, 0.83; 95% CI, 0.47 to 1.47). The study, however, was not powered to detect an effect on stroke outcomes (only 98 of 3749 subjects had strokes). The Heart Outcomes Prevention Evaluation (HOPE) 2 trial randomly assigned 5522 patients with vascular disorders or diabetes to a combination of folic acid, vitamin B_{12}, and vitamin B_6 or placebo. There was no effect of treatment on the combined risk of myocardial infarction, stroke or cardiovascular death (RR, 0.95; 95% CI, 0.84 to 1.07). Significantly fewer patients assigned to active treatment had a stroke (4.0% versus 5.5%; RR, 0.75; 95% CI, 0.59 to 0.97), despite there being a small number of stroke events (n=258). As pointed out by the study's authors, this finding is not adjusted for multiple comparisons and may have occurred as a result of chance. Another large secondary prevention trial is ongoing, and additional studies will be required to determine whether treatment of elevated homocysteine is independently associated with a reduction of stroke in high-risk primary prevention populations. Case-control studies have generally found an association between the presence of a patent foramen ovale (PFO) and cryptogenic stroke. Two new reports, however, suggest that PFO may not be a risk factor for stroke in the general population. In 1 study, transesophageal echocardiography (TEE) was used to identify PFO among 595 randomly sampled community subjects over age 45. Over 5.1 years, 41 subjects had a stroke or transient ischemic attack (TIA). After adjustment for age and comorbidity, PFO was not an independent risk factor for these events (hazard ratio, 1.46; 95% CI, 0.74 to 2.88). Only 1.9% had an atrial septal aneurysm, and larger studies will be required to determine whether its presence is independently associated with stroke risk. The second study used a case-control design. Using the presence of a large PFO in

randomly selected controls as a reference, after adjustment for comorbidity, the odds of having a large PFO among those with a cryptogenic stroke was 1.10 (95% CI, 0.63 to 1.90). It was suggested that the importance of PFO in cryptogenic stroke reported in previous studies might have been overestimated because of a combination of referral bias and underascertainment in controls. The rates of recurrent cryptogenic stroke are similar in those with and without a PFO, and a preliminary analysis of a prospective study available in abstract form indicates that recurrent stroke is not associated with massive right-to-left shunt. Randomized trials are in progress to determine whether endovascular PFO closure reduces the risk of recurrent stroke as compared with medical therapy.

CONCLUSIONS:
Optimal application of known preventive measures remains elusive in both primary and secondary prevention settings, and acute stroke treatments continue to be underused. For acute stroke, multilevel paramedic, hospital and community education can improve paramedic diagnostic accuracy and reduce the time to hospital arrival after symptom onset. Stroke-center designation and selective triage in an urban community improved quality of care, patient access to acute stroke units, and timely evaluations for thrombolytic therapy. Although requiring further study, demonstration projects show that telestroke is feasible and offers the possibility of extending stroke-related expertise to remote and rural hospitals. The availability of multispecialty stroke services within hospitals is associated with reduced mortality rates in both academic and community settings but also is underused. An observational study found that adherence to best practices in hospitalized patients improved with the use of standardized orders. Quality improvement systems such as the American Heart Association's Get with the Guidelines program should also lead to improved compliance with secondary prevention recommendations and awaits further evaluation.
Optimal service provision for patients with a TIA has yet to be determined, with some healthcare systems providing emergency inpatient care for nearly all patients and others providing rapid-access outpatient clinics. There is, however, good evidence that whichever system is used, investigation and treatment must be initiated quickly. Weekly TIA clinics, for example, which are the norm in many countries, are inadequate. Among 210 consecutive patients referred with suspected TIA to a weekly TIA clinic in the UK, the median (interquartile range) time from referral to appointment was 9 (4 to 16) days, during which time 11 (5.2%) patients had a stroke, 9 of which were disabling. Similarly, there is evidence of unacceptable delays to carotid imaging and endarterectomy after TIA and stroke in many countries. In 1 study of consecutive patients undergoing carotid imaging for ischemic retinal or cerebral TIA or stroke in the UK, 49 of the 85 patients found to have 50% to 99% symptomatic stenosis had endarterectomy, but in only 3 (6%) patients was surgery performed within 2 weeks of their presenting event, and only 21 (43%) had surgery within 12 weeks.
Public education about the symptoms of TIA and stroke and the need to seek emergency treatment is also required. A recent nationwide telephone survey of adults in the US revealed widespread ignorance of the symptoms of TIA and a lack of understanding of the seriousness of the condition. Using randomly generated telephone numbers, 11 400 households were contacted and 10 112 interviews about TIA were conducted. Only 8.6% of people could correctly identify a symptom of a TIA. Increasing age was associated with better knowledge of the definition and symptoms as was female sex, white ethnicity, higher income and higher educational level. Of the 2.3% of people who reported having a physician diagnosed TIA, 36% did not recall seeing a physician in the first 24 hours. An additional 3.2% recalled symptoms typical of TIA that were not brought to medical attention. The situation is similar in the UK. Of 377 consecutive patients attending specialist TIA and stroke clinics, 40% with minor stroke and 50% with TIA delayed seeking medical attention for over 24 hours. Only 41% of patients with minor stroke and 37% of patients with TIA correctly identified the cause of their symptoms, and only 45% of patients thought that the event was a medical emergency.
Part of the problem with public education about TIA and minor stroke has been the difficulty in conveying a succinct message about how to recognize an event because of the wide variety and the sometimes nonspecific nature of the symptoms. Data now available on the relationship between the nature of the clinical event and the early risk of stroke should allow public education to be more effectively focused. For example, although in 1 study focal motor weakness or speech disturbance lasting >=60 minutes occurred in only 30% of referrals for suspected TIA, 90% of the strokes that occurred within 7 days of the TIA occurred in this group. Advances in preventive therapies combined with more effective provision of preventive services should lead to reductions in the risk of a first stroke.

NRI 05-246 **Stroke Caregiver Information Needs: Comparison of Mainland and Puerto Rican Caregivers**

Hinojosa MS, Rittman, MR.

Journal of Rehabilitation Research and Development, 2007, 44(5), 649-58.

ABSTRACT:

BACKGROUND AND PURPOSE:
Research indicates that informal caregivers of stroke survivors often do not have the information necessary to adequately manage the recovery process at home. This article presents findings on the information sources and needs of stroke caregivers both in Puerto Rico and the Mainland United States.

METHODS:
Data were collected from 120 caregivers (42 Puerto Rican, 78 Mainland) of veterans who had experienced a stroke.

RESULTS:
Of all caregivers, 22% to 50% reported the need for information related to stroke recovery. This need was greater for Puerto Rican caregivers compared with Mainland caregivers. Caregivers receive most of their information from their doctors, the Veterans Health Administration (VHA), and the Internet.

CONCLUSION:
This study highlights the need for information dissemination to Puerto Rican and Mainland caregivers within the VHA system. This dissemination is an important and ongoing goal of the Stroke Quality Enhancement Research Initiative and the VHA/ Department of Defense Clinical Practice Guidelines.

03-151 **Multiple System Utilization and Mortality for Veterans with Stroke**

Jia H, Zheng YE, Reker DM, Cowper DC.

Stroke, 2007 Feb, 38(2), 355-60.

ABSTRACT:

BACKGROUND AND PURPOSE:
Many Veteran Health Administration (VHA) enrollees receive health services outside the VHA system. However, limited information is available about poststroke utilization and mortality by veterans who used multiple sources of health care. This study assessed the likelihood of 12-month poststroke rehospitalization and mortality of veterans who used VHA only versus those who used multiple sources of care.

METHODS:
Our retrospective observational study examined veterans living in Florida and diagnosed with acute stroke. We categorized users into 4 groups: VHA-only, VHA-Medicare, VHA-Medicaid, and VHA-Medicare-Medicaid based on their use of each health care program. Logistic regression models were fitted for 12-month poststroke general rehospitalization, recurrent stroke readmission, and mortality, adjusting for sociodemographic and clinical factors.

RESULTS:
The sample consisted of 29% VHA-only users, 61% VHA-Medicare users, 3% VHA-Medicaid users, and 7% VHA-Medicare-Medicaid triple users. Compared with the VHA-only users, multiple system users were significantly more likely to be rehospitalized for any cause and for recurrent stroke 12-months postindex. Mortality outcomes depended on when the outcome was measured; at the index admission date, we found no significant difference in mortality across the user groups; at the index discharge date, the VHA-only users was less likely to die within the first 12 months than the users of the 2 dual groups (VHA-Medicare and VHA-Medicaid).

CONCLUSIONS:
Multiple health care source use was common among VHA enrollees with acute stroke in Florida. Multiple system users were more likely to be rehospitalized and the mortality outcomes were dependent on when the outcome was measured.

QLP 71-003 **Care Coordination/Home-Telehealth for Veterans with Stroke and Their Caregivers: Addressing an Unmet Need**

Lutz BJ, Chumbler NR, Roland K.

Topics in Stroke Rehabilitation, 2007 Mar-Apr, 14(2), 32-42

ABSTRACT:

BACKGROUND:
Stroke is a life-disrupting, costly event for many stroke patients and their families. An estimated 4.8 million stroke survivors are living in the community with some level of disability, and the incidence of stroke is expected to rise with correspondingly higher costs, both in dollars and other forms of burden for families of patients with stroke. Approximately 80,000 veterans have experienced a stroke, leaving approximately 40% with moderate residual impairments and 15%-30% with severe residual disability.

OBJECTIVE:
The purpose of this study was to identify postdischarge needs of veterans with stroke and their caregivers and to identify how to design a care coordination/home-telehealth (CC/HT) program to address these needs.

METHOD:
Veterans and their caregivers (N = 22) were interviewed about their experiences with stroke, their postdischarge stroke recovery needs, and their experiences with the Veterans Administration's existing Care Coordination/Home-Telehealth (CC/HT) program. Data were analyzed using the process of grounded dimensional analysis.

RESULTS:
Core concepts identified were (a) assessing and managing the residual effects of stroke, and (b) shifting roles and responsibilities.

CONCLUSION:
The findings suggest that a comprehensive care coordination program that includes home telehealth could aid veterans and their caregivers in managing stroke recovery across the continuum of care at home and within the community. The results of the study can provide elements to be included in the CC/HT program.

STR 03-168 **Validation of the Stroke Specific Quality of Life Scale (SS-QOL): test of reliability and validity of the Danish version (SS-QOL-DK)**

Muus I, Williams LS, Ringsberg KC.

Clin Rehabil, 2007 Jul, 21(7), 620-7.

ABSTRACT:

OBJECTIVE:
To test the reliability and validity of the Danish version of the Stroke Specific Quality of Life Scale version 2.0 (SS-QOL-DK), an instrument for evaluation of health-related quality of life. DESIGN: A correlational study.

SETTING:
A stroke unit that provides acute care and rehabilitation for stroke patients in Frederiksborg County, Denmark.

SUBJECTS:
One hundred and fifty-two stroke survivors participated; 24 of these performed test-retest.

INTERVENTION:
Questionnaires were sent out and returned by mail. A subsequent telephone interview assessed functional level and missing items.

MAIN OUTCOME MEASURES :
Test-retest was measured using Spearman's r, internal consistency was estimated using Cronbach's alpha, and evaluation of floor and ceiling values in proportion of minimum and maximum scores. Construct validity was assessed by comparing patients' scores on the SS-QOL-DK with those obtained by other test methods: Beck's Depression Index, the General Health Survey Short Form 36 (SF-36), the Barthel Index and the National Institutes of Health Stroke Scale, evaluating shared variance using coefficient of determination, r2. Comparing groups with known scores assessed known-group validity. Convergent and discriminant validity were assessed.

RESULTS:
Test-retest of SS-QOL-DK showed excellent stability, Spearman's r = 0.65-0.99. Internal consistency for all domains showed Cronbach's alpha = 0.81-0.94. Missing items rate was 1.0%. Most SS-QOL-DK domains showed moderately shared variance with similar domains of other test methods, r2 = 0.03-0.62. Groups with known differences showed statistically significant difference in scores. Item-to-scale correlation coefficients of 0.37-0.88 supported convergent validity.

CONCLUSIONS:
SS-QOL-DK is a reliable and valid instrument for measuring self-reported health related quality of life on group level among people with mild to moderate stroke.

STR 03-168 **Improving the Process of Developing Technical Reports for Health Care Decision Makers: Using the Theory of Constraints in the Evidence-Based Practice Centers**

Patwardhan MB, Sarria-Santamera A, Matchar DB.
International Journal of Technology Assessment in Health Care, 2006, 22(1), 26-32.

ABSTRACT:

OBJECTIVES:
To apply the Theory of Constraints (TOC) to the Evidence-based Practice Center (EPC) process.

METHODS:
Participants in the EPC process were interviewed, and the technical contracting literature was reviewed. Undesirable effects (UDEs) that might occur in the EPC process were identified and, in a TOC Current Reality Tree (CRT), a fundamental UDE was selected and tracked back to potential root causes, focusing on the core "constraint". The resulting draft CRT was presented at an EPC directors' meeting and finalized. From possible solutions obtained from interviews and literature, a Future Reality Tree (FRT) was constructed.

RESULTS:
Three UDEs were identified and that a report is not used was deemed fundamentally undesirable. Nine root causes were identified, and using the CRT, a core constraint emerged: EPC partner does not know how to conceptualize and articulate needs, objectives, and specifications. Two change strategies ("injections") appeared to address the core constraint: establish an ongoing relationship between partners, EPC, and Agency for Healthcare Research and Quality early in the process, and use a changes clause; in a FRT the injections lead to the positive outcome-the production of a successful EPC report that meets partner needs and, therefore, will be used.

CONCLUSIONS:
As with any complex enterprise, the EPC needs to engage in self-reflection and active improvement to maximize its value. The development of technical reports intended to inform decision making represents a complicated area, involving a network of interrelated processes. Using the TOC permitted us to understand process failures; results serve as a guide to improvement

D3487R **Identifying Veterans with Acute Strokes with High-Specificity ICD-9 Algorithm with VA Automated Records and Medicare Claims Data: A More Complete Picture**

Ried LD, Cameon R, Jia H, Findley K, Hinojosa MS, Wang X, Tueth MJ.

Journal of Rehabilitation Research & Development, 2007 (in press)

ABSTRACT:

OBJECTIVES:
Medicare claims data are available to Department of Veterans Affairs (VA) researchers to identify veterans with acute stroke. Our study sought to (1) ascertain whether additional acute stroke cases are identified with Medicare data and (2) assess the use of VA and Medicare inpatient automated data for assigning the stroke date.

METHODS:
The study population was veterans living in Veterans Integrated Service Network 8 with an acute stroke diagnosis during fiscal year 2001. High-sensitivity and high-specificity algorithms were applied to VA data sets and matched with Medicare files. We confirmed acute stroke cases and index dates using the VA Computerized Patient Record System (CPRS).

RESULTS:
VA data identified 582 veterans with acute stroke, but Medicare claims data identified 201 more such veterans. CPRS confirmed 94% of the VA and 77% of the Medicare cases. The median difference between CPRS and automated index dates was 11 days for VA and 4 days for Medicare data. Use of both VA and Medicare data provides a more complete sample of veterans with acute stroke.

D3487R

Identifying Veterans with Acute Strokes with High-Specificity ICD-9 Algorithm with VA Automated Records and Medicare Claims Data: A More Complete Picture

Ried LD, Cameon R, Jia H, Findley K, Sberna M, Wang X, Tueth M.

Journal of the Rehabilitation Research and Development, 2007, 44(5), 665-674.

ABSTRACT:

BACKGROUND AND PURPOSE:
Medicare claims data are available to the Department of Veterans Affairs (VA) researchers to identify veterans with acute stroke.

METHODS:
Our study sought to (1) ascertain whether additional acute stroke cases are identified with Medicare data and (2) assess the use of VA and Medicare inpatient automated data for assigning the stroke data. The study population was veterans living in Veterans Integrated Service Network 8 with an acute stroke diagnosis during fiscal year 2001. High-sensitivity and high-specificity algorithms were applied to VA data sets and matched with Medicare files. We confirmed acute stroke cases and index dates using the VA Computerized Patient Record System (CPRS).

RESULTS:
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CONCLUSIONS:
Use of both VA and Medicare data provides a more complete sample of veterans with acute stroke.

NRI 98-183 **Transition Experiences of Stroke Survivors Following Discharge Home**

Rittman M, Boylstein C, Hinojosa R, Hinojosa MS, Haun J.
Topics in Stroke Rehabilitation, 2007 Mar-Apr, 14(2), 21-31.

ABSTRACT:

BACKGROUND:
Little is known about the transition experiences of stroke survivors after discharge home.

PURPOSE:
The purpose of this article is to describe three domains of psychosocial experiences of stroke survivors during the first month following discharge for acute stroke.

METHOD:
Data were collected from 125 stroke survivors interviewed at 1 month following discharge home.

RESULTS:
Findings indicate that changes in sense of self, connectedness with others, and community integration presented the major challenges.

CDA 04-342-2 **Improving Blood Pressure Control through Provider Education, Provider Alerts, and Patient Education: a Cluster Randomized Trial**

Roumie CL, Elasy TA, Greevy R, Griffin MR, Liu X, Stone WJ, Wallston KA, Dittus RS, Alvarez V, Cobb J, Speroff T.
Annals of Internal Medicine, 2006, 145 (3), 165-175.

ABSTRACT:

BACKGROUND:
Inadequate blood pressure control is a persistent gap in quality care.

OBJECTIVE:
To evaluate provider and patient interventions to improve blood pressure control.

METHODS: This was a cluster randomized, controlled trial that will be conducted at 2 hospital-based and 8 community-based clinics in the Veterans Affairs Tennessee Valley Healthcare System. 1341 veterans with essential hypertension cared for by 182 providers were included in the study. Eligible patients had 2 or more blood pressure measurements greater than 140/90 mm Hg in a 6-month period and were taking a single antihypertensive agent. Providers who cared for eligible patients were randomly assigned to receive an e-mail with a Web-based link to the Seventh Report of the Joint National Committee on the Prevention, Detection, Evaluation and Treatment of High Blood Pressure (JNC 7) guidelines (provider education); provider education and a patient-specific hypertension computerized alert (provider education and alert); or provider education, hypertension alert, and patient education, in which patients were sent a letter advocating drug adherence, lifestyle modification, and conversations with providers (patient education). The proportion of patients with a systolic blood pressure less than 140 mm Hg at 6 months was measured as well as the intensification of antihypertensive medication.

RESULTS:
Mean baseline blood pressure was 157/83 mm Hg with no differences between groups (P = 0.105). Six-month follow-up data were available for 975 patients (73%). Patients of providers who were randomly assigned to the patient education group had better blood pressure control (138/75 mm Hg) than those in the provider education and alert or provider education alone groups (146/76 mm Hg and 145/78 mm Hg, respectively). More patients in the patient education group had a systolic blood pressure of 140 mm Hg or less compared with those in the provider education or provider education and alert groups (adjusted relative risk for the patient education group compared with the provider education alone group, 1.31 [95% CI, 1.06 to 1.62]; P = 0.012). LIMITATIONS: Follow-up blood pressure measurements were missing for 27% of study patients. The study could not detect a mechanism by which patient education improved blood pressure control.

CONCLUSIONS: A multifactorial intervention including patient education improved blood pressure control compared with provider education alone.

CDA 04-342-2 **Clinical Inertia: A Common Barrier to Changing Provider Prescribing Behavior**

Roumie CL, Elasy TA, Wallston KA, Pratt S, Greevy RA, Liu X, Alvarez V, Dittus RS, Speroff T.

Joint Commission Journal on Quality and Patient Safety, 2007 May, 33(5), 277-85

ABSTRACT:

BACKGROUND:
A cross-sectional content analysis nested within a randomized, controlled trial was conducted to collect information on provider responses to computer alerts regarding guideline recommendations for patients with suboptimal hypertension care.

METHODS:
Participants were providers who cared for 1,017 patients with uncontrolled hypertension on a single antihypertensive agent within Veterans Affairs primary care clinics. All reasons for action or inaction were sorted into a framework to explain the variation in guideline adaptation.

RESULTS:
The 184 negative provider responses to computer alerts contained explanations for not changing patient treatment; 76 responses to the alerts were positive, that is, the provider was going to make a change in antihypertensive regimen. The negative responses were categorized as: inertia of practice (66%), lack of agreement with specific guidelines (5%), patient-based factors (17%), environmental factors (10%), and lack of knowledge (2%). Most of the 135 providers classified as inertia of practice indicated, "Continue current medications and I will discuss at the next visit." The median number of days until the next visit was 45 days (interquartile range, 29 to 78 days).

DISCUSSION:
Clinical inertia was the primary reason for failing to engage in otherwise indicated treatment change in a subgroup of patients. A framework was provided as a taxonomy for classification of provider barriers.

CDA 04-342-2 **Validation of ICD-9 Codes with a High Positive Predictive Value for Incident Strokes Resulting in Hospitalization Using Medicaid Health Data**

Roumie CL, Mitchel E, Gideon PS, Varas-Lorenzo C, Castellsague J, Griffin MR.

Pharmacoepidemiology and Drug Safety, 2007 Nov.

ABSTRACT:

OBJECTIVE:
To validate ICD 9 codes with a high positive predictive value (PPV) for incident strokes. The study population consisted of Tennessee Medicaid enrollees aged from 50 to 84 years.

METHODS:
We identified all patients who were hospitalized with a discharge diagnosis of stroke between 1999 and 2003 using highly specific codes (ischemic stroke ICD 9-CM codes 433.x1, 434 [excluding 434.x0], or 436; intracerebral hemorrhage [431]; and subarachnoid hemorrhage [430]). We reviewed medical records of a systematic sample of 250 cohort members. We randomly selected 10-30 eligible records for review from hospitals with at least 10 stroke hospitalizations.

RESULTS:
We reviewed 231 charts (93% of total sampled), and 205 (89%) met study criteria for new outpatient stroke. Of the 205 confirmed new outpatient strokes, 196 had stroke listed as the primary discharge diagnosis (PPV = 96%). However, 46 (23%) of the 196 patients identified by the primary diagnosis also had a remote stroke history (recurrent stroke not incident). Thus the PPV of the primary discharge diagnosis for identifying incident stroke decreased to 74%. When we applied an algorithm that restricted our population to those with stroke as the primary diagnosis and excluded patients with any prior outpatient diagnosis of stroke, we identified incident stroke events with more precision (PPV = 80%).

CONCLUSION:
The PPV of incident strokes was 80% using our strategy of primary discharge diagnosis and excluding prior outpatient diagnoses of stroke. Although an unknown percentage of incident strokes are missed, this group of proven incident stroke patients can be used for etiologic studies of medication exposures.

STR 03-168

Guidelines for Prevention of Stroke in Patients with Ischemic Stroke or Transient Ischemic Attack: A Statement for Healthcare Professionals from the American Heart Association/American Stroke Association Council on Stroke: Co-Sponsored by the Council on Cardiovascular Radiology and Intervention: the American Academy of Neurology Affirms the Value of this Guideline

Sacco RL, Adams R, Albers G, Alberts MJ, Benavente O, Furie K, Goldstein LB, Gorelick P, Halperin J, Harbaugh R, Johnston SC, Katzan I, Kelly-Hayes M, Kenton EJ, Marks M, Schwamm LH, Tomsick T; American Heart Association; American Stroke Association Council on Stroke; Council on Cardiovascular Radiology and Intervention; American Academy of Neurology.
Stroke, 2006, 37, 577-617.

