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Ischemic Heart Disease QUERI Center

Strategic Plan

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IHD QUERI
Ischemic Heart Disease Quality Enhancement Research Initiative

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Table of Contents

Strategic Plan Executive Summary 1

I. Center Mission, Goals and Scope

I.1 Clinical Focus and Scope 8
I.2 Significance and Consequences: Acute & Chronic Phase of IHD, Secondary Prevention 9
I.3 Treatment and Management Evidence Base 11
I.4 Current Practices and Quality/Outcome Gaps 13
I.5 Significant Influences on Current Clinical Practices and Outcomes 14
I.6 IHD-QuERI Center Goals 15
I.7 Plans for Achieving IHD-QuERI Center Goals 23

References

Reference List 25

II. Management Plan

Management Plan Update 31

List of Tables

Table 1 IHD-QuERI Clinical Goals Update for FY 2008 18
Table 2 IHD-QuERI Implementation Science Goals Update for FY 2008 21
Table 3 IHD-QuERI Staff 34

List of Figures

Figure 1 QuERI Center Implementation Pipeline 39
Figure 2 IHD-QuERI Center/VHA Collaborations 40

Ischemic Heart Disease QuERI Strategic Plan

Executive Summary

Mission statement: The mission of the Ischemic Heart Disease (IHD) QuERI is to improve the quality of care and clinical outcomes for veterans who have ischemic heart disease and its complications and those who are at risk for IHD by identifying, assessing and promoting implementation of evidence-based best practices; fostering collaboration among researchers and operational units; and advancing the sciences of evidence-based medicine and evidence-based management.

Ischemic Heart Disease Quality Enhancement Research Initiative (IHD-QuERI) is a collaboration between researchers and clinicians to foster national adoption and implementation of evidence-based best practices for veterans with ischemic heart disease (IHD). IHD-QuERI focuses on two major clinical goals: (1) to improve the quality of care and outcomes for Veterans in the acute phase of IHD, and (2) to improve the quality of care and outcomes for veterans with IHD, or at risk for IHD, in primary and secondary prevention and chronic disease management. In addition, we have a third goal of contributing to the broader knowledge base of implementation science.

Within these broad goals are multiple, specific long and short-term goals each reflected in one or more current or planned projects. While quite diverse, they all contribute to the central goal of improving quality of care and outcomes for Veterans with and at risk for IHD, and generally share three hallmarks of IHD-QuERI activities:

- Meaningful collaboration with other entities inside and outside of VA including:
    - VA/VHA leadership, particularly the Offices of Patient Care Services, Quality and Performance, Information, and Information and Technology, to affect national programs;
    - Other QuERI Centers including Heart Failure, Spinal Cord Injury, Diabetes and Mental Health;
    - Other federal agencies, e.g., the Food and Drug Administration;
    - Professional organizations such as the American Heart Association and the American College of Cardiology Foundation to improve monitoring of quality, performance and patient safety;

- Creation and use of national data resources to identify gaps in knowledge, compare performance across health care systems, and generate feedback to promote best practices;
- Development and assessment of implementation activities that help to advance understanding of implementation science.

Our clinical focus and scope and review of the science on the burden and care for ischemic heart disease are contained in sections 1.1 through 1.5 and remain largely unchanged. Our specific center goals are detailed in section 1.6 and in Tables 1 (clinical goals) and 2 (implementation science goals). Most represent ongoing efforts and are minimally changed, although we have several important new projects that are underway in 2009, and others that we intend to develop in the coming year. We briefly summarize these specific goals and related activities here. Completing and sustaining implementation of The Cardiovascular Assessment, Reporting and Tracking System (CART) remains a top priority. CART-CL (CART for cardiac catheterization laboratories) will support a range of quality of care and administrative improvements, and promises to be a unique tool for improving quality of care and outcomes in both acute and chronic phases of IHD.

CART represents a long-term and focal activity for IHD-QUERI (Tables 1 and 2, goals 1-3). CART-CL originated in 2003 as a stand-alone software application for use in a handful of VA cardiac catheterization laboratories and was subsequently adopted by the Undersecretary of Health and the National Leadership Board. It has evolved into a sophisticated software application for clinical report generation and data capture for quality of care assessment, workload capture, and device surveillance that is fully integrated within CPRS. CART-CL is installed in 73 of 75 VA cardiac catheterization laboratories. Following a directive from VACO in 12/05 mandating use in all VA cath labs, national rollout is essentially complete. We are excited that CART's focus can now shift to implementation evaluation, development of additional clinical modules, quality management and improvement programs, analytics and research, and patient safety.

CART is regarded as a model for clinical application development and implementation in VHA. Dr. Robert Jesse, Chief Consultant, Medical-Surgical Services and National Program Director for Cardiology, and Dr. Doug Rosendale, Enterprise System Manager-Provider Systems (OI) have recommended that the CART Program be expanded significantly, starting in FY09, and that it ultimately could serve as a template for other medical procedures in VHA. In

conjunction with VA Employee Education System (EES), the first CART national meeting (2.5 days) will be held in Denver in May 2009 with mandatory attendance by representatives from all VA cath labs. Over 200 cath lab directors and managers are expected to attend the meeting which will focus on quality and data issues, performance data (workload/complications), and future expansion of CART into other clinical areas.

In FY08, VHA finalized a Memorandum of Understanding with the US Food and Drug Administration to enable the use of CART-CL for surveillance of potential safety problems related to cardiac devices. CART-CL provides a unique ability to link specific cardiac devices, procedures and patients (for a large number of veterans) and to track long-term patient outcomes. This collaboration with the FDA establishes CART-CL as a sentinel patient safety network and contributes significantly to active post-market surveillance. Most importantly, it may improve patient safety through improved communications and provider understanding of reportable events. This liaison represents a major shift in the FDA's traditional strategy for detecting adverse outcomes that, up until this time, has relied upon voluntary reporting by individual clinicians and upon data submitted by industry. Given that hundreds of federal regulations recently took effect that limit corporate liability for medical devices, it is anticipated that device safety will be a very high profile issue under the new administration. CART is positioned to play a pivotal role.

CART/VHA is also contracting with the American College of Cardiology Foundation's (ACCF)/National Cardiovascular Data Registry (NCDR) for participation of all VA cardiac cath labs. This is a unique opportunity for VHA to collect data