ABSTRACT:

OBJECTIVE:
The aim of this new statement is to provide comprehensive and timely evidence-based recommendations on the prevention of ischemic stroke among survivors of ischemic stroke or transient ischemic attack.

RESULTS:
Evidence-based recommendations are included for the control of risk factors, interventional approaches for atherosclerotic disease, antithrombotic treatments for cardioembolism, and the use of antiplatelet agents for noncardioembolic stroke. Further recommendations are provided for the prevention of recurrent stroke in a variety of other specific circumstances, including arterial dissections; patent foramen ovale; hyperhomocysteinemia; hypercoagulable states; sickle cell disease; cerebral venous sinus thrombosis; stroke among women, particularly with regard to pregnancy and the use of postmenopausal hormones; the use of anticoagulation after cerebral hemorrhage; and special approaches for the implementation of guidelines and their use in high-risk populations.

STR 03-168 **The New Standing Guideline Committee Policy of the American Stroke Association Stroke Council**

Saver JL, Goldstein LB.

Stroke, 2006, 37(3), 753.

ABSTRACT:

BACKGROUND AND PURPOSE:
Evidence-based practice guidelines encapsulate the most current knowledge about best practices, improve the delivery of care, and support the introduction of new knowledge into clinical practice. The development of stroke-related practice guidelines is a core mission of the Stroke Council of the American Heart Association/American Stroke Association.

Over the last 3 years, the Stroke Council performed a systematic review of procedures for practice guideline development, a review initiated by Stroke Council Chair Robert Adams, MD and strongly supported by his successors, Marc Mayberg, MD and Larry B. Goldstein, MD. This review confirmed that Council guidelines possess the great preponderance of qualities deemed essential or desirable in guidelines, as identified by the Institute of Medicine, the Conference on Guideline Standardization, and other authorities. The review identified as a deficiency the timeliness of Stroke Council guidelines. The accelerated pace of research and therapeutic advance in stroke had begun to outpace the Council's ad hoc system for guideline development and update, which relied on convening of new writing panels when there was a general perception among the Council Leadership Committee that a particular guideline was needed or no longer current.

RESULTS:
In response to this finding, the Stroke Council developed and implemented a new system to ensure that key Stroke Council practice guidelines are always up-to-date. The Council created the multispecialty Stroke Scientific Statements Oversight Committee (SOC), with Jeffrey Saver, MD as initial Chair, to oversee the commissioning of individual guideline-writing committees, approve the membership of committees, refine the general Stroke guideline methodology, and provide additional support as may be needed. This Committee commissioned Standing Scientific/Writing Committees in six key areas of stroke care: (1) Primary Prevention of Stroke, (2) Secondary Prevention after Stroke, (3) Acute Ischemic Stroke, (4) Intracerebral Hemorrhage, (5) Subarachnoid Hemorrhage, and (6) Stroke Rehabilitation. Each of these Standing Committees is to produce a full, comprehensive guideline document every 3 years. In addition, the Standing Committees will issue interim, targeted updates when warranted by the publication of new trials or studies that have particularly substantial import for best clinical practices. In each triennial cycle, a portion of the membership of each Standing Committee will be rotated, to ensure fresh perspectives and energies. Similarly, in each cycle, each Standing Committee will have a new Chair, chosen from past members, with the immediate past Chair serving as a Committee member to optimize continuity.

This new system debuted in the last issue of *Stroke*, with the publication of the updated Guidelines on Secondary Prevention after Stroke. Similarly, updated versions of all of the 6 core guidelines will be appearing over the course of the next 18 months.

In addition to the 6 flagship, continually updated guidelines, the Stroke Council, via SOC, will continue to commission one-time Writing Committees to develop Guidelines and Scientific Statements on evolving areas of stroke science and practice that fall outside of the core domains. In the future, SOC will evaluate whether to expand the number of Standing Scientific/Writing Committees and continuously maintained guideline documents to additional topic areas.

We hope the launch of the new Stroke Council Guideline process will further promote evidence-based care of stroke patients, both nationally and internationally. The Stroke Council Leadership Committee welcomes suggestions and comments from users of our guidelines regarding how best to continue to optimize guideline development processes.

Acknowledgments

We are grateful to the past and current members, and scientific and administrative personnel, of the Stroke Scientific Statements Oversight Committee: Robert Adams, J. J. Connors III, Colin Derdeyn, Robert Harbaugh, Marc Mayberg, Tom Tomsick, Karen Modesitt, Donna Stephens, and Kathryn Taubert.

STR 03-168 **Improvements in Speed-based Gait Classifications are Meaningful**

Schmid A, Duncan PW, Studenski S, Lai SM, Richards L, Perera S, Wu SS.

Stroke, 2007 Jul, 38(7), 2096-100.

ABSTRACT:

BACKGROUND AND PURPOSE:
Gait velocity is a powerful indicator of function and prognosis after stroke. Gait velocity can be stratified into clinically meaningful functional ambulation classes, such as household ambulation (<0.4 m/s), limited community ambulation (0.4 to 0.8 m/s), and full community ambulation (>0.8 m/s). The purpose of the current study was to determine whether changes in velocity-based community ambulation classification were related to clinically meaningful changes in stroke-related function and quality of life.

METHODS:
In subacute stroke survivors with mild to moderate deficits who participated in a randomized clinical trial of stroke rehabilitation and had a baseline gait velocity of 0.8 m/s or less, we assessed the effect of success versus failure to achieve a transition to the next class on function and quality of life according to domains of the Stroke Impact Scale (SIS).

RESULTS:
Of 64 eligible participants, 19 were initially household ambulators, and 12 of them (68%) transitioned to limited community ambulation, whereas of 45 initially limited community ambulators, 17 (38%) became full community ambulators. Function and quality-of-life SIS scores after treatment were significantly higher among survivors who achieved a favorable transition compared with those who did not. Among household ambulators, those who transitioned to limited or full community ambulation had significantly better SIS scores in mobility (P=0.0299) and participation (P=0.0277). Among limited community ambulators, those who achieved the transition to full community ambulatory status had significantly better scores in SIS participation (P=0.0085).

CONCLUSIONS:
A gait velocity gain that results in a transition to a higher class of ambulation results in better function and quality of life, especially for household ambulators. Household ambulators possibly had more severe stroke deficits, reducing the risk of "ceiling" effects in SIS-measured activities of daily living and instrumental activities of daily living. Outcome assessment based on transitions within a mobility classification scheme that is rooted in gait velocity yields potentially meaningful indicators of clinical benefit. Outcomes should be selected that are clinically meaningful for all levels of severity.

P30 AG024967 **Fear of falling: An Emerging Issue After Stroke**

Schmid AA, Rittman M.

Top Stroke Rehabil. 2007 Sep-Oct, 14(5), 46-55.

ABSTRACT:

PURPOSE:
Qualitative data regarding stroke survivors' recovery experiences were used to describe factors important in the development of fear of falling (FoF) during the first 6 months after stroke.

METHOD:
Stroke survivors were interviewed 1 and 6 months after stroke to obtain data on their experiences related to stroke recovery trajectory. Analyses identified FoF as a naturally occurring part of stroke survivors' descriptions of their everyday lives. Interviews were reexamined to identify and describe personal experiences related to FoF in this population.

RESULTS:
Forty-two (32%) veterans who participated in the larger study discussed FoF during the first 6 months after stroke. Analyses indicate three important factors may be associated with the development of poststroke FoF: (a) the initial fall coinciding with stroke onset, (b) perception of poststroke body changes, and (c) a pervasive everyday fear of future falls.

CONCLUSION:
These factors related to FoF need to be further studied in the poststroke population. It is possible that individualized interventions may be necessary to assist stroke survivors to manage FoF, decrease fear, and reduce falls after discharge home poststroke.

5R03AG022075 **Hospital Admissions for Stroke Among the Very Old in the United States**

Tabereaux PB, Brass LM*, Concato J, Bravata DM.
*Deceased

Neuroepidemiology, 2007, (accepted, in press)

ABSTRACT:

BACKGROUND:
We sought to describe the proportion of acute ischemic stroke admissions for very old patients (≥85 years); compare characteristics of very old versus younger patients; and identify factors among very old patients associated with adverse outcomes.

METHODS:
The 2000 Healthcare Cost and Utilization Project data included acute ischemic stroke hospitalizations for patients ≥45 years. The combined outcome was in-hospital mortality or discharge to a long-term.

RESULTS:
Among 15,020 stroke hospitalizations, 20.4% were for very old patients. The outcome rate was higher in hospitalizations for very old patients (2176/3058, 71.2%; versus 5748/11,962, 48%, $p<0.0001$). More hospitalizations for very old patients were women (73.5% versus 55.1%; $p<0.0001$); fewer for Blacks (6.1% versus 12.3%; $p<0.0001$); and fewer at teaching hospitals (30.4% versus 36.2%; $p<0.0001$).

Among very old patients, factors that were independently associated with the outcome included: age (years) (adjusted OR [95%CI}: 1.02 [1.000-1.05]), female gender (1.4 [1.18-1.68]), atrial fibrillation (1.37 [1.15-1.63]), acute myocardial infarction (1.68 [1.20-2.35]), respiratory failure (3.59 [1.60-8.05]), and teaching hospital admission (0.82 [0.69-0.98). Similar results were observed in the hospitalizations for younger patients. The adjusted odds ratio for the outcome displayed geographic disparities in both age groups, but the pattern of the geographic disparities was not similar between the two age groups.

CONCLUSIONS:
The very old constitute a substantial proportion of stroke hospitalizations. Hospitalizations for very old patients are more likely to end in death or discharge to a long-term care facility than hospitalizations for younger patients. The pattern of geographic disparity in post-stroke adverse outcomes differs between younger and very old patients.

RO1INS39571-01 **How Valid Are Family Proxy Assessments of Stroke Patients' Health-Related Quality of Life?**

Williams LS, Bakas T, Brizendine E, Plue L, Tu W, Hendrie H, Kroenke K.
Stroke, 2006, 37(8), 2081-2085.

ABSTRACT:

BACKGROUND AND PURPOSE:
Proxy respondents are often needed to report outcomes in stroke survivors, but they typically systematically rate impairments worse than patients themselves. The magnitude of this difference, the degree of agreement between patients and proxies, and the factors influencing agreement are not well known.

METHODS:
We compared patient and family proxy health-related quality of life (HROL) responses in 225 patient-proxy pairs enrolled in a clinical trial for post-stroke depression. We used paired t-tests and the intraclass correlation (ICC) statistic to evaluate the agreement between patient and proxy domain scores and the overall Stroke-specific Quality of Life (SS-QOL) score. We used multivariate linear regression to model patient-and proxy-reported SS-QOL scores.

RESULTS:
Patients were older (63 versus 55 years) and less often female (48% versus 74%) than proxies. Proxies rated all domains of SS-SQOL slightly worse than patients. The Mood, Energy, and Thinking domains had the greatest disparity with mean patient-proxy differences of 0.45, 0.37, and 0.37 points, respectively. The ICC for each domain ranged from 0.30 (role function) to 0.59 (physical function). Proxy overall SS-QOL score was also lower (worse) than patient score (3.7 versus 3.4, $P<0.001$) with ICC of 0.41. Agreement was higher among patient-proxy pairs with higher patient depression scores and with lower proxy report of caregiving burden.

CONCLUSIONS:
Proxies systematically report more dysfunction in multiple aspects of HRQL than stroke patients themselves. Agreement between patient and proxy HRQL domain scores is modest at best and is affected by patient depression and proxy perception of burden. These differences may be large enough to impact the outcome assessment in stroke clinical trials.

RO1INS39571-01 **Care Management of Poststroke Depression: a Randomized, Controlled Trial**

Williams LS, Kroenke K, Bakas T, Plue LD, Brizendine E, Tu W, Hendrie H.

Stroke, 2007 Mar, 38(3), 998-1003

ABSTRACT:

BACKGROUND AND PURPOSE:
Poststroke depression is a prevalent and disabling disorder, yet evidence regarding the effectiveness of treating poststroke depression is inconclusive. Our objective was to determine the effectiveness of the Activate-Initiate-Monitor care management program for the treatment of poststroke depression.

METHODS:
We conducted a prospective, randomized, outcome-blinded trial in 188 ischemic stroke survivors identified at the time of admission to one of 4 Indianapolis hospitals. Depression screening and enrollment occurred between 1 and 2 months poststroke. The Activate-Initiate-Monitor intervention was a care management program that included Activation of the patient to recognize depression symptoms and accept treatment, Initiation of an antidepressant medication, and Monitoring and adjusting treatment. Usual care subjects received nondepression-related education and were prescribed antidepressants at the discretion of their provider. The primary outcome measure was depression response, defined as a Hamilton Depression Inventory score <8 (remission) or a decrease from baseline of at least 50% at 12 weeks.

RESULTS:
Intervention and usual care groups did not differ on any key baseline measures. Both depression response (51% versus 30%, P=0.005) and remission (39% versus 23%, P=0.01) were more likely in the Activate-Initiate-Monitor intervention than in the usual care group. This difference in depression scores was present by 6 weeks and persisted through the 12-week assessment. Serious adverse events did not differ between the 2 groups.

CONCLUSIONS:
The Activate-Initiate-Monitor care management model is significantly more effective than usual care in improving depression outcomes in patients with poststroke depression.

RRP 06-184 **VHA Costs of Acute vs Subacute Rehabilitation Care for Stroke**

W. Bruce Vogel, PhD, MA, BS
North Florida/South Georgia Veterans Health System
Gainesville, Florida
Funding Period: October 2006 - May 2007

BACKGROUND/RATIONALE:

This study is a follow-up business case analysis to recently completed VA RR&D project, Processes and Outcomes of Stroke Care in the VHA (03131R), and is being submitted under the Economic Analysis of Implementation Projects RRP solicitation. In our recently completed study, we evaluated the process of care and patient outcomes for two structures of rehabilitation stroke care: (1) VHA acute rehabilitation units and (2) VHA subacute rehabilitation units. We found that process of care, as measured by clinical stroke guideline compliance, was slightly better in two dimensions of care for patients receiving their rehabilitation in acute rehabilitation units. The study also found that the primary patient outcomes in the two settings of care, that is, functional gain during rehabilitation and discharge to the community, were equivalent across the two types of rehabilitation settings. An additional finding of the study identified the length of stay (LOS) in the subacute rehabilitation units to be 7 days or longer on the average compared to the LOS on acute rehabilitation units (29 vs 22 days, respectively). This 32% longer LOS has obvious cost implications and raises important economic and policy questions given the recent trends to close acute rehabilitation units or to convert the acute rehabilitation units to subacute rehabilitation units. Over the past 10 years, the number of acute rehabilitation units has decreased from 78 to 44 which is a reduction of 44%. Subacute units have increased from 0 to 18 over the same period.

OBJECTIVES:

We propose to answer the following research questions: 1) What are the short-term (0 to 3 months) and long-term (3-24 months) VHA costs of care associated with rehabilitation in either acute vs. subacute rehabilitation units? 2) Are costs (short-term or long-term) associated with clinical stroke guideline compliance? Specifically, does high quality (guideline compliant) care in the near term save money in the future? 3) Are costs (short-term or long-term) associated with facility characteristics such as staffing, technology, and system organization? 4) Do short-term, long-term, or total costs vary across the VISNs?

METHODS:

We will use data collected previously on a cohort of 480 stroke patients who received inpatient rehabilitation care in July 2002 through June 2003 in the VHA. We propose to merge these data with the VHA Decision Support System (DSS) National Data Extracts (NDE) for FY2002-FY2005 to obtain VHA treatment costs for this established cohort of stroke patients for two years following their index stroke admission. We will conduct both descriptive and multivariate analyses to answer each research question. For the multivariate analyses, we will estimate separate short-term, long-term, and total treatment cost regressions using the natural logarithm of costs as the dependent variable (to deal with skewness). Regressors will include rehabilitation structure (systemic organization, staff expertise, and technological sophistication), degree of clinical stroke guideline compliance, Veterans Integrated Service Network (VISN), and patient sociodemographic characteristics (age, sex, and marital status). A variety of statistical estimators will be used to test the sensitivity of our results.

FINDINGS:

No results at this time.

STATUS:

Active.

IMPACT:

We anticipate that our results will have major implications for VA policy concerning the efficient and effective provisions of rehabilitation services, especially when combined with the recently completed work on quality of care. Together, these results will assist VA policymakers in providing high quality, low cost rehabilitation services to veterans. To achieve its full impact, the

results of our work must be communicated clearly to VA rehabilitation policymakers. This communication will occur through a close and continuous working relationship with the VHA Physical Medicine and Rehabilitation (PM&R) Service and the VHA Rehabilitation Strategic Healthcare Group. Specifically, we will seek advice from and present results to the VHA Rehabilitation Strategic Healthcare Group headed by Lucille Beck, Ph.D. A key member of both these groups, Mr. Clifford Marshall, is located at the RORC in Gainesville, and has agreed to serve as our liaison with VA rehabilitation policymakers.

RO1INS39571-01 AIM: A Randomized Trial of Treatment for PSD

Linda S. Williams, MD
Department of Neurology, IUMC
Funding Period: September 2000 - September 2005

BACKGROUND/RATIONALE:

Post-stroke depression (PSD) is a prevalent condition that has pervasive effects on patients' functional recovery and health-related quality of life (HRQOL), as well as outcomes of caregivers.

OBJECTIVES:

The long-term objective of this proposal is to evaluate the effectiveness of a multi-faceted, 12-week intervention **(AIM)** that seeks to **Activate** patients to be aware of PSD, **Initiate** antidepressant treatment, and **Monitor** treatment side effects and compliance. The specific aims are to improve: 1) depression symptoms and 2) stroke-specific quality of life outcomes in patients with PSD. The study protocol requires assembly of a prospective cohort of ischemic stroke patients with and without PSD. Thus, a secondary objective of this study is to capitalize on this opportunity by assessing outcomes in non-depressed stroke survivors (n=244) and stroke caregivers (n=340). These secondary aims are to evaluate the effects of PSD by comparing: 1) outcomes in depressed and non-depressed patients and 2) in caregivers of depressed and non-depressed patients.

METHODS:

We will enroll 244 ischemic stroke patients who exhibit PSD 1 month poet-stroke and randomize them to the AIM intervention vs. usual care. Patients receive standardized assessments based on a conceptual framework of stress and coping. Variables include social support, stroke severity, depression, HRQOL, life satisfaction and functional outcomes. Primary depression outcomes are determined 3 month following randomization. We will also examine the durability of the intervention by comparing outcomes at 9 months following randomization.

STATUS:

Complete.

IMPACT:

These results aim to improve depression symptoms and stroke specific quality of life outcomes in patients with PSD. This study can also be used to examine the relationship of patient and caregiver outcomes post-stroke and compare the health care utilization of patients with and without PSD.

D3487R **Depressed Mood and Antidepressant Treatment Among Post-Stroke Veterans**

L. Douglas Ried, PhD
North Florida/South Georgia Veterans Health Systems
Gainesville, Florida
Funding Period: May 2005 - April 2008

BACKGROUND/RATIONALE:

Approximately 500,000 strokes occur each year in the United States, 11,000 to 15,000 in the VA Health System. Roughly 70 percent of these patients survive the acute phase and must deal with the sequelae. Physical deficits and psychological problems are secondary impairments that commonly follow stroke. Depending upon the criteria used to diagnosis mood disorders, 25 to 75 percent of stroke patients are affected. Post-stroke depressive mood disorders (PSDMD) frequently occur and are associated with higher rates of mortality and morbidity and lower functional status. Pharmacologic treatment with antidepressants is a proven, effective treatment for post-stroke depression. Although the issue is still not resolved, the literature partially supports the notion that treating PSDMD patients with antidepressants improves functional and economic outcomes.

OBJECTIVES:

The objectives of this project are to: 1) Establish the prevalence of mood disorders and utilization of antidepressant (ADT) medications among post-stroke veterans six months before and up to one- year after the stroke event, 2) Establish the sensitivity and specificity of mood disorder ICD-9-CM codes in existing VA automated databases and, if needed, create algorithms to maximize the sensitivity and specificity, 3) Establish the feasibility of conducting a nationwide retrospective study of recent treatment practices and to compare early treatment and non-early treatment patients on health outcomes and functional status. Specifically, to explore for preliminary evidence that patients treated early with antidepressants will have better outcomes after one year, as measured by: Fewer patients diagnosed with depressive mood disorders; Higher functional status, and; Lower rehabilitation resource utilization, after controlling for age, stroke severity, comorbid diseases, and number of recurrent strokes. Based on the preliminary findings from Objective #3, develop empirically informed power estimates to test these questions in subsequent studies.

METHODS:

This naturalistic, observational cohort study uses retrospective, automated database analytic techniques to study post-stroke health outcomes and rehabilitation resource utilization. The study uses a "non-equivalent control group" quasi- experimental design where the medical practice of interest is early antidepressant prescribing and its impact on the predictor and outcome measures.

FINDINGS:

The final cohort includes 1,831 veterans. 1,831 patients were identified using the search strategy. Of these patients 381 died during the one-year after the stroke (20.8%). A majority of the veterans was married, but nearly 40% were unmarried. Consistent with other work in VHS in this age cohort (Vietnam era and before), over 97 percent was male. A slight majority of the veterans were White, most of the others were Hispanic White or Hispanic Black. Just over 10% were Black or other / unknown. Among the 1,831 veterans, 1,768 had prescriptions dispensed to them according to the prescription benefits management system in Hines, IL during the 18-month time frame (96.6%). Among these veteran patients, 1,314 (71.8%) were dispensed an antidepressant, another medication that may be used for a mood disorder treatment, or that may have an adverse impact on mood during the 18-month study period. These medications include an antidepressant, benzodiazepine anxiolytic and hypnotic, stimulant, pain medication, such as NSAIDS or opioids, and mood stabilizer. Among these veterans, 166 (12.6%) had one of the medications dispensed to them only before the index date, 390 (29.7%) only after the index date, and 758 (57.7%) both before and after the index date. Among the 1,831 veterans, 778 had one or more antidepressant prescriptions dispensed to them during the entire 18-month study period (42.5%). Among those with prescriptions for an antidepressant, 145 (7.9%) veterans had an antidepressant dispensed to them within 15-days of the index date for the acute stroke event and

324 (17.7%) veterans had a prescription dispensed to them within 30 days. Just over 15 percent of the veterans (N=277) had one of the diagnoses indicating a post-stroke mood related disorder during the 6-month period before their stroke and nearly 28% (N=503) of them had one of the eligible diagnoses afterward.

STATUS:

The project work is ongoing.

IMPACT:

This long-term stream of research has the potential to reduce rehabilitation resource utilization, improve functional outcomes, and change the process of stroke primary care.

R01 HLO70-794 Improving Anti-Thrombotic Use in Stroke Prevention

Rebecca J. Beyth, MD, MS
Michael E. DeBakey Medical Center
Houston, Texas
Funding Period: September 2002 - August 2007

BACKGROUND/RATIONALE:

Atrial fibrillation is a common disorder and an important risk factor for stroke. Evidence from controlled clinical trials shows that adjusted-dose warfarin decreases the risk of stroke by two-thirds. Clinical practice guidelines recommend that most atrial fibrillation patients receive life-long anticoagulation; only about one-third of atrial fibrillation patients receive it.

OBJECTIVES:

This study is a randomized controlled trial of an intervention (the RBC) to increase the appropriate use of anti-thrombotic therapy (warfarin and aspirin) for stroke prevention in patients with chronic atrial fibrillation.

METHODS:

The intervention is a tailored patient-specific risk-benefit consult (RBC) that incorporates the risks and benefits of anti-thrombotic therapy for stroke prevention using the American College of Chest Physicians guidelines and the Outpatient Bleeding Risk Index, a validated risk assessment for major bleeding. The intervention is aimed at primary care providers practicing in different clinical settings. Evidence-based specific recommendations about the use of anti-thrombotic therapy, as well as the quality of anti-thrombotic management will be formulated for each atrial fibrillation patient in the intervention physician's panel. The control and the intervention physicians will also receive performance feedback in the form of an Achievable Benchmark of Care (ABC) that informs them of the percentage of their patient panel with atrial fibrillation that is receiving anti-thrombotic therapy in relation to the other physicians (intervention or control) in their group. The primary outcome is the change, pre-to post-intervention, in the proportion of eligible patients with chronic atrial fibrillation who are prescribed anti-thrombotics. This will be measured by the proportion of the eligible patients in each physician's panel for whom anti-thrombotics are currently prescribed at baseline, 6-months, and 12-months. Secondary safety outcomes are the proportion of individuals in the physician’s panel with stroke, the proportion of anticoagulated patients with major bleeds, and the proportion of total treatment time during which the International Normalized Ratio is below, above and within therapeutic range.

FINDINGS:

Focus Group data collected during Phase I, aim I, of the study has been analyzed and findings illustrated the following: 1) A need for provider education/knowledge in following areas (a) Cardioembolic vs. other etiologies of stroke, (b) Clarification on the use of anti-thrombotics for stroke prevention, and (c) risk factors for stroke and anticoagulant-related bleeding. 2) A need for and access to better tools for (a) patient education of atrial fibrillation and stroke prevention, (b) dosage schedules and monitoring, and (c) communicating to patients and other providers about risks (attitudes). 3) Providers’ barriers: (a) arranging follow-up and tracking down lab results, (b) lack of time to explain risks vs. benefits to patients, (c) availability and convenience of lab for testing, (d) coordinating care with multiple providers or specialists, especially if in different systems and (e) older patients with multiple comorbidities. 4) Providers facilitators: (a) availability of nurse or pharmacist to coordinate care or manage anticoagulant therapy, (b) family members or caregivers present at time of an office visit, (c) point of care testing, (d) group patient educational visits or sessions, and (e) systematic approach to follow-up of labs and dosage changes. 5) Findings also revealed that providers prefer to receive concise summaries with specific recommendations and a systematic approach to follow-up of labs and dosage when receiving the RBCs and ABCs. Preferred method of delivered is through email. Twenty-one clinics and 43 providers were recruited and enrolled in the clinical trial from 3 health care systems. The VA system included 3 sites; the Houston Michael E. DeBakey VA Medical Center, the VA Lufkin out-patient clinic and the VA Beaumont out-patient clinic. Baylor system included 1 site; the Geriatric Medicine Associates clinic, and the Kelsey Seybold system included 17 clinics. Seven hundred seventy-eight medical charts have been reviewed and scanned at 3 VA sites, 1 Baylor site and 8 Kelsey Seybold sites. Study is on-going.

STATUS:

Data collection.

IMPACT:

This study will test a novel and generalizable approach to increasing the appropriate use of anti-thrombotic therapy in patients with atrial fibrillation in a community setting and the findings will provide valuable insight into stroke prevention. Potentially could provide a mechanism for improving and optimizing the quality of care for patients with afib on anti-thrombotics.

ARCD 00-039-1 Improving the Quality of Care for Patients with Ischemic Stroke

Dawn Bravata, MD
Richard L. Roudebush VA Medical Center
Indianapolis, Indiana

My research goal is to improve the quality of care for patients with cerebrovascular disease with a specific focus on the effectiveness of diagnostic and therapeutic interventions in routine clinical practice. My proposed research builds upon my clinical training in general internal medicine and my methodological training in health services research, as well as my research accomplishments during the Research Career Development (RCD) Award period. Receipt of the Advanced Research Career Development (ARCD) Award will permit me to develop new methodological expertise and to contribute toward improving the quality of care of patients with stroke.

During RCD award period, I conducted several projects examining the prevalence and disparities in stroke risk factors. In one series of studies, I explored the relationship between glucose metabolism and stroke risk, including the association between insulin resistance and stroke. In another stroke risk factor study, I used data from a nationally representative sample to demonstrate that income explained racial disparities in stroke risk. Using a longitudinal cohort of twin veterans, I examined the relationships between diet and stroke and between headache and stroke. Later, I examined the use of diagnostic and therapeutic procedures in patients with stroke in routine clinical practice, specifically the use of warfarin for patients with atrial fibrillation, the use of echocardiography in patients hospitalized with stroke, and the use of informed consent for thrombolytic therapy for acute ischemic stroke patients treated in routine clinical practice.

Over the next three years I propose to build on this research to pursue two lines of research to improve the care of patients with stroke. The first study, "Quality Evaluation in Stroke and TIA (QUEST) Project," has received funding from the VA HSR&D Service, and is a retrospective cohort of 2960 patients at six hospitals. The primary aim is to identify processes of care, received by patients hospitalized with an acute ischemic stroke or transient ischemic attack, that are independently associated with a reduction in the combined endpoint of in-hospital mortality or institutionalization; adjusting for age, comorbidity, stroke severity, and brain imaging findings.

The second study, "Treatment of Sleep-Disordered Breathing in Acute Ischemic Stroke Patients," will further my work examining the effectiveness of therapeutic interventions in patients with cerebrovascular disease. In a project that has received pilot funding through the VA Cooperative Studies program, I will determine the prevalence of sleep-disordered breathing in patients with acute ischemic stroke and will evaluate the feasibility of screening and treating stroke patients with sleep-disordered breathing, using continuous positive airway pressure within 48 hours of stroke symptom onset. I plan on submitting both VA Cooperative Studies and NIH/NINDS R01 applications related to this novel stroke therapeutic strategy during the ARCD award period.

My current research often involves multivariable modeling. I plan to develop expertise in repeated measures data analysis through formal coursework at the Yale School of Public Health, short-courses offered by professional organizations such as the American Heart Association and the Society of General Internal Medicine, as well as tutorials with my mentors. I am supported by two experienced mentors, Drs. John Concato and Lawrence M. Brass. Dr. Concato serves primarily as my methodological mentor and Dr. Brass as my topic mentor.

Stroke is a common and serious problem for all Americans. At the end of the proposed award period, I seek to be an established and nationally recognized investigator in the field of cerebrovascular disease health services research for my work in improving the care for veterans and non-veterans with stroke by identifying the diagnostic and therapeutic strategies that are associated with improved patient outcomes.

SDR 07-304 **Evaluation of Caregiver Guidebooks**

Maude Rittman, PhD, RN
North Florida/South Georgia Veterans Health System
Gainesville, Florida
Funding Period: July 2007 - January 2008

BACKGROUND/RATIONALE:

Stroke is the leading cause of serious long-term disability affecting more than 4 million people in the United States (US). Approximately 80,000 veterans receiving health care in the Veterans Health Affairs (VHA) are stroke survivors and it is estimated that 9,000-11,000 veterans are hospitalized each year with a new stroke. Close to 80 percent of stroke survivors are discharged home with the burden of continuing care and recovery shifting to informal caregivers, often family members with little or no preparation or training. Informal caregivers face difficulties, such as uncertainty, anxiety, depression, eroded health, and poor quality of life, due to the sudden onset of stroke and the new caregiver role. Stroke survivors and their caregivers often do not have the information necessary to manage the recovery process at home. Nurses do not have easy access to current patient education materials for stroke survivors and their families.

OBJECTIVES:

Goal 1 of the Stroke QUERI is to improve compliance with the VHA and the Department of Defense (DoD) clinical practice guidelines for the management of stroke rehabilitation in the primary care setting. Educating stroke survivors, caregivers, and family members about stroke and stroke rehabilitation is cited by the VHA/DoD as an integral part of the rehabilitation process in postacute settings. In addition, the delivery of patient education after stroke is a JCAHO quality indicator. Nurses are key health professionals to provide education to informal caregivers. The Stroke QUERI expanded its focus on caregivers to meet these goals. This QUERI Nursing Rapid Response Project is in response to Goal 1 and issues related to patient and family education, a key element of nursing practice.

METHODS:

The proposed project uses research findings from a recently completed HSR&D NRI study using mixed methods to develop stroke recovery trajectories over 24 months for Puerto Rican, African American and non-Hispanic white veterans discharged home. Two caregiver guidebooks have been developed using findings from this study on the psycho-social processes of stoke recovery and caregiver experiences over the course of 2 years. One book is for caregivers on US mainland and one for caregivers of veterans living in Puerto Rico. Information on stroke, stroke prevention, medication management, and depression is provided. These guidebooks are ready for formative and summative evaluation in preparation for full dissemination. Aim 1: (QUERI Step 4) Formative evaluation involves assessing materials prior to completion and aids in identifying content and design problems. We will evaluate usefulness, readability, attractiveness, and cultural relevance (Puerto Rico). This phase of the study will include a formative evaluation of the guidebooks using two approaches. First, we will pilot test the guidebooks with 4 focus groups of 10 racially and ethnically diverse caregivers: 2 focus groups in Puerto Rico (VISN 8) and 2 in Indianapolis (VISN 11), the location of the Stroke QUERI. We will gain IRB approval to contact stroke caregivers who have participated in our previous studies and invite them to participate in a focus group. We will recruit 12 for each group to allow for attrition. Puerto Rican guidebooks will be in English and Spanish. Each participant will be mailed the guidebook and a list of potential questions to evaluate the book during focus group discussions. Participants will be given $40 to help defray travel costs and/or care of veterans while at the focus groups. Second, we will also conduct formative evaluation with a panel of expert nurses who manage care of veterans in the home in the US mainland and in Puerto Rico to obtain feedback as to whether the materials are accurate, useful in addressing issues that commonly occur among informal caregivers of stroke survivors, and up-to-date. We will distribute copies of our caregiver guidebooks to 10 nurses and obtain data using scanable forms. We will get feedback on the guidebooks and identify barriers and facilitators for health providers to use the guidebooks. Based on Aim 2: (QUERI Step 5) Disseminate caregiver guidebooks and conduct summative evaluation with nurses (months 4-6). This phase includes limited dissemination of the caregiver guidebooks at 2 VA sites with the highest volume of stroke patients (Houston, Texas and Puerto

Rico) for summative evaluation with nurses. Early in month 4 of this RRP we will provide Nurse Managers on inpatient units with caregiver guidebooks for nurses to use in preparing caregivers of veterans for discharge. We will also provide guidebooks to 6 volunteer care coordinators. We plan to track the dissemination impact by numbering each guidebook and accounting for its dissemination. At the beginning of month 6, we will use semi-structured interviews via phone to obtain information from nurses and Care Coordinators to improve future dissemination efforts, inquire about how nurses used the guidebooks and identify barriers to using the guidebooks in clinical practice. Taped calls will be transcribed and analyzed using qualitative methods. Modifications will be made prior to full dissemination across all VAMCs (QUERI Step 6).

FINDINGS:

No results at this time.

STATUS:

Active.

IMPACT:

None to date.

NRI 05-246 **Survey of Informal Caregivers of Veterans with Stroke**

Maude R. Rittman, PhD, MSN, BSN
North Florida/South Georgia Veterans Health System
Gainesville, Florida
Funding Period: April 2006 - March 2008

BACKGROUND/RATIONALE:

Stroke is the leading cause of serious long-term disability in the United States (US) and over 4 million people are living with the effects of stroke [1,2,3]. Approximately 80,000 veterans are stroke survivors and it is estimated that between 9,000 – 11,000 veterans are hospitalized each year with a new stroke [4,5]. In addition, approximately 80% of stroke survivors are discharged home and live for at least five years post stroke shifting a large amount of continuing care to informal caregivers. A priority in the Veterans Health Affairs (VHA) is to improve the quality of life of veterans who are receiving long term care which includes home care. This study is the first in an ongoing program of research being conducted in partnership between the VA Rehabilitation Outcomes Research Center of Excellence (RORC) and the VA Stroke QUERI to develop research-based information on caregivers' experiences and implement interventions to assist informal caregivers to prolong veterans with stroke living in their own homes for as long as possible. A plethora of research has documented that caregivers experience high levels of stress, burden and depression. However, no studies have examined positive aspects of stroke caregiving or caregivers' desire to institutionalize veterans post stroke. In response to the call for a "wholesale rethinking about caregiving to include positive aspects of caregiving, "[6] the primary focus of the proposed study is to better understand positive as well as negative aspects of informal stroke caregiving. A conceptual framework will be tested and refined to guide future intervention studies. Data collection is underway.

OBJECTIVES:

Long Term Objective: The long-term goal of this line of research is to support veteran stroke survivors to live independently in their own home and communities for as long as possible. Specific Aim 1. Determine the relationships between veteran and caregiver characteristics and positive and negative responses to stroke caregiving.

METHODS:

This two year study uses a telephone survey methodology to obtain data from 395 veteran/caregiver dyads in VISNs 8, 11, and 15 through a contract with the University of Florida Survey Research Center, a state of the art center, that is capable of completing this number of surveys within our projected time frame. Our investigative team will work closely with this center for successful training and completion of data collection, data management and development of complete datasets. We will refine the conceptual model using results from extensive statistical analyses testing hypotheses.

FINDINGS:

No findings or results to report at this time.

STATUS:

Active.

IMPACT:

Clinicians can use the results concerning factors that improve caregivers' positive response to caregiving and reduce burden, depression and injuries in designing evidenced-based patient education materials and treatment plans. Care coordinators and telehealth services can use findings to develop training modules and home-based tools to help caregivers. Health planners and administrators can use the results to allocate resources and develop future cost-effective programs. By understanding the determinants of outcomes, such as desire to institutionalize veterans, the VHS can design a monitoring and support system to promote independent living for veterans post stroke.

RRP 06-153 **Improved Clinical Decision Making for Stroke Prevention**

Rebecca J. Beyth, MD, MSc
North Florida/South Georgia Veterans Health System
Gainesville, FL
Funding Period: June 2006 - September 2007

BACKGROUND/RATIONALE:

High-quality epidemiological studies have demonstrated that atrial fibrillation (AF) is the most potent common risk factor for stroke and six randomized trials of anticoagulants in AF consistently have demonstrated a risk reduction of stroke by approximately two-thirds. Nonetheless anticoagulants remain underused in clinical practice in AF patients despite its proven efficacy for stroke reduction. Reasons for the under-use of anticoagulation in AF patients are not totally known, but include patient, provider, as well as healthcare system barriers.

OBJECTIVES:

This project addresses the gaps in decision making by developing an implementation process and testing the feasibility of using a previously validated clinical decision making tool, "Making Choices: An Atrial Fibrillation Treatment Decision-Making Aid" developed by the Atrial Fibrillation Decision Aid Group at the University of Ottawa (permission obtained).

METHODS:

The program has both a physician and patient component. Specifically, the physician component consists of a physician manual. The patient component consists of an audio cassette, a personnel worksheet, and education booklets which are specific to four levels of stroke risk (low, medium, high, and very high) that detail the risk of benefits of therapy for stroke prevention in AF as described by the current national accepted American College of Chest Physicians recommendations. Using the Department of Veteran Affairs (VA) automated databases (Patient Treatment Files (PTF) and Outpatient Clinic file (OPC) we will first determine all potentially eligible patients with atrial fibrillation by identifying patients with ICD0 code 427.31 (atrial fibrillation) who had either a discharge diagnosis or outpatient clinic visit for atrial fibrillation at the North Florida/South Georgia Veterans Health System in the past fiscal year. From this list we will categorize these potentially eligible patients by the provider of record in the databases. We will then contact the providers by letter asking them to inform the patient of the study. Patients will contact us and arrange telephone meetings. Enrolled patients will be mailed an informed consent form and the clinical decision making tool kit, and followed up for outcomes assessment by phone. Physician satisfaction with the Decision Aid will be assessed by a self-administered mail questionnaire.

ANALYSIS:

Descriptive statistics will be used. Our outcomes of interest include (1) number of patients who complete the decision tool kit, (2) satisfaction, (3) knowledge/expectations, (4) decisional conflicts, and (5) number of patients who make an appointment with their physician in 30 day period. We will also assess reasons for and against therapy.

FINDINGS:

No results at this time.

IMPACT:

Expected contribution of research: This research will provide an understanding of the AF decision making tool's acceptability among and effect on AF patients. Our results will provide important information about the feasibility of using the decision making tool throughout the VA on a national level.

NRI 98-183 **Culturally Sensitive Models of Stroke Recovery and Caregiving After Discharge Home**

Maude Rittman, PhD, MSN, BSN
North Florida/South Georgia Veterans Health System
Gainsville, Florida
Funding Period: October 2000 - March 2006

BACKGROUND/RATIONALE:

Stroke is the leading cause of disability in the (US) and the third leading cause of death. A 1999 study suggests a much higher incidence of stroke than previously reported, estimating 259 new strokes per 100,000 population. Findings from this study also indicate that incidence of stroke increased exponentially with age and is consistently higher for males than females. Stroke also occurs more frequently among African-Americans and Hispanics. More stroke survivors are receiving the majority of their care in the home, placing a substantial burden on informal caregivers.

OBJECTIVES:

The goals of this study included(1) Describe stroke recovery trajectories for African-American, Puerto-Rican Hispanic, and non-Hispanic white veterans across two years following discharge home, (2) Explore variations in stroke recovery and describe strategies used by survivors to manage the illness course at home among three ethnic groups, (3) Explore the use of formal and informal health services and identify barriers to recovery at home, (4) Explore changes in burden, coping, depression, hours of caregiving and general health status of stroke caregivers over time for each ethnic group, (5) Describe the types of assistance informal caregivers provide during the first year to facilitate stroke recovery.

METHODS:

This is a prospective cohort multi-site study. A total of 250 participants (125 veterans and 125 caregivers) were enrolled in the study. Participants included 33 African Americans, 49 Puerto Rican Hispanic and 43 non-Hispanic white veterans. Subjects and their caregivers were enrolled prior to discharge for acute stroke. Data were collected at 1, 6, 12, 18, and 24 months following discharge home. Trained research assistants of the same ethnicity as the veteran collected data during home visits. Qualitative data included in-depth interviews with stroke survivors about their life following stroke. Quantitative data from the veteran included type of stroke, co-morbidities (Charlson Co-morbidity Scale), functional assessments (Functional Independence Measure, FIM), instrumental activities of daily living (Frenchay Activity Index, FAI), depression (Geriatric Depression Scale, GDS), and mental status (Mini-Mental Status Exam, MMSE). Caregiver data were collected at the same time points and included caregiver burden (Sense of Competence Scale, SOC), coping (Sense of Coherence), depression (GDS), hours and types of caregiving provided, and general health of caregivers across two years.

FINDINGS/RESULTS:

Controlling for covariates, growth models indicate that racial/ethnic groups differed in their initial status (i.e., FIM at discharge) and in patters of recovery across 24 months. Puerto Rican veterans had greater functional impairment (lower motor FIM and FAI scores) compared to whites and African Americans. African Americans had less depressive symptomology and a better recovery trajectory compared to whites and Puerto Ricans. However, the average Puerto Rican had depressive symptoms within the depressed range. Changes in one's sense of self following a stroke are related to depression. Puerto Ricans experience more disruption in sense of self than other groups across all time points. Experiences related to connectedness and isolation affected veterans across 12 months of the recovery trajectory. Results suggest the majority of white veterans maintain and recover a greater sense of connectedness throughout the twelve months and Puerto Ricans experience the greatest sense of isolation initially post stroke. Puerto Rican veterans experienced no or low community integration throughout this recover period more often than other groups. Puerto Rican veterans and caregivers reported greater need for formal care services and greater use of selected services. There are no racial and ethnic differences in the level of caregiver burden and caregiver coping, although African American caregivers have a lower average GDS score which indicates lower levels of depressive symptomology. Puerto Rican caregivers spend the most hours per day, and have the most help

with their care recipient compared to whites and African Americans. Caregiving tasks did not vary by race/ethnicity and included cooking, clothes/dressing, housework, personal care (bathing etc.), transportation, medical help, finances, shopping and companionship.

STATUS:

This project has been completed and the Final Report has been submitted.

IMPACT:

Results indicate that the recovery of stroke survivors varies by race/ethnicity in (a) functional status, (b) activities of daily life, (c) depression, (d) sense of self, (e) connectedness, (f) social participation. Across the board Puerto Ricans on average were more impaired (functional status and activities of daily living) at discharge and experienced slower recovery across the 24 month time period.

RRP 07-295 **Optimizing Glycemic Control of Hospitalized Stroke Patients**

James Walsh, MD
Richard L. Roudebush VA Medical Center
Indianapolis, Indiana
Funding Period: September 2007 - January 2008

BACKGROUND/RATIONALE:

There is strong evidence that effective management of blood glucoses with insulin after acute ischemic stroke improves neurologic outcomes and reduces morbidity, mortality, and length of stay. This pilot study will implement an evidence-based, systematic approach for early detection and management of hyperglycemia in acute stroke patients admitted to the Roudebush VAMC.

OBJECTIVES:

The specific aims are: (1) detect hyperglycemia promptly when acute ischemic stroke patients are admitted to the hospital; (2) implement a CPRS-based Decision Support System (DSS) to improve management of hyperglycemia in stroke patients; (3) conduct formal usability testing of the DSS; and (4) conduct an evaluation to determine the barriers and facilitators of the implementation strategy.

METHODS:

The CPRS-embedded insulin DSS tool provides recommendations for insulin strategies and dosages in common clinical situations. Insulin therapy will be initiated in all patients with diabetes and in non-diabetics when blood glucose exceeds 150 mg/dl. The strategy for stroke patients will emphasize appropriate doses of basal insulin to control glucoses and minimize hypoglycemia. Non-diabetic patients who are not hyperglycemic on admission will have blood glucoses monitored four times a day for the first 72 hours. Physicians and nurses caring for stroke patients will receive education about the detection and management of hyperglycemia in acute stroke, and in use of the DSS to manage blood glucoses

The Promoting Action on Research Implementation in Health Systems model will guide the implementation plan. The study team will identify clinical champions involved in care of patients with acute stroke and work with them to facilitate adoption and implementation of the proposed approach, identify factors that promote or hinder implementation, and identify facilitators to make and sustain the change. Monthly formative evaluations will be conducted. The research team will meet monthly to assess effectiveness of the DSS and discuss solutions to barriers to its optimal use. Formal usability testing of the insulin DSS tool will be conducted to improve its reliability and acceptance by clinicians. Summative evaluation at the end of the project will elicit users' feedback to further improve the system.

The study will employ a prospective pre-post cohort design to examine the specific aims. The cohort will be all patients admitted for acute ischemic stroke. The primary outcome will be the mean blood glucose during the first 72 hours after initiation of the DSS. Data will be collected via chart review and retrieval from the CPRS. Secondary outcomes will include (1) hypoglycemia, (2) length of hospital stay, (3) use of the CPRS-based DSS to write insulin orders, (4) missed or delayed insulin doses, and (5) functional neurologic outcome.

FINDINGS:

No results at this time.

STATUS:

Active.

IMPACT:

This project will provide data to inform a multi-site roll out implementation of the insulin DSS. Demonstration of the effectiveness and safety of the DSS patients with acute stroke will also facilitate the design of a larger, randomized trial to further clarify the benefits of post-stroke glucose lowering. It will also identify factors that influence the adoption and sustainability of the implementation strategy.

STR 03-168 **Assessment of the Implementation of a Dysphagia Screen for Veterans with Acute Ischemic Stroke**

Neale R Chumbler, MD
Dawn Bravata, MD
North Florida/South Georgia Veterans Health System
Gainesville, Florida
Funding Period: October 2007 - September 2008

OBJECTIVES:

An Office of Inspector General report evaluated the management of patients with dysphagia (swallowing problems) in VHA medical facilities and found substantial variations in care. A directive emerged that instructed VAMCs to screen all hospitalized veterans with stroke for dysphagia within 24 hours of admission. The objectives of this study are to: (1) identify the facilitators and barriers and communication patterns among VHA clinicians in the development and implementation of the screening process at two VAMCs; and (2) evaluate and improve the implementation of a dysphagia screening process using a healthcare system redesign strategy at one VAMC.

METHODS:

This project is being conducted as a case study at two VAMCs (Gainesville, FL and Indianapolis, IN). A mixed method approach is being used and includes: semi-structured interviews; human factors analyses; and a retrospective medical record review. In Gainesville, a formative evaluation was conducted using in-depth interviews with 13 VHA clinicians in a single VAMC, representing nursing, speech and language pathology (SLP), nutrition, neurology, and general medicine. In Indianapolis, the intervention involves a 100-day system redesign approach using Lean Six Sigma Systems methods with front-line healthcare providers.

RESULTS:

Preliminary results from Gainesville demonstrate that hospitalized stroke patients were screened in two ways. A pilot version was performed by nurses on a neurology unit that asked questions related to oral-pharyngeal phases of swallowing, level of independence in feeding and dental/oral screening. Second, SLPs administered a clinical assessment tool for the measurement of acquired neurological orophyaryngeal swallowing disorders. Both screenings were completed at the patient's bedside by both SLPs and nurses, sometimes coinciding with the other, while other times performed independently. Core concepts identified were: (a) lack of communication between the clinicians (nurses and SLPs) performing initial assessments the clinicians performing the initial assessments and lack of communication among the clinicians handling subsequent, follow-up care; (b) a lack of "hands-on" training experienced by clinicians, particularly nurses; and (c) competing VACO policies between nursing, SLP and nutrition (issues of labeling of diet). Preliminary results from Indianapolis demonstrate that among veterans admitted to the hospital 2030/2071 (98.0%) received dysphagia screening and 166/2030 (8.2%) had a positive screening. The system redesign methodology is in progress but has already identified several problems with the dysphagia screening tool including: the length and content of the questionnaire; delays in patient receiving oral medications; confusion regarding diet status; confusion regarding diet taxonomy; access to speech-language pathology on nights/weekends; and inadequate communication of positive screen results among staff members. The process has revealed that the use of dysphagia diets have increased substantially and that general awareness about dysphagia has improved. Data regarding several outcomes is pending at this time (e.g., sensitivity and specificity of the tool; change in dysphagia screening rates; change in pneumonia rates; change in speech consultation rates; and change in length of stay).

STATUS:

Data collection is ongoing at both sites.

IMPACTS:

This study suggests that dysphagia screening is a multi-step process that requires time, communication and flexible, but comprehensive training for multiple disciplines of VA clinical staff. Better inter-disciplinary communication is warranted in implementing a dysphagia screen for

veterans hospitalized with stroke. A revised dysphagia screening tool has been developed and is being tested; this tool may be used by other VAMCs as part of the nursing assessment.

5R03AG02 2075 **Lower Antithrombotic Medication Use Among Eligible Older Ischemic Stroke Patients**

Judith H Lichtman PhD, Lisa Naert, Norrina B Allen MPH, Emi Watanabe MPH, Dawn M Bravata MD, Larry B Goldstein MD
VA Connecticut Healthcare System
West Haven, Connecticut

BACKGROUND/RATIONALE:

Aspirin is recommended in patients with acute ischemic stroke, and antithrombotics are often used for DVT prophylaxis in non-ambulatory patients. These drugs are also recommended for prevention of recurrent ischemic stroke. The frequencies of their use in eligible patients reflect quality of care. We investigated whether the use of antithrombotics and DVT prophylaxis varied by age among ischemic stroke patients over age 65 who were eligible for treatment.

METHODS:

The analysis included Medicare fee-for-service (FFS) beneficiaries ≥65 years of age, discharged with ischemic stroke (ICD-9 433, 434, 436) in the Medicare Health Care Quality Improvement Program's National Stroke Project 1998-1999, 2000-2001. Patients discharged from non-acute facilities, transfers, those who had a terminal illness, or documented contraindications to the therapies were excluded. We compared the receipt of an antiplatelet medication, antithrombotics for atrial fibrillation (AF), and DVT prophylaxis (by day 2 among non-ambulatory patients) during the acute hospitalization and the use of antithrombotics at discharge by age (65-74, 75-84, and 85+ yrs).

RESULTS:

Among 31,554 patients (mean age 79 years, 59% women, 79% white), 70.1% of eligible patients received antiplatelet drugs, 17.9% DVT prophylaxis, and 82.6% antithrombotics for AF; 72.4% were discharged on these drugs. The use of these therapies among eligible candidates decreased with advancing age, especially for those over age 85 years (each p<0.0001, see table).

CONCLUSIONS:

Use of antithrombotics decrease with age among older ischemic stroke patients. The reasons for the observed decrease and the overall low use of DVT prophylaxis in otherwise eligible patients requires further investigation.

	Total		65-74	75-84	85+	p-value
	N	%	%	%	%	
Antiplatelets In-Hospital	21852	70.1	74.4	70.7	64.5	<0.0001
DVT Prophylaxis In-Hospital	1615	17.9	19.2	20.4	14.1	<0.0001
Warfarin for Afib In-Hospital	3193	82.6	88.8	85.7	76.0	<0.0001
Antithrombotics at Discharge	11044	72.4	75.2	72.8	68.4	<0.0001

OQP **Office of Quality and Performance Stroke Special Project**

Dede Ordin, MD; Dawn Bravata, MD; Linda Williams, MD; Bruce Vogel, PhD
OQP/Richard L. Roudebush VAMC/Malcolm Randall VAMC
Funding Period: October 2007 - September 2008

BACKGROUND/RATIONALE:

Indicators of quality for acute stroke care have been developed by several organizations including the Joint Commission (JC) and are currently used in the certification of acute care facilities as Primary Stroke Centers. To date, the VHA has not systematically assessed quality of acute stroke care in VA facilities.

OBJECTIVES:

The objectives of this project are to: 1) identify a cohort of veterans admitted to any VA inpatient facility for management of acute ischemic stroke during FY07; 2) assess and feed back to VA facilities their performance on JC stroke quality indicators among this cohort; 3) assess stroke risk factor management prior to stroke in all veterans in the cohort with VA outpatient care in the year prior to their VA stroke hospitalization; and 4) assess risk factor management and rehabilitation care delivery in the first six months post-stroke for all veterans in the cohort with VA post-stroke follow-up.

METHODS:

Veterans admitted to the VA with ischemic stroke in FY07 will be identified using a modified high specificity algorithm of ICD-9 codes for DXPRIME and/or DXLSF. Data during the index admission will be abstracted to assess JC stroke performance measures as well as other selected stroke management process variables and clinical variables necessary for optimal risk adjustment. Pre-stroke vascular risk factor information (e.g. blood pressure, LDL, Hgb A1c) and management data will be abstracted in those veterans who also have outpatient care in a VA NEXUS clinic in the year prior to their stroke. Similarly, post-stroke vascular risk factor and management data, and rehabilitation care delivery variables will be assessed in those with VA outpatient care in the first six months post-stroke. All data will be abstracted from the electronic medical record by trained abstractors at WVMI. Data analysis will be conducted by the Stroke QUERI in collaboration with OQP and will calculate performance indicators at the facility, VISN and national levels. Feedback of JC inpatient stroke performance measures only will be coordinated by OQP. Additional facility-, VISN-, and national-level descriptive analyses of characteristics of VHA stroke patients, including aspects of their pre-admission and post-discharge care will be provided to the field in collaboration with and under the direction of OQP.

FINDINGS:

No results at this time. Data elements have been identified. Drs. Bravata and Williams have trained WVMI abstractors in retrospective stroke severity assessment. Pilot abstractions will be completed by December 7, 2007. Chart abstraction will be completed by February 2008. Data analysis will begin in February 2008 with targeted feedback to facilities in the third quarter of FY08.

STATUS:

Active.

IMPACT:

This project will provide benchmark data about VA performance for acute inpatient stroke care. In addition, it will identify important evidence-practice gaps in acute stroke care and in pre- and post-stroke risk factor management. These data will be used by QUERI in its FY08 Implementation Project to develop and test a stroke quality improvement network, will help

prioritize future planned projects to improve VA stroke care, and will hopefully stimulate the field to work proactively to improve VA stroke care.

1RO1HS013940-01 Process Outcomes Links in the National Stroke Project

L. Brass (deceased)
J. Litchman

Funding Period: September 2003 - August 2008

BACKGROUND AND PURPOSE:

Stroke survivors are commonly dependent in activities of daily living; however the relationship between pre-stroke mobility impairment and post-stroke outcomes is poorly understood. The primary objective of this study was to evaluate the association between pre-stroke mobility impairment and four post-stroke outcomes. The secondary objective was to evaluate the association between pre-stroke mobility impairment and a plan for physical therapy (PT).

METHODS:

This was a secondary analysis of the National Stroke Project data, a retrospective cohort of Medicare beneficiaries who were hospitalized with an acute ischemic stroke (1998–2001). Logistic regression modeling was used to examine the adjusted association between pre-stroke mobility impairment with patient outcomes and a plan for PT.

RESULTS:

Among the 67,445 patients hospitalized with an ischemic stroke, 6% were dependent in pre-stroke mobility. Pre-stroke mobility dependence was independently associated with an increased odds of: post-stroke mobility impairment (OR 9.9, 95%CI 9.0-10.8), in-hospital mortality (OR 2.4, 95%CI 2.2-2.7), discharge to a skilled nursing facility (SNF) (OR 3.5, 95%CI 3.2-3.8), and the combination of in-hospital death or discharge to a SNF (OR 3.5, CI 95% 3.3-3.8). Pre-stroke mobility dependence was independently associated with a decreased odds of having a plan for PT (OR 0.79, 95%CI 0.73-0.85).

CONCLUSIONS:

These data, obtained from a large, geographically diverse cohort from the United States, demonstrate the strong association between dependence in pre-stroke mobility and adverse outcomes among elderly stroke patients. Clinicians should screen patients for pre-stroke mobility impairment to identify patients at greatest risk for adverse events.

IMV 04-096 **Implementation Evidence in the Detection and Treatment of Post-Stroke Depression**

Linda S. Williams, MD
Richard L. Roudebush VA Medical Center
Indianapolis, IN
Funding Period: July 2003 - December 2009

BACKGROUND/RATIONALE:

This proposal is in response to the VA RFP VISN Implementation Collaborative and is the extension of our VISN Implementation Planning Grant Implementing Evidence in the Detection and Treatment of Post-stroke Depression. We have used the planning grant to develop a strong team of clinicians and investigators in VISN 8 and 11, conduct critical formative evaluation of the patterns of stroke follow-up in facilities within these VISNs, as well as the patient- and provider-perceived barriers and facilitators to successful screening and treatment of post-stroke depression (PSD). Further, this proposal reflects the joint efforts of VA Stroke QUERI investigators as it is one of the core implementation projects planned and supported by the QUERI. We are convinced that that this proposal will advance the quality of care for our veteran stroke survivors and will also advance the science of implementation intervention research.

OBJECTIVES:

Our immediate objective is to test the planned system intervention to evaluate which aspects of the intervention are critical to improving the quality of care for veterans with PSD, and to refine it to prepare for our long-term objective: a multi-site study across multiple sites and VISNs. To address our immediate objective, we will evaluate two specific study aims using a quasi-experimental design comparing improvement in depression screening and treatment in veteran stroke survivors receiving care at two facilities receiving the intervention.

The primary aim of the study is to evaluate the effectiveness of a system intervention to improve the proportion of veterans screened and treated for PSD. The system intervention is based on extending the use of the current depression performance measure that mandates yearly depression screening in VA primary care clinics to target veteran stroke survivors a) following-up in Primary Care within six months of stroke, and b) following-up in VA Neurology clinics. The secondary aim of the study is to evaluate whether a patient-based self-management intervention provides additional benefit beyond the system intervention alone in improving guideline-adherent treatment of depression and improves patient depression symptoms, quality of life, and self-efficacy compared to usual post-stroke care. Subjects for the secondary aim will be recruited from the two intervention sites and will be randomized, stratified by site, to the patient intervention or usual care.

A1. Hypotheses/key research questions

Specific **Aim 1**: To determine whether the system implementation intervention improves a) detection, and b) guideline-adherent treatment of PSD. Aim 1 Hypotheses: Compared to the base rate of PSD screening and treatment at the two intervention facilities, the system intervention will result in at least a 25% increase in: a) The proportion of veterans screened for PSD in the first six months after stroke, and b) The proportion of veterans with PSD that receive guideline-adherent depression treatment.

Specific **Aim 2**: To determine the effect of a patient self-management intervention in improving a) guideline-adherent treatment of PSD, and b) patient-centered outcomes after stroke. Aim 2 Hypotheses: Compared to veterans receiving usual post-stroke care, veterans receiving the self-management intervention will: a) Be more likely to receive guideline-adherent PSD treatment, and b) Have fewer depression symptoms, improved quality of life, and reduced health-related fears after stroke.

METHODS:

Specific **Aim 1:** we are gathering administrative data on veterans with ischemic stroke hospitalized at any of the VISN 8 or 11 VAMC facilities during the 18-month cohort enrollment period. For Specific **Aim 2,** we are recruiting hospitalized veterans for ischemic stroke at the Indianapolis or Gainesville VAMC, age 18 or older, able to speak and understand English, no severe cognitive impairments, access to a telephone, willing to follow-up at VA outpatient care, willing to participate in interviews, and life expectancy of at least six months. We anticipate

identifying 822 stroke patients from administrative data in VISNs 8 and 11 for Aim 1. For Aim 2, we plan to recruit 140 stroke patients into the Aim 2 self-management cohort.

Aim 1: All data will be obtained from the VA administrative databases. These data include ICD-9 codes extracted from Patient Treatment File main as well as basic demographics (i.e., age, gender, race, ethnicity, depression screening results, antidepressants prescribed, and number and type of outpatient follow-up appointments in the six months after stroke). All outcome data for this aim will be collected from electronic medical records that are part of the usual clinic care of the patients (VISTA and PBM data).

Aim 2: Data for the self-management program will be collected via patient interviews during the course of the study. The baseline interview will take place prior to hospital discharge or within two weeks of discharge. Two other interviews for outcome assessment will be done by phone at three and six months post-stroke.

Intervention patients will also receive a self-management program over the first six months post-stroke. The program consists of six sessions delivered either in person or by phone and four additional follow-up calls to assess goal setting, behaviors, and study outcomes. Based upon our earlier work, patients have expressed an interest in the following topics: expectations after stroke, negative/positive thinking, fears, creating a daily schedule, follow-up care, communication with providers, adapting/coping with disabilities, community resources and communication with caregivers. These topics will be addressed in the six sessions.

Control patients will get baseline, three, and six-month interviews with the same outcome assessments. They will be provided American Stroke Association printed literature about stroke risk factors, warning signs, and community resources. They will receive one individual session prior to discharge or within two weeks of discharge focusing on stroke symptoms and risk factor education. They will receive the same number of calls at similar frequency to the intervention patients but the calls will generically cover how they are doing since their stroke and will not address goal setting, post-stroke behaviors, or self-management strategies.

The primary outcome for the patient self-management intervention is depression symptoms as assessed by the PHQ-9. Secondary outcomes include depression treatment, quality of life (measured by the Stroke-specific Quality of Life scale), self efficacy, fear of injury, and stroke outcomes (patient-reported modified Rankin scale).

FINDINGS:

Study in progress. To date 34 patients have been enrolled in Aim 2 of the study.

IIR 01-104 **Quality Evaluation in Stroke and TIA (QUEST)**

Dawn M. Bravata, MD
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Indianapolis, Indiana
Funding Period: July 2003 - June 2007

BACKGROUND/RATIONALE:

Stroke patients cared for in stroke units have better outcomes than patients treated in general wards. Although the benefits of stroke unit care have been demonstrated in numerous studies, the processes of stroke care that are responsible for the observed improvements in patient outcomes have not been identified.

OBJECTIVE(S):

The primary aim of this study is to identify processes of care received by patients hospitalized with acute ischemic stroke and transient ischemic attack (TIA) that are independently associated with a reduction in in-hospital mortality or institutionalization to a skilled nursing facility, adjusting for patient characteristics. We will examine several processes of acute stroke care: fever management, hypoxia management, blood pressure management, neurology assessment, swallowing evaluation, deep vein thrombosis prophylaxis, and early mobilization. Our hypothesis is that specific processes of acute stroke care improve patient outcomes. The secondary aim of this study is to further examine those processes that are associated with reduced in-hospital mortality or institutionalization to a skilled nursing facility to detect the specific components of each process that account for improved patient outcomes. For example, if fever management is associated with improved outcomes in the primary analysis, then we will examine specific components of fever management in the secondary analysis (i.e., prescription of antibiotics). Our hypothesis is that for each essential process of stroke care, specific components of that process improve patient outcomes.

METHODS:

This is a retrospective medical record review of 2000 patients hospitalized with acute ischemic stroke or TIA between 1998 and 2004 at three VA hospitals and three non-VA hospitals.

FINDINGS:

None at this time.

IMPACT:

The challenge within the VA is to provide excellent stroke care across the spectrum of medical centers. The QUEST Project provides key support to this mission by identifying the processes of care that are associated with improved patient outcomes. These results can be used to enhance care within the VA nationwide and lead to improved outcomes for veterans with stroke.

RRP 07-293 **Racial Disparities in Blood Pressure Management Among Stroke Patients**

Dawn Bravata, MD
Richard L. Roudebush VA Medical Center
Indianapolis, Indiana
Funding Period: July 2007 - December 2007

OBJECTIVES:

The primary aims of this proposal are to examine whether racial differences exist in the management of blood pressure: (1) in the one-year prior to hospitalization for acute ischemic stroke, (2) in the acute stroke period (the first 48 hours after admission to the hospital), (3) at the time of discharge from the hospital, and (4) in the one year after discharge from the stroke hospitalization.

METHODS:

The proposed project includes three components: (a) a secondary analysis of an ongoing retrospective cohort study entitled "Quality Evaluation in Stroke and Transient Ischemic Attack" (QUEST), (b) a medical record review of veterans included in the QUEST project including data from the one year pre-stroke and one year post-stroke, (c) the identification of barriers and opportunities to improving blood pressure management and the development of rapid cycle implementation strategies that will facilitate the implementation of programs to address any identified gaps or disparities in blood pressure care within the VA sites.

The primary outcomes will be median systolic and diastolic blood pressure, and median anti-hypertensive medication dose in the one year pre-stroke, at discharge, and in the one-year post stroke. The secondary outcomes will include: the proportion with guideline adherent blood pressure management during the acute stroke period; the mean number of primary care visits in the one year pre-stroke and in the one-year post stroke; the proportion of antihypertensive refills obtained on-time; the proportion with prosthetics consults for home blood pressure monitor devices; the proportion with clinician documented reasons for poor blood pressure control; and the proportion with recurrent vascular events or death within the one-year post-stroke.

Approximately 1500 patients will be included in the final QUEST cohort; approximately 500 will be veterans, and approximately 15% of the veterans are Black, whereas 20% of the non-veterans are Black. The primary analysis for this proposed project will be a comparison of blood pressure management between blacks and non-blacks both within the VA. The secondary analyses will be a comparison of blood pressure management (a) overall between the VA and non-VA sites, (b) a race-based comparison between the VA and non-VA sites, and (c) a comparison between those in care at the VA pre-stroke versus those not in care at the VA pre-stroke.

IMPACTS:

This proposal focuses on the evaluation of blood pressure management in both the acute stroke setting and the outpatient setting, assessing whether blood pressure management guidelines are being implemented equally across races. Data from this proposed project will be used to identify opportunities to implement future programs to address any racial disparities in care that exist in three VA medical centers. These data will serve to guide future implementation projects to improve blood pressure management for veterans with cerebrovascular disease, beyond the quality improvement efforts that are already ongoing within the VA primary care service. Opinion leaders at the three VA medical centers will be informed of any gaps in care or racial disparities in care that are identified at their site. Interventions to improve any identified disparities in care will be developed as part of this RRP but the evaluation of these programs will not be included in this proposed project.

B5-4346R **Cost-Effectiveness of Stroke Rehabilitation Settings in the VA**

W. Bruce Vogel, PhD
North Florida/South Georgia Veterans Health System
Gainesville, Florida

Funding Period: March 2007 - February 2009

BACKGROUND/RATIONALE:

Stroke is the leading cause of disability and the third leading cause of death in the U.S. In the Department of Veterans Affairs (VA), stroke related diseases consume at least $1 billion annually, or 5% of health care resources, with approximately 15,000 new stroke patients seen each year. A 1999 study suggested a much higher incidence of stroke than previously reported, with 259 new strokes per 100,000 population. The increasing number of older adults and the emergence of new therapies for acute stroke suggest that the number of survivors with significant residual physical, cognitive, and psychological disabilities will continue to increase, with more survivors living with the aftermath of stroke. Simultaneously, concerns over resource consumption in health care generally, and within the VA specifically, have focused increasing attention on finding efficient methods of achieving quality outcomes. Consequently, it is becoming increasingly important to examine the cost-effectiveness of stroke rehabilitation within the VA, and to understand how formal rehabilitation services across different settings contribute to achieving cost-effective improvements in functioning. The VA presently collects admission and discharge FIM scores on all stroke patients treated within the VA through its Functional Status Outcomes Database (FSOD). These data are incorporated into the Integrated Stroke Outcomes Database (ISOD) maintained by the Rehabilitation Outcomes Research Center (RORC), which will be the central data source for this proposed research. This availability of comprehensive functional recovery data across the continuum of care enables better evaluations of the effectiveness and efficiency of VA

OBJECTIVES:

The objective of this research is to compare the cost-effectiveness of stroke rehabilitation in the VA across different rehabilitation settings. We propose to examine the change in treatment cost per change in Functional Independence Measure (FIM) for stroke patients in four VA rehabilitation settings involving: (1) no post-acute rehabilitation care (2) post-acute rehabilitation in a non-specialized location (3) post-acute rehabilitation in a subacute rehabilitation unit (i.e., typically a nursing home) and (4) post-acute rehabilitation in a specialized acute rehabilitation unit (either alone or in any conjunction with any other combination of post-acute care).[Hoenig, 2000] In accomplishing this objective, we will also document variations in treatment costs and functional outcomes across these settings. Specific research questions include: (1) What are the differences in treatment costs per patient across rehabilitation settings after controlling for the factors that influence costs? (2) What are the differences in functional status outcomes across rehabilitation settings after controlling for factors that influence such outcomes? (3) What are the differences in treatment cost per FIM point across rehabilitation settings after controlling for factors that influence both costs and outcomes.

METHODS:

We will use data from the ISOD for our analyses. The ISOD is a census of stroke patients seen in the VA nationwide, so adequate power to detect statistically significant differences is not an issue. We will, however, address the issue of clinical significance of any differences as part of our research. We will use data from the 2004 National Patient Care Database (NPCD), consisting of data on inpatient, outpatient, and extended care VA patients as merged with the ISOD. In addition, we will use the VA Decision Support System (DSS) National Data Extracts (NDEs) for treatment cost data. We will validate these cost data with the VA Health Economics Resource Center's (HERC) average cost data as recommended by HERC. We will use advanced linear model techniques to control for patient and facility characteristics that influence both costs and outcomes. While such techniques can control for observable, well-measured differences among patients and facilities, any observational design such as ours must also address the issue of selection bias. Selection bias in the present context arises from the decisions that clinicians and patients make in selecting stroke patients for rehabilitation services. To the extent that a facility or setting selects 'tougher' stroke patients for rehabilitation than other facilities or settings, that

facility or setting will have comparatively poorer outcomes when factors influencing selection are unobserved or poorly measured. For this reason, we propose to explore the use of instrumental variables techniques along with the more traditional two-stage Heckman approaches to controlling for selection bias in our statistical analyses. In particular, we will explore the use of the differential distance instrumental variable used by McClellan and Newhouse in their seminal work in instrumental variables estimation applied to health care. We are specifically focusing on functional status as the key rehabilitation outcome in our analyses because of the continuing debate in the cost-effectiveness literature over the use of Quality Adjusted Life Years (QALYs) as a global measure of health outcomes. We believe that FIM scores are more appropriate for measuring rehabilitation outcomes, and will provide a more sensitive measure for detecting differences across rehabilitation venues.

FINDINGS:

No findings/results to report at this time.

STATUS:

Start-up activities.

IMPACT:

The results of this research will provide critical guidance to VHA clinicians, planners, and administrators concerning how to achieve maximal functioning for VHA stroke patients within an increasingly constrained budget, thereby addressing the VHA mission to serve America's veterans and to ensure that quality medical care is provided on a timely basis. The desired outcome of this research is to improve the efficiency and effectiveness of VHA rehabiliation resources by identifying differences in costs and outcomes achieved by different rehabiliation settings within the VHA, and thereby enabling the VHA to adjust its mix of rehabilitation settings in the most cost-effective manner.

CDA 04-342-2 **Implementation of Targeted Evidence Based Clinical Improvements to Overcome Clinical Inertia**

Christianne L. Roumie, MD, MPH
Nashville Veterans Affairs Medical Center
Nashville, Tennessee
Funding Period: July 2006 - December 2009

BACKGROUND/RATIONALE:

This research builds upon the Chronic Care Model and proposes lines of inquiry in two broad and related areas: 1. the factors that affect the provider-patient relationship and yield productive interactions in hypertension care and 2. improving hypertension management in the primary care setting. Project 1, has the following aims: 1. Characterize veteran "activation" and perception of patient centered care. 2. Prospectively evaluate patient level of activation on previously identified barriers to hypertension control--medication adherence and visit adherence. Project 2 has the following Specific Aims: 1. Delineate the provider characteristics (level of provider training, as well as generalist vs. specialist) that predict "clinical inertia" and uncontrolled hypertension. 2. Determine if clinical inertia is more likely with certain patients--specifically elderly patients and those who have multiple co-morbidities. These goals are consistent with the primary goals of the career development award improving the quality of hypertension care in these veterans while understanding the process and outcomes of care in patients with differing levels of activation.

OBJECTIVES:

I aspire to become an investigator who can design, execute, analyze and disseminate studies that identify feasible and sustainable interventions to improve hypertension control in veterans. Over the 3 year award period I will achieve 4 short term goals with the help of my mentors: 1. To become more familiar with implementation methodology and clinical effectiveness trials designed to improve the quality of care; 2. to better understand population-based approaches in caring for patients with cardiovascular diseases including observational epidemiology and pharmacoepidemiology 3. Increase knowledge of the concept of patient activation and its effect on process and outcomes of care—and to use survey data to measure patient activation, 4. to extend my collaborative research network locally and nationally.

METHODS:

During this award period, I will focus on the care of veterans with hypertension. In the first portion of my career plan covering this award period, I will investigate patient factors including the concept of activation and patient centered care among veterans. I will also evaluate provider factors that may affect guideline concordance and lead to productive interactions.

IMPACT:

Through the study of patient provider and system interactions, we can begin to understand and employ integrative approaches that target both the patient and provider to achieve collaboration in the application of evidence based guidelines. Through this collaboration we can improve quality of healthcare by minimizing the variation that exists in outpatient settings for the care of chronic diseases such as hypertension.

P30 AGO 24-967 The Exploration of the Development of Fear of Falling after Stroke

Arlene Schmid, PhD
Richard L. Roudebush VA Medical Center
Indianapolis, Indiana
Funding Period: September 2006 - August 2007

BACKGROUND/RATIONALE:

The presence of fear of falling (FoF) is common in the general elderly populations. FoF can limit participation in daily activities, within roles and social functioning, decrease self-efficacy and lead to increased caregiver burden, which may all lead to a general decrease in functioning following a stroke. FoF and its consequences may easily become a vicious cycle of decreased physical ability, loss of independence and increased fear and risk of falling. There is a paucity of literature specific to the development of FoF after a stroke and how FoF might negatively impact recovery of activities of daily living (ADLs) and instrumental activities of daily living (IADLs).

OBJECTIVES:

The objective of this study is to survey post-stroke individuals to estimate the prevalence of FoF and to better understand the timing and consequences of the development of FoF and the impact on activity limitations after stroke. The ultimate goal is to use these data to develop patient-centered interventions to improve activity after stroke.

METHODS:

This is a longitudinal cohort study using a mixed method of quantitative and qualitative data collection on FoF and falls after stroke. Data will be collected using closed and opened survey questions that will include standardized assessments. We are interested in understanding the participants' perspective of FoF and the impact it has on post-stroke FoF to develop future interventions.

All baseline assessments will be completed before the stroke survivor is discharged from the hospital. In order to capture the process of the development of FoF, participants will be asked to engage in follow up interviews and assessments at 3 and 6 months after discharge from the hospital.

FINDINGS:

This study has not begun as we are waiting for IRB approval. About ½ of the 50 participants will be veterans who have survived a stroke. This study will provide us a better understanding of the development and incidence of fear of falling, but most importantly we will explore the impact of fear on veteran community integration and social participation after stroke.

RWJ 051081 **Robert Wood Johnson Foundation Generalist Physician Faculty Scholars Program: The Diagnosis and Treatment of Sleep-Disordered Breathing in the Home of Patients with Transient Ischemic Attack**

Dawn M. Bravata, MD
Richard L. Roudebush VA Medical Center
Indianapolis, Indiana
Funding Period: July 2004 - June 2008
Mentor: John Concato, MD

PURPOSE:

Despite existing secondary prevention therapies, patients with transient ischemic attack (TIA) are at high risk of recurrent vascular events such as stroke, myocardial infarction, and vascular death. New therapeutic approaches for patients with TIA are needed to reduce this risk of recurrent vascular events. Sleep apnea is a risk factor for cerebrovascular and cardiovascular disease, is common among patients with stroke and TIA, and is associated with poor outcome following a stroke or TIA. We hypothesize that diagnosing and treating sleep apnea in TIA patients can improve cerebrovascular and cardiovascular outcomes.

The primary aims of this study are to determine in TIA patients: 1) the prevalence of sleep-disordered breathing; 2) the feasibility of diagnosing and treating sleep-disordered breathing using an auto-titrating continuous positive airway pressure (auto-CPAP) machine within 24-hours of TIA symptom onset; 3) adherence to auto-CPAP; and 4) the effect of auto-CPAP on blood pressure.

METHODS:

We will recruit 80 TIA patients from primary care offices and Emergency Departments in the greater New Haven, Connecticut area. Patients will be randomly assigned to either the intervention or the control groups. Each patient in the intervention group will use an auto-CPAP machine at home for up to 90 days and will then receive an unattended sleep study using a home sleep monitor. Auto-CPAP adherence will be supported by scheduled visits to patients on days 1, 2, 7, 30, 60, and 90-post-TIA. Each patient in the control group will receive two unattended sleep studies using a home sleep monitor, one upon enrollment and another after 90 days.

RESULTS:

Data collection continues at three sites: Yale-New Haven Hospital, the West Haven VA Medical Center, and the Hospital of St. Raphael. A total of 62 patients with transient ischemic attack (TIA) have been enrolled; 6 patients are actively engaged in the protocol. We expect to complete our enrollment of 80 patients by February 2008.

An interim analysis revealed the following preliminary results related to the four primary project goals. (1) Sleep apnea appears to be common in the post-TIA population: 8/15 (53%) patients have sleep apnea in the immediate post-TIA period and 16/31 (52%) have sleep apnea 90-days post-TIA. (2) We have found that it is generally feasible to diagnose and treat sleep-disordered breathing using auto-CPAP. Patients state that the acute TIA period is a very busy time and often express the desire to delay diagnostic procedures for several days. (3) Excellent CPAP adherence is defined as using CPAP for >4 hours per night. The median auto-CPAP adherence in our cohort has been 4.7 hours/night overall and 5.1 hours/night among patients with sleep apnea. (4) Auto-CPAP does not appear to substantially change blood pressure or blood pressure medication use in this cohort. The use of auto-CPAP is associated with clinically and statistically significant improvements in daytime sleepiness and quality of life and with a trend toward improvements in recurrent vascular events and depression.

CONCLUSIONS:

Cerebrovascular disease is a major medical problem for which additional therapies are greatly needed. If we find that diagnosing and treating sleep-disordered breathing is associated with improvements in patient outcomes, then our results will likely provide a new opportunity for stroke prevention by generalist physicians. The proposed research can also influence clinical practice and improve patient care by evaluating an alternative, outpatient, approach to the diagnosis and management of sleep-disordered breathing. The results of the current research

will be used as pilot data for planning a future randomized controlled trial of auto-CPAP for patients with TIA.

RRP 07-305 **Intervention Development for Shared Decision Making in Stroke Prevention**

Constance Uphold, PhD, ARNP-BC, FAAN
North Florida/South Georgia Veterans Health System
Gainesville, FL
Funding Period: November 2007 - April 2008

OBJECTIVES:

The aims of this project are to 1) describe patients' perceptions of using anti-thrombotics for stroke prevention, and 2) develop and evaluate a script and video design to improve shared decision making related to stroke prevention. This project fits well with the QUERI mission and addresses three interest areas in the QUERI Nursing Implementation RRP: 1) achievement of appropriate self-care, 2) demonstration of health-promoting behaviors, and 3) patient care delivery models and systems of care. In this application, we propose to develop the script and video design. This first step is critical to meeting our future goal to produce a video, which will be disseminated system-wide. By making this future video a part of the "treatment" program for veterans with atrial fibrillation (AF), we will not only improve the quality of care veterans receive (through improved communication with nurses and other providers), but we will also improve the patients' quality of life (empowering them to participate in their own care, and hopefully preventing a stroke).

RESEARCH PLAN:

This project is a pre-implementation project involving qualitative interviews of veterans and VA providers. This project will be the first step in developing a patient education video on anti-thrombotic choices that nurses can use in in-hospital, outpatient, and home settings. We will use the concepts within the Transtheoretical Model and the direct-to-consumer approach to increase patient's/family's knowledge of anti-thrombotics and improve self-care skills.

METHODS:

This project builds on the research of investigators in the VA Rehabilitation Outcomes Research Center (RORC), the Stroke QUERI Center, and the UF CJHC. We will conduct 8 face-to-face qualitative interviews with patients who have AF and who are not using anti-thrombotics. Based on concepts within the Transtheoretical model, we will describe patients' perspectives of AF, anti-thrombotics, and their past experiences with decision making and decision self-efficacy. We will use traditional qualitative methods to conduct the interviews and we will analyze the data with the constant-comparative method using the *N6* program. Findings from these interviews will be the foundation for a script and video design to improve shared decision making regarding stroke prevention options. We will gather input from veterans and partner with organizations (e.g., VA Stroke QUERI, VA Patient Education Service, VHA National Center for Health Promotion and Disease Prevention, American Heart Association, American Stroke Association) in creating and evaluating our script and video design. Our technical team (creative director, health communication specialist, telecommunications specialist) will put the script in broadcast terms and carefully plan that the video has appropriate shots, wording, length, lighting, set design, editing, sound, tone, and spokespersons. The interdisciplinary healthcare team (2 nurses, 2 physicians, 1 pharmacy administration researcher) will contribute the clinical content. The VA marketing specialist, with input from the consultant, will assure that the video is veteran-centric and is appealing and understandable for veterans of all races/ethnicities and education levels. After completion of the script/video design, we will interview veterans and convene a focus group of NF/SG VHS nurses and providers from diverse racial groups to evaluate and make recommendations for improving the video. In the future, we will use the finalized script/video design to produce a video that patients can view and VA nurses can use at the bedside, and in clinics and homes to educate and activate patients to share in the decision making. Next, our future plan is to test the video and ultimately to conduct an implementation project to disseminate the video system-wide.

FINDINGS:

Initial Report

RRP 07-294 **STARS: Stop Tobacco-Attributable Risk after Stroke**

Teresa Damush, PhD
Richard L. Roudebush VA Medical Center
Indianapolis, Indiana
Funding Period: January 2008 - June 2008

BACKGROUND/RATIONALE:

A wealth of evidence confirms that tobacco smoking is a major risk factor for the development of cardiovascular disease, including but not limited to stroke. Overall, patients who smoke exhibit at least double the risk for stroke, compared to patients who do not smoke, and associated treatment is costly. Although the VA monitors tobacco cessation counseling as performance measures in both inpatient and outpatient settings, currently there are no existing tobacco cessation programs that are systematically delivered to veterans admitted with stroke to prevent another stroke.

OBJECTIVES:

Lifestyle changes, particularly smoking cessation, are cost-effective interventions that can substantially prevent the incidence of an initial stroke as well as recurrent stroke. Capitalizing on the hospitalization period as an important "window of opportunity" for initiating the behavior change process, this application aims to conduct developmental formative research to: (a) characterize the current VA procedures for the management of tobacco cessation in veterans admitted with stroke or TIA for secondary prevention, and (b) apply the PRECEDE-PROCEED model and Intervention Mapping procedures in planning an effective tobacco cessation intervention for veterans admitted with stroke or TIA to prevent a secondary stroke.

METHODS:

Specifically, we will (a) visit 3 VAMCs in VISN 11 (Indianapolis, Danville, and Northern Indiana) to observe the existing tobacco cessation intervention procedures for hospitalized veterans identified as current smokers, (b) conduct in-depth interviews with key informants, (c) conduct four focus groups with previous patients/family members (n=48 participants, total), and (d) administer surveys to previous patients and their family members at the three VAMCs (n=600 surveys, total). This broad range of informants is necessary to characterize the issue fully and to gain a clear understanding of the capacity (strengths, weaknesses) of both target populations—the healthcare providers and the patients/families—for the intervention. These findings will provide the necessary information for Intervention Mapping procedures, to be applied in a subsequent grant application, to operationalize a theory-based intervention that will target both the healthcare providers within the VA system and the patients/family. Given our "ground-up" approach, which addresses the needs of key stakeholders, we anticipate that our resulting intervention will witness high levels of adoption as well as ultimate success in promoting cessation among veterans admitted with stroke or TIA.

FINDINGS:

No results at this time.

IMPACT:

Our goal in this formative stage is to obtain the necessary data for development of a feasible and effective tobacco cessation service intervention. We envision that next steps will be to submit a VA Merit Review application. Importantly, the results of the proposed RRP will inform the Stroke QUERI's efforts in secondary stroke risk factor management and prevention among veterans with stroke.

ACC 01002 **Developing of the Self-management TO Prevent (STOP) Stroke Tool: A Feasibility Study**

Jane A. Anderson, MSN, RN, FNP
Michael E. DeBakey VAMC
Houston, Texas
Funding Period: June 2006 - June 2007

OBJECTIVE:

Our overall objective for this pilot project was to evaluate the feasibility of developing a computerized patient encounter template that directs nurse practitioners and other providers in clinical practice guidelines for stroke secondary prevention and patient self-management. ***Setting/Subjects:*** The project took place at the Michael E. DeBakey VA Medical Center (MEDVAMC) in Houston, Texas. A multidisciplinary team comprised of experts in stroke care from neurology, nursing, patient education, and information resource management (IRM) met regularly from July through December of 2006 to inform the design specification for the STOP Stroke tool.

METHODS:

Stroke secondary prevention guidelines from the AHA/ASA and VADoD were translated into an algorithm format. The team then applied Use Case Method (UCM) scenarios to determine how the end-user would interact with the tool to achieve specific goals and functions. During the UCM process, the design team identified patient specific clinical information to be entered by clinicians using the tool (inputs). The stroke secondary prevention algorithm was then applied to determine appropriate clinical recommendations to be generated by the tool (outputs). Validation occurred during the UCM process as design team members achieved consensus on the inputs and outputs, and specifications for functionality.

FINDINGS:

Template design specifications were compiled into a design blueprint. This document served as the outline for developing a prototype of the STOP Stroke Tool using Reminder Dialog programming. Functionality specifications were: (1) access to the template during documentation of patient encounters, (2) guidelines embedded as text reminders, (3) check boxes that prompt guideline adherent care and automate documentation, (4) automated orders and consultations, and (5) storing of selected quality indicators in the Veterans Health Information System Architecture (ViSTA) for outcomes monitoring. Design specifications for prototype architecture included a platform dependent template-based tool within ViSTA that was easily accessible to providers via the graphic user interface CPRS. Two component sections of a prototype template programmed in reminder dialog were completed.

IMPACT*:*

Findings from this evaluation indicate that computerized template-based tools, such as the STOP Stroke Tool are feasible using current technology within ViSTA and CPRS. Computerized template-based tool may offer a means to bridging the gap in guideline translation across care delivery processes that are often fragmented in current practice. Further development and evaluation is planned to determine if the STOP Stroke Tool facilitates evidence-based care and integrates care delivery processes to improve stroke secondary prevention and patient self-management of behavioral risk factors for ischemic stroke and transient ischemic attack.

Core **Performance Measure National Rollout**

Diane Cowper, PhD
North Florida/South Georgia Veterans Health System, RORC
Gainesville, Florida
Service Activity Period: October 2002 - ongoing

BACKGROUND/RATIONALE:

This service activity originally started prior to the establishment of the Stroke QUERI in Gainesville/Indianapolis. RORC investigators consulted with the PM&RS National Program Office and the Office of Quality and Performance about establishing a performance measure for rehabilitation. In the AHRQ Guidelines for Stroke Rehabilitation (and, subsequently, the VA/DoD Guidelines for Stroke Rehabilitation), one of the elements is that patients with stroke be assessed for rehabilitation potential. RORC investigators worked closely with the PM&RS Office to establish a numerator and denominator so that the percentage of stroke, amputees, and TBI who were given a Functional Independence Measure assessment could be calculated. After the Stroke-QUERI Research Coordinating Center moved to Gainesville, this activity was shifted to Goal Group 2. Over the past four years, data extraction, rate calculation and mapping of VISN variation in the rehabilitation performance measure have been conducted on a quarterly basis.

STATUS:

This is an ongoing quarterly activity.

IMPACT:

Since the initiation of the Performance Measure using the strategy of forming collaborations with Physical Medicine and Rehabilitation Services and the Office of Quality and Performance (OQP), we are observing changes in patient care; for example, in FY07, the percentage of all stroke patients in the moderate stroke impairment group receiving intensive rehabilitation services increased from 22% to 30%.

STR 03-168 **VA National Supporting Indicator**

Diane Cowper, PhD
North Florida/South Georgia Veterans Health System, RORC
Gainesville, Florida
Service Activity Period: October 2005 - ongoing

BACKGROUND/RATIONALE:

This service activity started approximately one year ago. Stroke QUERI investigators consulted with the PM&RS National Program Office and the Office of Quality and Performance on creating another performance measure for rehabilitation. The VA/DoD Guidelines for Stroke Rehabilitation state that inn addition to being assessed for rehabilitation, those patients who are in moderate impairment groups (Functional Related Group) 4 through 7 would benefit from intensive inpatient rehabilitation care. Stroke Investigators provided methodological support to developing an extraction of VA administrative and clinical data to show the percentage 9both b7 facility and VISN) of FRG 4-7 stroke patients who receive intensive rehabilitation services. Additionally, Geographic Information Systems are used to display the Lowest 25%, Middle 50%, and Highest 25% VISNs in providing this level of care.

STATUS:

This is an ongoing activity.

IMPACT:

The first full year of Supporting Indicator has been documented, with the national average of 22.3% of all stroke patients in the moderate impairment groups receiving intensive rehabilitation and vast geographic variation across VISNs. Continues -tracking one quarterly basis may show marked improvement over time.

No assigned # to date

A Transition Assistance Program (TAP) to Improve Self Efficacy and Reduce Strain in Stroke Caregivers

Maude Rittman, PhD, RN, Project Director
North Florida/South Georgia Veterans Health Systems
Gainesville, Florida
Funding Period: October 2007 - October 2008

Objectives:

The proposed caregiver assistance pilot program evaluates an evidence-based program assisting informal caregivers for veterans with stroke related disabilities. Interventions addressing education, support, and problem solving needs are effective in improving the mental health of stroke survivors. About 80,000 veterans receiving health care in the Veterans Health Affairs (VHA) are stroke survivors and about 9,000-11,000 veterans are hospitalized annually with a new stroke. Almost 80% of stroke survivors are discharged home and live for at least five years, shifting a large amount of continuing care to informal caregivers. Informal caregivers play a key role in assisting stroke survivors needing long term care to sustain independent living in their own homes and communities. A VHA priority is to improve the quality of life of veterans receiving long term care, including home care. The proposed demonstration pilot program will be conducted at the Stroke Specialty Rehabilitation Program, VA Caribbean Healthcare System, San Juan, PR and the Michael E. DeBakey VA Stroke Center, Houston, TX. These two centers have the highest volume of stroke treatment in the VHA and have a strong committed team to execute the demonstration pilot program. Both sites have a desire to implement a caregiver transition support program and welcome the opportunity to implement and evaluate a model that can be exported across the VHA. The program takes advantage of our extensive clinical experience using home telehealth technology and our previous research findings on stroke caregiving and stroke recovery after discharge home.

Methods:

This caregiver program occurs during the transition period beginning prior to discharge and extending six weeks during the adjustment period at home. We will compare outcomes of delivering a caregiver assistance pilot demonstration program using outcome evaluation data from two groups. **Group A** will be a comparison group of caregivers who receive standard care provided by the local VAMC. **Group B** will receive the standard care <u>and</u> a caregiver *Transition Assistance Program* (TAP) beginning before discharge and extending across six weeks. The TAP includes three components to improve caregiver self-efficacy and reduce caregiver strain and burden: (1) skill development; (2) education; and (3) supportive problem solving via *videophone technology*. Health outcomes, resource utilization, and relative costs will be evaluated between the two groups. The goals of the program are:

1. Evaluate TAP's impact on caregiver self-efficacy, strain, burden, depression, general health status and satisfaction controlling for caregiver characteristics.
2. Evaluate TAP's impact on veteran functional status, general health status, and resource use controlling for veteran characteristics including co-morbidities.
3. Identify barriers and facilitators to implementing TAP for stroke caregivers.
4. Compare the cost and utilization experience of the standard care group (Group A) to the cost and utilization experience of the standard care plus TAP group (Group B).

Characteristics of caregivers and the caregiving context including veteran characteristics will be collected. Outcome measures will be obtained at baseline while in hospital, 1 month (mid-intervention) and 3 months after discharge. We will assess caregiver general health status, self-efficacy, strain, depression, burden, and satisfaction. We will assess veteran's functional status, instrumental activities of daily living, general health status, and formal resource use. We will use validated measures with good psychometric properties for collecting data from caregivers and veterans. Data analyses will be completed at the end of each data collection point. All of the VA domains of value will be considered: quality, access, function, satisfaction, cost-effectiveness and healthy communities. Data from this project will support a larger implementation project.

QLP 71-003 **Home-Based Tele-health Stroke Care: Validation of Evidence-Based Disease Dialogues**

Neale R. Chumbler, PhD, MA, BS
North Florida/ South Georgia Veterans Health System
Gainesville, Florida
Funding Period: May 2005 - April 2006

BACKGROUND/RATIONALE:

Home-telehealth (where the patient is at his or her own residence and there is direct communication between the patient and clinician located outside the residence) offers the potential to provide a potentially cost-effective method to enhance both in-home rehabilitation and post-stroke disease management. One of several modalities (e.g., an in-home messaging device) may be used for communication. The proposed LIP is congruent with goals 1, 2,and 3 of the VA Stroke QUERI and uses the Guidelines for the Management of Stroke Rehabilitation Care published by the VHA Office of Quality Improvement (http://www.oqp.med.va.gov/cpg/cpg.htm) to guide our research. The elements of the guidelines appropriate for use after discharge from inpatient rehabilitation include management of chronic medical conditions. It further supports the ongoing implementation of VA's CC/HT patient centered care initiative.

OBJECTIVES:

The purpose of the LIP is to collect pilot information that supports the development and initial testing of the VA care coordination/home-telehealth (CC/HT) of disease management dialogues for veterans with stroke and their family caregivers. The proposed LIP advances an ongoing program of study by the PI who has explored the extent to which tele-care coordination (TCC) interventions ar4 associated with reduced health service utilization for veterans with diabetes and heart failure, two very common conditions that stroke patients have to effectively manage in their post-acute, home-based care.

METHODS:

A convenience sample of stroke patients will be used to get a heterogeneous group of veterans with stroke. We will try to get patients who have diverse functional deficits. When available, we will attempt to enroll the stroke patients' family caregivers and they will be asked to complete a dialogue. A sub-group of the stroke patients and their family caregivers will also complete qualitative interviews. Feasibility of using the in-home messaging equipment will be tested by having veterans with these deficits use the equipment examining outcomes such as: -The number of in-home messaging device calls correctly place.-The proportion of all in-home messaging device questions answered.-Comparison of responses to questions via the in-home messaging device versus via telephone interview (the gold standard).-Qualitative feedback from the patients and their caregivers.-What are the barriers/facilitators in stroke patients who are responding to the in-home messaging device?-Exploring which deficits are associated with veterans who are unable to use the device and which deficits lead to the caregivers serving as a proxy in the use of an in-home messaging device.

FINDINGS:

Some core concepts identified from the stroke patients and their caregivers were: (1) assessing and managing the residual effects of stroke; (2) shifting roles and responsibilities. Some of the findings suggest that a comprehensive care coordination program that includes home-telehealth could aid veterans and their caregivers manage stroke recovery across the continuum.

STATUS:

Project is complete. A manuscript from the findings appeared in this past year in a peer-reviewed journal, Topics in Stroke Rehabilitation, and a second paper is currently under review at a second peer-reviewed journal.

IMPACT:

The proposed LIP will develop a new dialogue that will be specifically applicable for stroke patients and their informal caregivers in terms of gaining information on patients' knowledge of stroke, falls, fear of falls, quality of life, and caregivers' unaddressed needs, stress

and burden and facilitators and barriers to care. Even though the proposed LIP is a small pilot study, with a modest sample size, the proposed study tests of novel idea of investigating the barriers/facilitators of using an in-home messaging device for veterans with stroke who have diverse functional deficits. Data gathered will serve as the basis for providing needed information for future studies examining home-telehealth interventions and veterans with disabilities.

B3887R **Home-Based Tele-health Stroke Care: A Randomized Trial for Veterans**

Neale Chumbler, PhD
North Florida/South Georgia Veterans Health System
Gainesville, Florida
Funding Period: January 2007 - December 2009

BACKGROUND/RATIONALE:

Stroke patients clearly benefit from intensive, coordinated, inpatient care. At the same time, there is considerable interest in ways to reduce hospital lengths of stay. Early discharge rehabilitation programs require coordinated, well-organized home-based rehabilitation, and lack of sufficient information about the home setting impedes successful rehabilitation. Unfortunately, resources for in-home rehabilitation are limited.

OBJECTIVE:

The goal of TR is to improve functional mobility using a multifaceted rehabilitation intervention via two types of telehealth technology. Tele-video is used to carry out an in-home assessment of functional mobility, to make treatment recommendations, and to provide periodic goal-oriented reassessment, modifying the treatment plan as the patient improves. Tele-video uses a mobile, wireless video technology with a home health aid in the patient's home to provide live visual and communication from any location in the home between the patient, the home health aid, and a therapist located at the base hospital. It is used to carry out an in-home assessment of functional mobility, to make treatment recommendations, and to provide periodic goal-oriented reassessment, modifying the treatment plan as the patient improves. An interactive, in-home messaging device is used to facilitate adherence with treatment recommendations and to screen for interval problems (depression, falls, and difficulty with self-care).

METHODS:

This is a Phase II, 2-arm, 4-site Randomized Controlled Trial (RCT). Subjects will be recruited from 4 VA facilities that differ in the presence of a Rehabilitation Bed Unit (RBU), but are otherwise fairly similar (Tampa, Minneapolis, Durham, and Atlanta VAMCs). The Rehabilitation Outcomes Research Center (RORC) at the Gainesville, FL VAMC will be the coordinating center. A total of 120 veterans with recent onset of ischemic or hemorrhagic stroke who are discharged to the community will be randomly assigned to one of two groups: (a) TR; and (b) Usual Care. Randomization will be centrally-sealed allocation upon discharge to the community. Dependent variables (physical function, disability, falls-related self-efficacy, and patient satisfaction) will be measured at baseline, 3-, 6-, and 9-months via telephone interviews by the study coordinator located at the RORC who will be blinded to the study group assignment of the patient.

CSP 481 **The Home INR Study (THINRS)**

David B. Matchar, MD
Durham VA Medical Center
Durham, North Carolina

Funding Period: August 2003 - September 2009

BACKGROUND/RATIONALE:

Since home monitors of prothrombin time (PT) may potentially improve the safety, quality, and convenience of chronic anticoagulation management, it is likely that there will be demands from providers, patients, and manufacturers to make home monitors available to VA patients. The rationale for PST is that it would permit more intense monitoring and increased patient participation in his/her own care, resulting in increased precision in anticoagulation control and thus fewer events.

OBJECTIVES:

To compare anticoagulation management with frequent patient self-testing of prothrombin time using home monitoring device with conventional Pt monitoring on major health outcomes: stroke, major bleed, and mortality.

METHODS:

Thirty two VA Medical Centers will participate in the study and it will be conducted in two parts. Part 1: Candidates for PST will be evaluated over a 2-week period for their ability to use the home-monitoring devices. Part 2: The duration of this part of the study will be for two years, 3200 consenting and eligible subjects from Part 1 will be randomized to one of two arms.

FINDINGS:

There are none at this time.

STATUS:

The study is ongoing.

IMPACT:

This study will help determine if home monitoring of PT improves patient's health and if it will be more cost-effective.

IAB 05-297-2 Adapting Tools to Implement Stroke Risk Management to Veterans

Teresa Damush, PhD
Richard L. Roudebush VA Medical Center
Indianapolis, Indiana
Funding Period: January 2008 - March 2010

BACKGROUND/RATIONALE:

Stroke affects at least 15,000 veterans each year, and this number will likely increase as the veteran population ages. According to the AHA, the prevalence of stroke is expected to double by 2020 with the increased proportion of older adults nationwide. Our preliminary QUERI work indicates that stroke risk factors are often undermanaged in VHS.

OBJECTIVES:

The purpose of this study is to help us understand how a stroke prevention program can help improve control of medical conditions that increase the risk of having a stroke. A stroke prevention program is a collection of materials including written materials like pamphlets and brochures, videotapes and training guides for stroke survivors and for the doctors that provide care for them. Other tools that may be used in a stroke prevention program include things that help patients monitor medical symptoms at home like home blood pressure machines or blood sugar monitors and messaging devices that allow reporting symptoms from home to a health care provider.

METHODS:

Rate of compliance with the various measures during the course of the study at the intervention site will be compared between regionally matched facilities. To be eligible, participants must be 18 years or older, hospitalized with stroke or TIA at Indianapolis VAMC or Houston VAMC, willing to participate, have access to telephone, speak and understand English, have no severe cognitive impairments, have a life expectancy of at last 6 mos, and are willing to follow-up in VA outpatient care.

FINDINGS:

No results at this time.

IMPACT:

This proposed study of a stroke risk factor management program may benefit the VHS in several ways. First, it offers VHS a systematic program for reduction in stroke risk factors leading to better health for our veterans and a reduction in inpatient and outpatient rehabilitation and home health services for these events. Second, the VSPP takes into account the varied resources and services offered in VAMCs across the nation, allowing the program to be tailored both to a given facility and to the individual veteran's needs and readiness to change. Importantly, the program could allow all VA facilities to offer guideline-concurrent stroke risk reduction programs and therefore increase compliance with VA/DoD, AHA, and JCAHO stroke care guidelines and improve their quality of stroke care.

IIR 03-151 **VA and Non-VA Healthcare Utilization by Veterans with Acute Stroke**

Huanguang Charlie Jia, PhD, MPH, BA
North Florida/South Georgia Veterans Health System
Gainesville, Florida
Funding Period: July 2004 - June 2006

BACKGROUND/RATIONALE:

No research has been done on the dual utilization of VA and Medicare or VA and Medicaid by veteran stroke patients. Little is known about which veteran stroke patients have used rehabilitation services within the VA system only, and who have used VA and Medicare and/or VA and Medicaid-funded services. Likewise, little is known about the differences in rehabilitation related outcomes between these user groups.

OBJECTIVE:

This purpose of this retrospective observational cohort study is to understand the utilization and outcomes of stroke rehabilitation services by veterans living in the state of Florida who used a single source of care (VA only) versus those patients who received care from multiple sources (VA and Medicare, VA and Medicaid, and VA, Medicare and Medicaid), in calendar years (CY) 2000 and 2001.

METHODS:

This retrospective observational cohort study used secondary data gathered from three major sources: Austin Automation Center for VHA data, VA Information Resource Center for Medicare data, and Florida Agency for Health Care Administration for Medicaid data. From the inpatient datasets, we identified 1,953 study patients who lived in Florida; had a primary inpatient diagnosis matching Reker's high sensitivity stroke ICD-9 codes; and were confirmed veterans between calendar year 2000 and 2001. Patient demographic and clinical characteristics were examined using descriptive statistics. After adjusting for risk factors, a multinomial logit model was constructed to predict out-of-system utilization, and a multivariable logistic regression model was fitted for the study of each outcome measure (12-month rehospitalization and mortality as well as discharge to home at index).

FINDINGS:

Of the 1,953 study patients, 30% used VHA-only care within the first 12 months post-stroke and 70% relied on VHA and other health care programs as well. The user groups were demographically and clinically distinctive. Patients who had their initial inpatient stroke care under VHA received less rehabilitation services during their inpatient and 12-month follow-up outpatient care than Medicare-initial inpatients. Many multiple systems users obtained their post-acute rehabilitation services from VHA outpatient clinics. We predicted that the older and frequent acute care VHA stroke patients were more likely to be either VHA-Medicare or triple users, whereas younger and long-term care users were more likely to be VHA-Medicaid or VHA-only users. The Medicare- and Medicaid-initial inpatients were less likely to be discharged home from their index admission when compared to the VHA-initial inpatients. Further, the multiple-source users were more likely to be rehospitalized for any cause and for recurrent stroke within the first 12 months post index as compared to the VHA-only users. Mortality outcomes depended on when the outcome was measured: If measured from the index admission date, no significant difference across the user groups occurred; if measured from the index discharge date, the VHA-only users were less likely to die within the first 12 months than users of the two dual groups.

IMPACT:

As the first study to examine the utilization and related outcomes of VHA stroke patients who used multiple sources of care, our findings suggest that using multiple sources for post-acute care was common among VHA stroke patients in Florida. In addition, while VHA-initial inpatients received less rehabilitation services than the Medicare patients, VHA provided a safety net for multiple-system enrollee users who need rehabilitation care post-stroke; older and acute-care patients were more likely to be VHA-Medicare dual or triple-system users whereas younger and long-term care patients were more likely to be VHA-Medicaid or VHA-only users; VHA inpatients were more likely to be discharged home than Medicare and Medicaid inpatients; multiple-system

users were more likely to be rehospitalized; and the mortality outcomes were dependent on when the outcome was measured. These findings are limited to VHA enrollee stroke patients who lived in Florida between 2000 and 2001. Future research is necessary, particularly at the national level, to compare the outcomes of different user groups and understand factors such as accessibility, scope of services of each system, benefits under each plan, and patient satisfaction due to possible impacts on patient preference and choice of care across different systems. These findings may help improve VA clinicians' understanding of their patients' characteristics, continuum of care post-stroke, and the importance of considering dual or triple system usage when conducting program evaluations for healthcare systems with a high proportion of dual or triple enrollees.

06-108-02 **VA and Non-VA Healthcare Utilization and Outcomes By Veterans With Stroke**

Huanguang 'Charlie' Jia, PhD
North Florida/South Georgia Veterans Health System
Gainesville, Florida
Funding Period: January 2007 - December 2009

OBJECTIVES:

This study's focus is to understand the process and outcomes of post-stroke care by VA stroke patients who are VA-only users versus those stroke patients who are Medicare-only users or VA-Medicare dual users. The immediate objectives of this study are: (1) to refine the patients' eligibility and utilization status for each healthcare program (VA and Medicare) in 2001-2002 based upon the methods we developed in our on-going project, VA and non-VA rehabilitation utilization by VA stroke patients living in the state of Florida, and to categorize the patients into three user groups (VA-only, Medicare-only, and the dual users), (2) to describe and compare the demographic and clinical characteristics between the three user groups, (3) to profile and compare 12-month pre-index and 3-, 6-, 9-, and 12-month post-index stroke healthcare utilization between the 3 user groups as well as the patterns of health services dual use by the dual users, (4) to predict the out-of-VA healthcare use, and (5) to estimate the differences in 3-, 6-, 9-, and 12-month post-index stroke mortality, rehospitalization in general, readmission for recurrent strokes, fractures, and discharge to community at index hospitalization between the three user groups and geographic regions.

METHODS:

For this retrospective observational national cohort study, our sample includes all veterans who were VHA enrollees, or Medicare Fee-for-Service plan enrollees, and identified in FY 2001-2002 VA and Medicare inpatient databases using the high specificity stroke ICD-9 codes. Our estimated overall sample would be 26,714 patients; this includes 19% VA only users, 42% Medicare only users and 39% dual users. Secondary data will be obtained from databases of two major sources: VA Austin Automation Center (AAC) for the VA data and VA Information Resource Center (VIReC) for the Veteran Medicare data. Summary statistics will be provided for sociodemographic, clinical and utilization characteristics of the different user groups as well as the dual use pattern by the dual users. Objective 1, 2 and 3 are descriptive studies. For objective 3, multinomial logit model will be constructed to predict the potential out-of-system utilization. For objective 5, we will use general linear-mixed models, with logit link for dichotomous outcomes (mortality, readmission for recurrent stroke, diagnosis of fractures, and discharge to home) and log link for rehospitalizations (any cause). This approach will allow us to consider intraclass correlation for patients within the same medical center by including a random center effect. In addition, for the longitudinal outcomes we will also include time and time by user group interaction as independent variables.

FINDINGS:

No findings/results to report at this time.

STATUS:

Start-up activities.

IMPACT:

This study is intended to provide needed information about: VA and Medicare healthcare utilization including post-stroke rehabilitation use, pattern of dual use, factors affecting the utilization variation, and several related outcomes of veterans with acute stroke. The study will allow us to develop a model to examine and compare the processes and outcomes of multiple user groups and it will be an important resource for future studies in stroke research. To clinicians, the findings will improve their understanding of the characteristics of their patients, patient VA and non-VA health use behavior, the continuum of treatment, and related outcomes. To healthcare planners and policy makers, this study will provide the evidence-based information about the processes and outcomes of stroke care by veterans who use VA and non-VA sources of care. To researchers, the study results will provide a basis for future studies in VA and non-VA healthcare utilization.

STR 03-168 **VISN 11 Initiative Stroke Care Survey**

Dawn Bravata, MD
Richard L. Roudebush VA Medical Center
Indianapolis, Indiana
Funding Period: September 2007 - October 2008

BACKGROUND:

VISN 11 is interested in improving care for conditions that require a timely response (including stroke).

OBJECTIVES:

To improve in-patient stroke care within all VISN 11 facilities.

METHODS:

The VISN 11 Chief Medical Officer and the Stroke QUERI have partnered to lead this initiative. To date we have identified clinical champions in all VISN 11 facilities. We developed and fielded a survey of current practices and systems of stroke care. The survey was distributed to the stroke clinical champions who were responsible for obtaining the answers for their facility (this usually required seeking information from a variety of clinical services). The survey asked about 12 domains related to stroke care: emergency services; brain imaging; information technology; quality management; patient education; in-patient stroke care; risk factor modification; rehabilitation; staffing; continuing education; research; and stroke care needs assessment.

RESULTS:

The survey identified opportunities for improvements in stroke care structures. For example, although 83% of the VISN 11 facilities have 24-hour access to a computed tomography (CT) machine, only 33% have in-house staff trained to perform a non-contrast brain CT. Very few IT tools, templates or reminders are available for processes of care related to stroke risk factor management or complication prevention, with the notable exception of smoking cessation where 83% of the facilities had a tool. Only 17% of facilities have ongoing stroke related quality management projects or have a plan to conduct stroke-related quality management projects.

PROJECT STATUS:

We plan to utilize this developing network of stroke care champions (within VISN 11) in our planned FY08 Implementation Project (see Strategic Plan). As part of that planned project, nursing and provider clinical champions at each facility in VISN 11 will be trained and mentoring in rapid cycle process improvement methods. Participating staff will select components of inpatient stroke care that will serve as the basis of the quality improvement effort. Data from the OQP project will be used as baseline data. Evaluations of project impacts at each facility will be conducted to assess the success of the rapid cycle process improvement projects.

SDP 06-237 **Web-based Informational Materials for Caregivers of Veterans Post-stroke**

Constance Uphold, PhD, ARNP-BC, FAAN
North Florida/South Georgia Veterans Health System
Gainesville, FL
Funding Period: December 2007 - April 2010

OBJECTIVES:

The primary objective is to implement culturally sensitive, useable, and appropriate web-based informational materials for stroke caregivers and health care providers on the My Health*e*Vet (MHV) Web site. This informational material will be used by informal caregivers and health care providers to help manage and understand the process of post-stroke recovery at home.

Objective one is to evaluate stroke and caregiver related information for web-based adaptation by collecting and analyzing currently available stroke caregiver information on the MHV Web site and other Web sites such as the American Stroke Association (ASA). Objective two is twofold: 1) To modify and adapt stroke caregiver materials in a paper and web format based on identified gaps in currently available information and translate caregiver materials into Spanish as needed, and 2) To develop a web-design on the VA *intranet* for caregiver materials for pilot testing. Objective three is to conduct formative evaluation of the stroke caregiver information materials by convening a focus group with providers and conducting individual interviews with informal caregivers of stroke survivors at three sites: Gainesville, Florida; Milwaukee, Wisconsin; and San Juan, Puerto Rico. Objective four is to conduct a summative evaluation by conducting an on-line survey that will be completed by the providers and family caregivers who use our web-based materials. Objective five is to conduct a promotional campaign to inform providers and administrators in the VA about our web-based information system for stroke caregivers on the VA My Health*e*Vet (MHV).

RESEARCH PLAN:

We will develop, test and implement informational materials for informal caregivers of veterans with stroke provided in a web-based format on the VA My Health*e*Vet (MHV) Web site.

METHODS:

We will evaluate stroke and caregiver related information for web-based adaptation by collecting and analyzing currently available stroke caregiver information by partnering with agencies, such as the American Stroke Association (ASA), conducting a literature review, and searching the MHV Web site and other Web sites for their readability, accuracy, attractiveness, cultural relevance, and potential for comprehension for caregivers. We will then modify and adapt the stroke caregiver materials in a paper and web based format and translate caregiver materials into Spanish as needed. Then, our informational materials (both English and Spanish-language versions) will be posted on the VA *intranet* for pilot testing. We will conduct a formative evaluation of the materials with three focus groups of providers of stroke patients and 24 - 30 face-to-face interviews of informal caregivers of veterans with stroke at the three sites: Gainesville, San Juan, and Milwaukee. These interviews will be audio-taped, transcribed, and verified. The team will code, verify the coding, and analyze and interpret the data with the *N7.* We will prepare the materials and post them to the MHV Web site. The final phase will be the summative evaluation of the caregiver materials posted on MHV. The summative evaluation will be an on-line survey that will pop-up after an individual has been navigating the Web site for a specified amount of time and accessed a certain number of pages. Throughout all phases of the study, we plan to conduct a promotional campaign so that VA employees and employees in stroke-related community agencies are aware of and use our web-based informational system.

FINDINGS:

Initial Report

Appendix G Dissemination Products

Other dissemination products listed in Table 2 not attached due to size include;
NIHSS-Retrospective Training Manual
PSD Patient Self-Management Manual

These are available by contacting lplue@iupui.edu.

Materials	Page
Post-stroke Depression Screener Pocket Card	146
Post-stroke Depression Screener Clinic Poster	149
Post-stroke Depression Telephone Script	150
"My Blood Pressure Wallet Card"	151
"My Blood Pressure Diary"	151
Stroke QUERI Fact Sheet – June 2007	152
Stroke QUERI Impact Update – June 2007 "Home Telehealth Dialogues"	154
Stroke QUERI Impact Update – June 2007 "CPRS-based Depression Screener for Veterans with Stroke"	156
Stroke QUERI Impact Update – June 2007 "Making Choices: An Atrial Fibrillation Treatment Decision-Making Aid"	158
Stroke QUERI Newsletter Volume 3, Issue 2	160

Poststroke Depression Screener

PHQ- 9
PATIENT HEALTH QUESTIONNAIRE

I'd like to ask you about any problems you may have been bothered by over the past 2 weeks. For each problem I ask about, you can answer "not at all", "several days", "more than half the days", or "nearly everyday".

During the last 2 weeks, how often have you been bothered by ...?

		Not at all	Several days	More than half the days	Nearly everyday
1.	Little interest or pleasure in doing things	0 ❑	1 ❑	2 ❑	3 ❑
2.	Feeling down, depressed or hopeless	0 ❑	1 ❑	2 ❑	3 ❑
3.	Trouble falling or staying asleep... or sleeping too much	0 ❑	1 ❑	2 ❑	3 ❑
4.	Feeling tired or having little energy	0 ❑	1 ❑	2 ❑	3 ❑
5.	Poor appetite ... or overeating	0 ❑	1 ❑	2 ❑	3 ❑
6.	Feeling bad about yourself--or that you are a failure or have let yourself or your family down	0 ❑	1 ❑	2 ❑	3 ❑
7.	Trouble concentrating on things, such as reading the newspaper or watching television	0 ❑	1 ❑	2 ❑	3 ❑
8.	Moving or speaking so slowly that other people could have noticed. ...Or the opposite- being so fidgety or restless that you were moving around a lot more than usual	0 ❑	1 ❑	2 ❑	3 ❑
9.	Thoughts that you would be better off dead or of hurting yourself in some way	0 ❑	1 ❑ STOP	2 ❑ STOP	3 ❑ STOP

STOP!
Proceed to Suicide Evaluation inside!

PHQ-9 Suicide Evaluation

If the answer to Question 9 was 1, 2, or 3, ask the following questions

1. You mentioned you (paraphrase the suicide trigger: "had thoughts about being better off dead," "ending your life," 'hurting yourself')… could you tell me more about that? (open-ended, regardless of response, proceed to 2.)

2. How likely is it that you might do something (to hurt yourself? To end your life?)

3. Have you ever tired to hurt or harm yourself in the past? (**Learn When, What/How, Hospitalized?**)

NO to both Questions 2 and 3

No prior attempts *and* not likely now, including responses:
"Not at all," "not likely," "I wouldn't really do anything," or "It's against my religion"

It sounds as if you are not going to act on these thoughts, even though they are distressing. Is that right?
Note: it is acceptable to reconfirm this point later in the interview.

NO SUICIDALITY

Proceed with interview

YES or Unclear to Questions 2 OR 3
Proceed to Next Page

YES or Unclear to Questions 2 OR 3

"I might," or "Afraid I will," or "I will," or "I don't know," AND/OR had a prior attempt!

LEARN THE PLAN:
3a. Do you have any specific plan *HOW* you might end your life, hurt or harm yourself? (paraphrase)
3b. *WHAT* is your plan?
3c. Do you know *WHEN* you might do this?
4a. Do you drink alcohol?
4b. Do you have a gun in the house?
4c. Have you been stockpiling pills?
4d. Do you spend most of your time alone?

NO to all of 3

LOW RISK
Consider referral to mental health specialist, especially if YES was answered to 4a, b, c, or d. Document response in patient records.

Proceed with interview if patient comfortable.

YES to 3a, b, OR c.

HIGH RISK
Call 911 or arrange urgent mental health assessment.

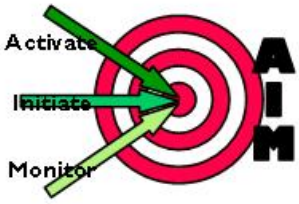
Medication Actions for Patient on Same Antidepressant for 12 Weeks

Wk	Measure	Action Threshold	Medication Action
2	Side effects	Intolerable	Change to new antidepressant
4	PHQ-9	Decrease < 5 points	Increase dose of current antidepressant
6	PHQ-9	Algorithm (Table A)	See Table A
8	PHQ-9	Absolute value neither < 10 nor 50% drop	If on this antidepressant 4 wks, increase dose
10	PHQ-9	Absolute value neither < 10 nor 50% drop	Reconsider current antidepressant – whether to increase dose or change med
12	PHQ-9	Algorithm (Table A)	Consider psych referral if suboptimal

Table A. Medication Algorithm Based upon PHQ-9 Scores*

	50% decrease	25-49% decrease	< 25% decrease
PHQ-9 < 10	no med change	no med change	no med change
PHQ-9 ≥10	no med change	increase med dose	change to new med**

*Original study used identical percentage changes in HAM-D scores
**Change to a different class of antidepressant may be beneficial[1]; original study changed from SSRI to SNRI



http://www1.va.gov/stroke-queri/

1. Rush AJ, Trivedi MH, Wisniewski SR, et al.; STAR*D Study Team. Bupropion-SR, sertraline, or venlafaxine-XR after failure of SSRIs for depression. *N Engl J Med*. 2006;3534:1231–1242.

AIM Intervention

ACTIVATE, INITIATE, and MONITOR Treatment for Poststroke Depression

Based on a study by the QUERI research team at the Richard L. Roudebush VA Medical Center in Indianapolis, IN

Poststroke depression (PSD) occurs in approximately one third of stroke survivors and is associated with diminished recovery, including less functional gain in activities of daily living and lower recovery trajectories, even when adjusting for other important covariates, including stroke type and severity. Like with depression that occurs after myocardial infarction, PSD is also associated with increased risk for subsequent cardiovascular events, increased mortality, and increased healthcare utilization.[3]

Our findings also suggest that PSD is as responsive to treatment as is depression associated with other serious medical conditions and that the rate of spontaneous remission of PSD in patients treated in a usual care setting is not high. Given the prevalence and impact of PSD, providers should consider active depression screening in this high-risk group and should provide guideline-adherent depression treatment, including dose and antidepressant class adjustments for stroke survivors with depression in the first few months after stroke.[3]

The treatment of PSD consists of 3 steps:

- **ACTIVATE stroke survivor and family:** Help stroke survivor and family understand and accept the depression diagnosis by discussing the symptoms and treatment guidelines
- **INITIATE antidepressant medication:** Recommend antidepressant to patient based on the medication algorithm
- **MONITOR treatment effectiveness:** Using scripted telephone calls, assess the symptoms, side effects of medication, and treatment adherence

The Patient Health Questionnaire 9-item depression scale (PHQ-9) is a 9-item self-administered depression screening and diagnostic tool increasingly used in primary care and other medical populations. The use of a brief but accurate depression screening tool like the PHQ-9 that patients can self-complete before the provider visit could help increase the identification and treatment of PSD and thus improve patient outcomes after stroke.[2]

The PHQ-9, printed below, has been made into a pocketcard for physicians to screen stroke patients. The suicide guide triggered by an answer of 1, 2, or 3 for question 9 is also included in the pocketcard.

30-40% of stroke survivors experience depression symptoms due to chemical changes in the brain:

- Excessive crying
- Feeling tired all of most of the time
- Sleep disturbance– too much or too little
- Not caring about things, bored, or indifferent
- Anxiety, nervousness, irritability
- Difficulty concentrating
- Eating disturbances and appetite changes– eating too much or too little
- Feelings of hopelessness, discouragement, despair
- Physical complaints

Medication Actions for Patient on Same Antidepressant for 12 Weeks

Wk	Measure	Action Threshold	Medication Action
2	Side effects	Intolerable	Change to new antidepressant
4	PHQ-9	Decrease < 5 points	Increase dose of current antidepressant
6	PHQ-9	Algorithm (Table A)	See Table A
8	PHQ-9	Absolute value neither < 10 nor 50% drop	If on this antidepressant 4 wks, increase dose
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Table A. Medication Algorithm Based upon PHQ-9 Scores*

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PHQ-9 < 10	no med change	no med change	no med change
PHQ-9 ≥10	no med change	increase med dose	change to new med**

*Original study used identical percentage changes in HAM-D scores
**Change to a different class of antidepressant may be beneficial[1]; original study changed from SSRI to SNRI

PHQ-9 Patient Health Questionnaire

During the last 2 weeks, how often have you been bothered by…?

		Not at all	Several days	More than half the days	Nearly everyday
1.	Little interest or pleasure in doing things	0 ❑	1 ❑	2 ❑	3 ❑
2.	Feeling down, depressed or hopeless	0 ❑	1 ❑	2 ❑	3 ❑
3.	Trouble falling or staying asleep… or sleeping too much	0 ❑	1 ❑	2 ❑	3 ❑
4.	Feeling tired or having little energy	0 ❑	1 ❑	2 ❑	3 ❑
5.	Poor appetite …or overeating	0 ❑	1 ❑	2 ❑	3 ❑
6.	Feeling bad about yourself--or that you are a failure or have let yourself or your family down	0 ❑	1 ❑	2 ❑	3 ❑
7.	Trouble concentrating on things, such as reading the newspaper or watching television	0 ❑	1 ❑	2 ❑	3 ❑
8.	Moving or speaking so slowly that other people could have noticed. …Or the opposite-being so fidgety or restless that you were moving around a lot more than usual	0 ❑	1 ❑	2 ❑	3 ❑
9.	Thoughts that you would be better off dead or of hurting yourself in some way	0 ❑	1 ❑ STOP	2 ❑ STOP	3 ❑ STOP
			STOP! Proceed to Suicide Evaluation***		

For additional toolkits, see the QUERI website: http://www1.va.gov/stroke-queri/

***Suicide evaluation tool can be found in the PSD toolkit

References:

1. Rush AJ, Trivedi MH, Wisniewski SR, et al.; STAR*D Study Team. Bupropion-SR, sertraline, or venlafaxine-XR after failure of SSRIs for depression. *N Engl J Med*. 2006;3534:1231–1242.

2. Williams LS, Brizendine EJ, Plue L, Bakas T, Tu W, Hendrie H, Kroenke K. Performance of the PHQ-9 as a Screening Tool for Depression after Stroke. *Stroke*. 2005;36:635-638

3. Williams LS, Kroenke K, Bakas T, Plue LD, Brizendine E, Tu W, Hendrie H. Care Management of Poststroke Depression: A Randomized, Controlled Trial. *Stroke*. 2007;38:998-1003

The AIM study data represent the largest randomized clinical trial of treatment for poststroke depression to date and demonstrate that care management of depression in patients with recent ischemic stroke results in greater remission of depression and reduction of depressive symptoms than usual care alone.[3]

The AIM study was funded by the NIH.

Optimizing Post-Stroke Depression Treatment

Linda S. Williams, MD

Approximately one-third of stroke patients will develop depression at some point after the event. Risk factors for post-stroke depression include a history of depression before stroke, a family history of depression, and the severity of the stroke (the more severe the stroke, the more likely they are to become depressed). Patients with post-stroke depression have worse functional recovery and take longer to recover than those without depression. Other investigations have demonstrated that there is an increased risk of death—up to 30%, in fact—for patients with post-stroke depression. Depression may exert these effects via suboptimal management of risk factors, changes in the coagulation and inflammation systems, and failure to fully participate in rehabilitation programs.

New Care Management Program Effective

In the March 2007 issue of *Stroke*, my colleagues and I reported the results of a prospective, randomized, outcome-blinded trial in 188 ischemic stroke survivors. We identified them for post-stroke depression, initiated a care management intervention called Activate-Initiate-Monitor (AIM), and compared it with usual care (Table 1). The AIM protocol focused on educating patients about depression and its treatments, initiating use of antidepressants, and monitoring patients and adjusting treatments when required. The usual care group received some patient education and was prescribed antidepressants at the discretion of their provider.

When our study group evaluated patients at 12 weeks, we found that 39% of patients in the AIM protocol had complete remission of their depression, comparing favorably to the usual care group (23%). We also evaluated depression response: a complete remission or at least a 50% drop in depression symptom scores. The AIM protocol led to a significant response in about 51% of the patients; the percentage for individuals in the usual care group was just 30%. The differences in depression scores were present 6 weeks after the AIM intervention and persisted throughout the 12-week assessment.

Table 1

The AIM Intervention

The Activate-Initiate-Monitor intervention, or AIM, was conducted by nurse care managers under the supervision of study physicians and consisted of 3 main steps:

1. Activating stroke survivors and their families to understand and accept depression diagnoses and treatments.
2. Initiating antidepressant medication.
3. Monitoring treatment effectiveness and adjusting medications when needed.

Source: Adapted from: Williams LS, et al. *Stroke*. 2007;38:998-1003.

Recent evidence suggests that switching to another class of antidepressants can result in a 25% additional response for patients not responding to the first medication, so early treatment and adjustments are important. In our study, patients in the AIM protocol received rapid adjustments if their medications were ineffective.

AIM: A Universal Tool for Clinicians

The AIM protocol is applicable to various clinical settings because the monitoring of patients and adjustments of medications can be done over the phone. We used the Patient Health Questionnaire-9, or PHQ-9, a brief screening tool, every 2 weeks to monitor patients and make adjustments to medications. This is important because patient monitoring is often neglected in usual care. Although care management protocols like AIM do consume resources, these strategies are likely to be cost effective for the long term.

Readings & References available at www.physweekly.com.

Please visit www.physweekly.com to read the financial interest disclosures, if any, of the author(s) who contributed to this feature story.

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AIM Intervention

Activate, Initiate, and Monitor Treatment for Poststroke Depression

This telephone script is a part of the ACTIVATE/ INITIATE stages of AIM Intervention for poststroke depression patients. Nurses and case managers use this tool when contacting patients to check their symptoms, possible side effects of their medication, and adherence to the treatment.

PSD **ACTIVATION** AND EDUCATION

Before Treatment started

- **Depression after stroke is result of** chemical changes in the brain.
- **Depression is a medical illness,** not a weakness of character flaw.
- **Depression is** <u>**treatable**</u> thanks to years of research.
- **Depression after stroke affects** the way a person eats, sleeps, the way a person feels about oneself and thinks about things—it affects the body, mood, and thoughts.
- <u>**It affects recovery from stroke!**</u>
- **Depressive illness without treatment** can last for months and years.
- **Untreated depression prolongs recovery period.**

Depression causes symptoms like you've been experiencing. On the questionnaire you just completed, you indicated (***insert pt's symptoms from the PHQ-9***):

- **You had symptoms of… (*list*)**

Medications available for treating depression that we use are:

- **NOT habit-forming.**
- **NOT sedatives or tranquillizers.**
- **HAVE VERY FEW SIDE EFFECTS—and generally, if you experience any, they go away within a short time—your body adjusts as you feel better.**

PSD **INITIATION** AND EDUCATION

After treatment started

- The **medication** your doctor has prescribed for you is <u>**(trade name)**</u>.
- You will take this <u>**(dose information)**</u>.
- **Most people do not have difficulty taking** _____, but some things you might notice are:
  - Dry mouth
  - Appetite changes
  - Changes in sleep patterns
  - Lightheadedness
    - ***(adjust side effect information based on medication used)***
- **Side effects** like these generally go away during the first few weeks of treatment.
- **If you have any of these side effects, continue taking the medication—DON'T STOP—call me at this number.** It could be we will need to change your medication.
- **Will call** to check in **2** weeks, but call us if there are questions.
- **Give Medication Information Sheet**

Lifestyle changes to help reduce High Blood Pressure

Talk with your doctor about the lifestyle changes that are appropriate for you.

- Maintain a healthy weight
- Do physical activity for 30 minutes most days
- Eat a diet high in fresh fruits and lowfat dairy products with reduced saturated and total fat
- Choose foods that are lower in salt and other forms of sodium. Read food labels.
- If you drink alcohol, have no more than one drink per day for women, two drinks a day for men
- Remember to take your blood pressure medicine

Questions to ask if you have High Blood Pressure

- What is my goal blood pressure?
- Is there a healthy eating plan that I should follow to help lower my blood pressure and lose weight?
- Is it safe for me to do regular physical activity?
- What is the name of my medication?
- What time of day should I take my BP medicine?
- What should I do if I forget to take my blood pressure medication at the recommended time?

Department of Veterans Affairs
Tennessee Valley Healthcare System

My Blood Pressure Wallet Card

Dr. Name : _____

Dial-a-Refill: 615-321-6325: _____

Telephone Care: 1-800-228-4973 _____

My Blood Pressure Diary

Date/Time	Location	Blood Pressure

MY BLOOD PRESSURE GOAL:

It is important to take prescribed Blood Pressure Drugs

Ask your doctor to help you fill out the information below:

Blood Pressure Medicine:

_____

_____

_____

_____

_____

Special Instructions:

_____

_____

_____

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VA QUERI

Quality Enhancement Research Initiative

Stroke

Indianapolis, IN

QUERI Fact Sheet **June 2007**

QUERI currently focuses on nine conditions that are prevalent and high-risk among veterans: Chronic Heart Failure, Diabetes, HIV/Hepatitis, Ischemic Heart Disease, Mental Health, Polytrauma and Blast-Related Injuries, Spinal Cord Injury, Stroke, and Substance Use Disorders.

Stroke is the third leading cause of death in the United States, accounting for more than 1 of every 15 deaths. More than 700,000 persons experience a new or recurrent stroke each year, resulting in an approximate cost of $58.6 billion. On average, every 45 seconds an American has a stroke, every 3 minutes someone dies of stroke, and 15%-30% of stroke survivors have serious, long-term disability.

The Veterans Health Administration (VHA) estimates that 15,000 veterans are hospitalized for stroke each year, with new strokes costing an estimated $111 million for acute inpatient care, $75 million for post-acute inpatient care, and $88 million for follow-up care over six months post-stroke.

Stroke Quality Enhancement Research Initiative

The mission of the Stroke Quality Enhancement Research Initiative (Stroke-QUERI) is to employ the QUERI process (see back page) to reduce stroke risk and maximize the functional status and quality of life of veterans with stroke by systematically implementing clinical research findings and evidence-based guidelines into routine clinical practice.

The Stroke-QUERI was established in March 2004 and has four major goals: 1) To improve overall compliance with the Department of Veterans Affairs and the Department of Defense (VA/DoD) clinical practice guidelines for the management of stroke rehabilitation; 2) To ensure that a plan for rehabilitation is considered for all stroke patients; 3) To reduce the risk of stroke recurrence by assuring appropriate management of stroke risk factors; and 4) To reduce the physical, emotional, and social burden of depression after stroke.

Stroke-QUERI Projects and Findings

In 2005-2006, the Stroke-QUERI advanced its pipeline toward active implementation and received funding for several implementation projects that fall within Step 4 of the QUERI Six Step Process.

In their efforts to reduce the physical, emotional, and social burden of post-stroke depression, QUERI investigators received HSR&D funding for a project titled, "Implementing Evidence in the Detection and Treatment of Post-Stroke Depression." This 3-year project is being conducted at the Indianapolis VAMC and Gainesville VAMC, and aims to improve the quality of depression care provided to veterans with stroke. The goal of this project is to partner with VA clinicians and managers involved in the outpatient care of veterans with recent stroke, in order to improve the detection and treatment of post-stroke depression.

The study's primary goal is to extend the use of the current CPRS-based depression screener in VA primary care clinics to target veteran stroke survivors, following up in VA primary care or in VA neurology clinics within six months post-stroke. Team members at each site are identifying colleagues from these clinics, and other related clinical areas, who are interested in working together and having input into how veterans with stroke will be screened and treated for depression after stroke at their facility.

The teams are developing a strategy to identify recent stroke survivors at the time of outpatient follow-up in either PC or neurology clinics, and to prompt screening using the existing CPRS-based depression

The Stroke-QUERI Executive Committee

Each QUERI Executive Committee is led by a research expert and a clinician. The research coordinator for Stroke-QUERI is **Linda Williams, MD**, and the clinical coordinator is **Dawn Bravata, MD**. The membership of the Stroke-QUERI Executive Committee is: **David Matchar, MD** (Chair); Bradley Doebbeling, MD, MSc; Thomas Kent, MD; Sarah Krein, PhD, RN; Brian Mittman, PhD; Eugene Oddone, MD; Robert Ruff, MD; Barbara Sigford, MD; Marita Titler, PhD, RN, FAAN; MBA; and Don and Jan Prether.

VA Office of Research and Development, Health Services Research and Development Service

screener. The teams also are developing a strategy for fostering effective treatment of veterans with post-stroke depression.

Additional Stroke-QUERI Findings and New Projects

Another area of research across the continuum of stroke care within Stroke-QUERI is the management of stroke risk factors. In order to engage and activate veterans in preventing stroke, Stroke-QUERI has received funding for a patient-centered study titled "Disseminating Stroke Prevention Materials to Veterans: The Development of a Direct-to-Consumer (DTC) Implementation Strategy."

The objective of this project is to educate veterans about stroke risk factors and motivate them to request additional information using the recognizable character of "Sarge" from the Beetle Bailey cartoon. Project members worked with the VA programs of My HealtheVet, Managing Obesity/Overweight for Veterans Everywhere (M.O.V.E.), VISNs 8 and 11, the Malcolm Randall and Richard L. Roudebush VAMCs, facility Quality Performance Managers, facility Associate Chief of Staff for Education, the American Stroke Association/American Heart Association, as well as the National Stroke Association to create a dissemination plan and educational materials to be distributed to veterans at risk for second stroke.

Stroke-QUERI investigators also received funding for a Rapid-Response Project to address provider and patient barriers to anti-coagulation.

The program consists of a physician manual, and for patients, a video, a personnel worksheet, and education booklets that are specific to four levels of stroke risk (low, medium, high, and very high) and that detail the risks and benefits of therapy for stroke prevention in atrial fibrillation (AF), as described by the current American College of Chest Physicians' recommendations.

In this local demonstration implementation project, potential patients will be contacted by phone to determine if they know they have AF and to obtain consent, and a second phone call will be arranged. Enrolled patients then will be mailed the clinical decision-making tool kit.

The outcomes of interest include: 1) number of patients who complete the decision tool kit, 2) satisfaction, 3) knowledge/expectations, 4) decisional conflicts, and 5) number of patients who make an appointment with their physician in a 30-day period. The decision-making tool is patient-focused, and has the potential to be implemented in the VA's care coordination and telehealth programs.

Adapting tools to implement stroke risk management

This implementation study seeks to inform the adaptation of existing stroke prevention tools through peer support to the VA – and to test the feasibility of an implementation strategy. This study will: 1) develop an evidence-based, implementation strategy to adapt existing stroke tools for stroke prevention; and 2) estimate the effect size to test the impact of a future regional and national roll out. In doing so, we will assist VA with compliance to stroke care guidelines. Increased guideline compliance will lead to a reduction in the occurrence of stroke in veterans and an improvement in veterans' health-related quality of life.

THE QUERI PROCESS

QUERI utilizes a six-step process to diagnose gaps in performance and identify and implement interventions to address them:

1) Identify high-risk/high volume diseases or problems;
2) Identify best practices;
3) Define existing practice patterns and outcomes across VA and current variation from best practices;
4) Identify and implement interventions to promote best practices;
5) Document that best practices improve outcomes; and
6) Document that outcomes are associated with improved health-related quality of life.

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VA's Research and Development QUERI Website: www.hsrd.research.va.gov/queri
Stroke-QUERI direct web link: www.va.gov/stroke-queri

VA Office of Research and Development, Health Services Research and Development Service

VA QUERI
Quality Enhancement Research Initiative

Stroke
Home-Based TeleHealth Stroke Care

Stroke-QUERI Impact Update June 2007

Home-Based Telehealth Stroke Care

The principal aim of this Stroke Quality Enhancement Research Initiative (Stroke-QUERI) project is to perform a needs assessment on stroke patients and their family members' perception of home-telehealth services – an integration of information and communication technologies that enables a clinician and/or their family caregiver to maintain direct communication. This project tests the feasibility of using in-home messaging devices for veterans who have survived a stroke, and their informal caregiver (when available). The VA has widely implemented evidence-based disease management dialogues for veterans through an in-home messaging device for common chronic conditions, such as diabetes and heart failure, but little is known about the extent to which such dialogues are valid for veterans who have survived a stroke. QUERI investigators, along with VA's Rehabilitation Research Outcomes Center researchers, worked closely with VA's Office of Care Coordination and Health Hero, Inc. to create new dialogues specifically for veterans who have survived a stroke, and their caregivers. This project will provide important data on the validity of the post-stroke dialogue, information which is imperative before system-wide implementation.

Home-Telehealth Dialogues

The origin of the questions used in the home-telehealth dialogues was based on pilot data collected through face-to-face interviews with seven veterans with a history of stroke and their caregivers (when available). These veterans were enrolled in a care coordination/home-telehealth program that focused on chronic diseases and had experience with video-phone or in-home messaging technology. In the pilot study, veterans and their caregivers were asked to describe their stroke experiences and how the technology could be adapted for veterans experiencing a new (recent) stroke. These veterans and their caregivers provided comprehensive descriptions of their experiences with stroke.

Based on these pilot interviews, questions were written to assess veteran and caregiver needs, including support for the caregiving role, unaddressed issues and concerns of both the veteran and the caregiver, as well as the frequency and risk of falling. Stroke-QUERI also used instruments that had been validated for self-report. These instruments include the Stroke Impact Scale, an abbreviated Zarit Caregiver Scale (for the caregiver only), and an abbreviated PHQ-2 depression scale (for veterans only).

Data from this needs assessment will be critical in providing the necessary information for a proposed clinical trial to examine the effectiveness of a home-telehealth intervention in the improvement of quality of life, functional status, and patient satisfaction – and the extent to which service use and costs are reduced for veterans with stroke and their family members versus stroke survivors receiving usual care.

Home-Telehealth and the Veterans Health Administration

The Veterans Health Administration (VHA) is a recognized leader in the development and implementation of home-telehealth services. Home-telehealth services within VHA have shown some promise in facilitating physiologic measurements and diagnostic testing. It has been shown to obviate unnecessary services (e.g., hospital admissions) and reduce costs for veterans with particular chronic diseases, such as diabetes and hypertension. As the number of veterans who need more non-institutional long-term care services increases, home-telehealth may be viewed as one particular type of service that could help fill this need.

How Do I Learn More?

If you are interested in learning more about this project, please contact:

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NF/SG Veterans Health System
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E-mail: Neale.chumbler@med.va.gov

For information about Stroke-QUERI, contact:

Jini Hanjain, PhD
Stroke-QUERI Administrative Coordinator
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E-mail: jini.hanjain@va.gov

Web Resources

For more information about home telehealth, visit the following websites:

www1.va.gov/visn8/nfsg/clinical/TeleHealth/sites_gainesville.asp.

vaww.va.gov/occ/TH/TelehealthMain.asp.

vaww.va.gov/occ/HomeTelehealth/telehealth.asp.

www.healthhero.com.

www1.va.gov/rorc.

For more information about the Stroke-QUERI Center, visit their website at:
www1.va.gov/stroke-queri.

For more information about the QUERI program in general, visit the national QUERI website at:
www.hsrd.research.va.gov/queri.

Access QUERI's "Guide for Implementing Evidence-Based Clinical Practice and Conducting Implementation Research" at:
www.hsrd.research.va.gov/queri/implementation.

The Stroke-QUERI Executive Committee

Each QUERI Executive Committee is led by a research expert and a clinician. The research coordinator for Stroke-QUERI is **Linda Williams**, MD, and the clinical coordinator is **Dawn Bravata**, MD. This executive committee includes experts in both the field of stroke and implementation science. The membership of the Stroke-QUERI Executive Committee includes: David Matchar, MD (Chair); Bradley Doebbeling, MD, MSc; Thomas Kent, MD; Sarah Krein, PhD, RN; Brian Mittman, PhD; Lynnette Nilan, RN, EdD; Eugene Oddone, MD; Robert Ruff, MD; Barbara Sigford, MD; Marita Titler, PhD, RN, FAAN; and Don and Jan Prether.

VA QUERI
Quality Enhancement Research Initiative

Stroke

Detecting and Treating Post-Stroke Depression

Stroke-QUERI Impact Update June 2007

Detecting and Treating Post-Stroke Depression

This 3-year Stroke Quality Enhancement Research Initiative (Stroke-QUERI) project is being conducted at the Indianapolis VA Medical Center and the North Florida/South Georgia Veterans Health System, Gainesville Division to improve the quality of depression care provided to veterans with stroke. The goal of this project is to partner with VA clinicians and managers involved in the outpatient care of veterans with recent stroke to improve the detection and treatment of post-stroke depression.

CPRS-Based Depression Screener for Veterans with Stroke

The primary goal of the study is to extend the use of the current Computerized Patient Record System (CPRS) based depression screener in VA primary care clinics to target veterans who have survived stroke and are following-up in VA primary care or in VA neurology clinics within 6 months post-stroke.

The Stroke-QUERI team members at each site will identify colleagues from these clinics, and other related clinical areas, who are interested in working together – and having input into how veterans with stroke will be screened and treated for depression after stroke at their facility. The teams will develop a strategy to identify these recent stroke survivors at the time of outpatient follow-up in either primary care or neurology clinics, and to prompt screening using the existing CPRS-based depression screener.

The teams also will develop a strategy for fostering effective treatment of veterans with post-stroke depression. Ongoing use of the depression screener and trends in treatment of veterans with post-stroke depression will be discussed among the teams quarterly to identify what aspects of the plan are working and what needs to improve to reach program goals.

A secondary aim of this project is to evaluate whether a patient-based, stroke self-management intervention provides additional benefit beyond modifying the system to improve depression detection and treatment. Investigators will focus on the veteran rather than the system of care, with aims to improve depression symptoms after stroke.

All veterans who survived stroke from both the Indianapolis and Gainesville VA healthcare facilities will be eligible to be randomized to this intervention versus usual care. The intervention will consist of face-to-face and telephone sessions designed to help them set goals, improve their understanding of depression symptoms and post-stroke recovery, and decrease their anxieties.

How Do I Learn More?

If you are interested in learning more about this project, please contact:

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For information about Stroke-QUERI, contact:

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Web Resources

For more information about the Stroke-QUERI Center, visit their website at:
www1.va.gov/stroke-queri.

For more information about the QUERI program in general, visit the national QUERI website at:
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VA QUERI
Quality Enhancement Research Initiative

Stroke

Improving Clinical Decision-Making for Stroke Prevention

Stroke-QUERI Impact Update **June 2007**

Improving Clinical Decision-Making for Stroke Prevention

High-quality epidemiological studies have demonstrated that atrial fibrillation (AF) is the most potent common risk factor for stroke, and six randomized trials of anticoagulants in AF consistently demonstrated a risk reduction of stroke by approximately two-thirds. Nonetheless, anticoagulants remain under-used in clinical practice in patients with atrial fibrillation despite their proven efficacy for stroke reduction. Preliminary work with data from patients with AF and stroke in Veterans Integrated Service Network (VISN) 8 revealed that 38.3% of veterans were receiving anticoagulants at four weeks after discharge in FY2003. Reasons for the under-use of anticoagulation in AF patients are not totally known, but they include patient, provider, and healthcare system barriers.

Making Choices: An Atrial Fibrillation Treatment Decision-Making Aid

The Stroke Quality Enhancement Research Initiative (Stroke-QUERI) is working to address provider and patient barriers to appropriate anticoagulation therapy. This project addresses the gaps in decision making by developing an implementation process and testing the feasibility of using a previously validated clinical decision-making tool – "Making Choices: An Atrial Fibrillation Treatment Decision-Making Aid" developed by the Atrial Fibrillation Decision Aid Group at the University of Ottawa.

This decision-making tool kit consists of a physician manual, and, for patients, a personnel worksheet, audio recordings, and education booklets that are specific to four levels of stroke risk (low, medium, high, and very high), and detail the risk and benefits of therapy for stroke prevention in atrial fibrillation as described by the current American College of Chest Physicians'.

In this demonstration implementation project, potential patients will be informed of the study by their physician and invited to contact the study team. Eligible veterans who contact the study team will be mailed the clinical decision-making tool kit and will be followed-up by telephone for consent and assessment about their use and opinions of the decision aid.

Physicians also will be provided with information on the patient education materials. Veterans will be asked if they have a formal plan to be started on warfarin or aspirin in the next 30 days. Reasons for or against therapy will be ascertained. Veterans with a plan will be asked the relative strength of their personal input into the choice, versus their physicians'. The content of the video and decision aid will be discussed via phone. After the decision aid process, patient knowledge, expectations, decisional conflicts (uncertainty about which therapy to choose), and satisfaction will be assessed using scales developed by the Ottawa group. A third phone call will be arranged for 30 days later to allow veterans adequate time to contact their physician. Veterans will be asked if they have begun therapy, or if they have made – or had an appointment with their physician to discuss therapy.

Patient choice will again be assessed. The outcomes of interest include: 1) number of patients who complete the decision tool kit, 2) satisfaction, 3) knowledge/expectations, 4) decisional conflicts, and 5) number of patients who make an appointment with their physician during the 30-day period. The decision-making tool is patient-focused, and has the potential to be implemented in the VA's care coordination and telehealth programs.

How Do I Learn More?

If you are interested in learning more about this project, please contact:

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VA QUERI Stroke
Quality Enhancement Research Initiative

VA Stroke QUERI Circular

Winter, 2006
Volume 3, Issue 2

Dr. Linda Williams Named New Research Coordinator and Other Changes...

Change: A word that can inspire anxiety, fear, frustration, exhilaration, hope, or some weird combination of all these emotions. Although change can be intimidating, it is a process with which QUERI should be at least somewhat comfortable, given that our mission is to change (improve) the quality of care for veterans with stroke.

Change has come to the Stroke QUERI in the form of a recent reorganization of our Research and Clinical Coordinators. In December 2006, Dr. Pamela Duncan accepted an endowed position at Duke University where she will continue her research in stroke rehabilitation, outcomes, and policy. Her leadership and infectious energy were fundamental to the successful launch of the Stroke QUERI in April, 2004, and to our ongoing work to improve stroke care in the VA. We are pleased to say that although Dr. Duncan has stepped down as Research Coordinator of the QUERI, she will serve on our Executive Committee and continue to collaborate on key stroke projects.

Dr. Linda Williams, former Stroke QUERI Clinical Coordinator, has accepted the role of Research Coordinator. Her in-depth involvement in the QUERI Operations Committee, the Implementation Core, and her role as leader of one of the QUERI workgroups will ensure that the major projects and strategic plans of the QUERI will continue uninterrupted. Dr. Williams' role as Chief of Neurology at the Roudebush VAMC in Indianapolis will further help to link the Stroke QUERI to front-line clinicians and managers as we work to impact the care of veterans with stroke. This transition will also link the QUERI more closely to the Center for Implementing Evidence-Based Practice in Indianapolis (Dr. Brad Doebbeling, Director), where Dr. Williams and Dr. Teresa Damush, Stroke QUERI Implementation Research Coordinator, are Senior Investigators.

Dr. Dawn Bravata, internist and stroke researcher from the VA Connecticut Healthcare System in New Haven and Yale University, has assumed the position of Stroke QUERI Clinical Coordinator (page 2). Dr. Bravata brings substantial expertise in stroke care quality assessment, and stroke risk factor management. In addition to becoming the Clinical Coordinator, she will lead our QUERI Workgroup focusing on guideline implementation. She will join the Center for Implementing Evidence-Based Practice in Indianapolis this May.

As the QUERI coordinator positions transition to Indianapolis, Ms. Laurie Plue, former Assistant Implementation Research Coordinator, will take on the role of Stroke QUERI Administrative Coordinator effective March 1, 2007. The QUERI will continue its strong collaboration with the Gainesville VA

Continued on page 2

Stroke QUERI Associated Investigators Present at the HSR&D National Meeting, February 21-23, 2007, Washington, DC

Hosted by the **Rehabilitation Outcomes Research Center (RORC) for Veterans with Central Nervous System Damage**, North FL/South GA Veterans Health System in Gainesville, FL.

Career Development, Wednesday, 2/21, 8:30 – 9:00 am

- Dawn Bravata, MD, *Quality Evaluation in Stroke and Transient Ischemic Attack (QUEST) Project*

Continued on page 4

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Dr. Dawn Bravata: New Clinical Coordinator 2
Project Reports 2-3
Stroke QUERI Papers at 2007 HSR&D Meeting 4

Dr. Dawn M. Bravata Joins Stroke QUERI as Clinical Coordinator

Dr. Dawn M. Bravata joined the Stroke QUERI as the Clinical Coordinator in December 2006, when Dr. Linda Williams became the Research Coordinator. Dr. Dawn Bravata, an internist and stroke researcher, graduated from Yale University in 1989; and the University of California, San Diego School of Medicine in 1993. She trained as an intern, resident and Chief Resident at the Yale School of Medicine Primary Care Residency Program.

In 2000, Dr. Bravata graduated from the Yale Robert Wood Johnson Clinical Scholars Program, and joined the VA Connecticut Healthcare System at West Haven, where she practices Internal Medicine and serves as Director of the Multidisciplinary Stroke Program. She is an Associate Professor of Medicine at the Yale University School of Medicine.

Dr. Bravata conducts health services research in cerebrovascular disease. The fundamental goal of her research is to improve the quality of care for patients with cerebrovascular disease. She is interested in three topics within this larger domain: the effectiveness of therapeutic interventions for patients with acute ischemic stroke and transient ischemic attack (TIA), the quality of care received by patients with stroke and TIA, and the identification and treatment of medical co-morbidities in patients with cerebrovascular disease.

Recently, Dr. Bravata received a VA Health Services Research & Development (HSR&D) Advanced Career Development Award for her current work entitled "The Quality Evaluation in Stroke and Transient Ischemic Attack (QUEST) Project" which evaluates the quality of care received by veterans and non-veterans with a stroke or TIA. She received the Robert Wood Johnson Generalist Physician Faculty Scholars Program Award for her research entitled: "The Diagnosis and Treatment of Sleep-Disordered Breathing in the Home of Patients with Transient Ischemic Attack."

Dr. Bravata will join the Indiana University School of Medicine faculty and the VA HSR&D Center on Implementing Evidence-Based Practice (CIEBP) in May 2007.

Change, continued ...

Rehabilitation Outcomes Research Center (RORC). The major responsibility for our rehabilitation portfolio continues to reside in Gainesville under the leadership of Dr. Neale Chumbler, Dr. Diane Cowper, and Dr. Rebecca Beyth. Ms. Kristen Wing the Stroke QUERI Dissemination Coordinator, as well as many of our investigators will continue to be based at the RORC.

We look forward to the opportunities we have this year to improve stroke care for veterans, including (among others) ongoing projects implementing depression screening post-stroke, improving access to rehabilitation via tele-rehabilitation services, supporting evidence-based decisions for managing atrial fibrillation and other stroke risk factors, and implementing dysphagia screening as a critical inpatient stroke quality of care indicator. Instead of being intimidated by change, we embrace the sentiments of anthropologist Margaret Mead about change: "Never doubt that a small group of thoughtful, committed citizens can change the world. Indeed, it is the only thing that ever has." The Stroke QUERI is eager to expand our ability to be a force for this type of positive change for stroke care throughout the VA.

Project Reports

Post-Stroke Swallowing Projects Start in 2006

In 2006, a VA Office of the Inspector General (OIG) published a report on the management of patients with feeding and swallowing problems in VA facilities. The report found significant variation in care and the need for improved dysphagia evaluation and management. Although the OIG report is not restricted to stroke, swallowing problems are a common problem after stroke. In response to the report, the Stroke QUERI is responding with two new initiatives on swallowing screenings. The first response is a RRP pilot implementation project in 2007 that will address the establishment of better initial screening of patients with acute stroke. The project will take place in Gainesville and Indianapolis VA facilities and provide the team with an opportunity to compare and contrast how the two sites handle the implementation of screening tools and processes. The second initiative for the Stroke QUERI is working with the Office of Quality and Performance (OQP) on the development of a Dysphagia Supporting Indicator to measure swallowing screenings completed on patients suffering a stroke. The anticipated beginning date for the indicator is FY 2008. *For more information: Dr. Neale Chumbler, 352-376-1611, ext. 4920.*

Florida Veterans Utilize a Variety of VA and Non-VA Services Post-Stroke

VHA is not the only source of care for its enrollees. This is particularly true for those enrollees who are also eligible for Medicare and/or Medicaid. However, our understanding about the VHA stroke patients who receive services within VHA and beyond is limited. In a recently completed, HSR&D-funded IIR study on VHA enrollees with acute stroke in Florida, Dr. Charlie Jia and his research team found that: (1) over 70% of the stroke patients relied on VHA and other health care programs (Medicare and Medicaid) for their post-stroke care; (2) user groups (VHA only, VHA, and Medicare, VHA and Medicaid, and all three systems) were demographically and clinically distinctive; (3) patients who had their initial inpatient stroke care under VHA received less rehabilitation services during their initial hospitalization and 12-month follow-up outpatient care than Medicare-initial inpatients; (4) many multiple systems users obtained their post-acute rehabilitation services from VHA outpatient clinics; (5) multiple-source users were more likely to be re-hospitalized for any cause and for recurrent stroke within the first 12 months post index as compared to the VHA-only users; (6) mortality outcomes depended on when the outcome was measured: If measured from the index admission date, there was no significant difference across the user groups occurred; if measured from the index discharge date, the VHA-only users were less likely to die within the first 12 months than users of the two dual groups. These findings may help improve VA clinicians' understanding of their patients' characteristics, continuum of care post-stroke, and the importance of considering dual or triple system usage when conducting program evaluations for healthcare systems with a high proportion of dual or triple enrollees.

Based upon the methodologies developed and findings from the Florida project, the research team is expanding to a national level study with a HSR&D newly funded project. The objectives of the national study are to: (1) refine the patients' eligibility and utilization status for each healthcare program (VHA and Medicare); (2) describe and compare the demographic and clinical characteristics between the different user groups (VHA only, VHA-Medicare, and Medicare only); (3) compare 12-month pre-index and 12-month post-index stroke healthcare utilization between the different user groups as well as the patterns of health services dual use by the dual users, (4) predict the out-of-VA healthcare use, and (5) estimate longitudinal differences in post-index stroke mortality, re-hospitalization, fractures, and discharge to community at index hospitalization between the user groups and geographic regions.

For more information: Dr. Charlie Jia, 352-376-1611, ext. 4926.

Tele-Rehabilitation Expands Rehabilitation for Veterans with Stroke

Veterans who have suffered a stroke require long-term rehabilitation. However, the Stroke QUERI has found that a large number of acute stroke patients live more than 120 minutes from an inpatient rehabilitation unit (RBU), or they receive care at a facility without a RBU. Dr. Neale Chumbler, Dr. Barbara Lutz, located in the Gainesville, NF/SG Veterans Health System, and Dr. Helen Hoenig, a physician investigator, in the Durham VAMC, have researched tele-health and tele-rehabilitation approaches to address the veterans rehabilitation needs. In 2006, Drs. Chumbler and Lutz completed a QUERI locally initiated project (LIP) that initially tested the VA Care Coordination/Home Telehealth (CCHT) Program. They found that the program can provide a post-discharge link for the veterans and their caregivers with the VA that includes expert advice, and information on respite. In addition it may help the caregiver manage the patient's stroke throughout the recovery process. An article on this project will appear in a special journal issue on post-discharge care for stroke: Lutz, B.J., Chumbler, N.R., and Roland, K., Care Coordination/Home-Telehealth for veterans with stroke and their caregivers: Addressing an unmet need, *Topics in Stroke Rehabilitation*, 2007 (February, in press).

The pilot information from the LIP has supported the development of a Phase II, two-arm, four-site randomized controlled trail. Drs. Chumbler and Hoenig are the PIs, and it is funded for three years beginning in early 2007. The purpose of this study is to examine a tele-rehabilitation (TR) intervention that uses tele-health technology to improve outcomes of stroke patients after discharge to home. They will be examining the effect of TR on physical functioning, disability, falls and patient satisfaction.

For more information: Dr. Neale Chumbler, 352-376-1611, ext. 4920.

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VA Stroke QUERI Mission Statement

The mission of the Stroke QUERI is to reduce stroke risk and maximize the functional status and quality of life of veterans with stroke by systematically implementing clinical research findings and evidence-based guidelines into routine clinical practice.

The Stroke QUERI has assembled an excellent team of national leaders and research investigators with the intention of continually developing collaborations with other institutions and investigators centered on the VA stroke population to further expand implementation efforts.

"Implementation of Research into Clinical Practice"

HSR&D Meeting, continued from Page 1...

Check the Conference Agenda for Session Rooms

Oral Presentations, Thursday, 2/22, 4:15-5:45pm
- Session B, Quality II, Hayden Bosworth, PhD, *The Veterans' Study to Improve the Control of Hypertension (V-STITCH): A Patient and Provider Intervention to Improve Blood Pressure Control*
- Session E, Access, Neale Chumbler, PhD, *The Impact of a Cancer Care Coordination/Home-Telehealth Program on Preventable Health Service Utilization: A Case Control Study*
- Session F, Function, Linda Williams, MD, *Medical Comorbidity and its Relationship to Post-Stroke Depression*

Workshop, Thursday, 2/22, 2:15-3:45pm
- Maude Rittman, PhD, RN, *Mixed Methodology: Combining Qualitative and Quantitative Approaches*

Poster Session, Thursday, 2/22, 5:45-7:45pm
- Diane Cowper, PhD, and Huanguang (Charlie) Jia, PhD*; Veterans, Multiple System Use, and Stroke Rehabilitation: Who Gets What from Where?*
- Bruce Vogel, PhD, *Function-Based Risk Adjustment in Statistical Models: Systems vs. Components*
- Linda Williams, PhD, *Patient and Family Caregiver Characteristics that Predict Development of Post-Stroke Depression*

Special Interest Groups, 7:00-8:00am
- Thursday, 2/22, VACO QUERI
- Friday, 2/23, Stroke QUERI

Research Coordinator
Linda Williams, MD
Clinical Coordinator
Dawn Bravata, MD
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Teresa Damush, PhD
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Barbara Lutz, PhD, RN
Chona Macalindong, MD
David Matchar, MD
Nan Musson, CCC-SLP
L. Douglas Ried, PhD
Maude Rittman, PhD
Melanie Sberna, PhD
Arlene Schmid, PhD
Connie Uphold, PhD
W. Bruce Vogel, PhD
Debbie Wilson, PhD
Sam Wu, PhD
Linda Young, PhD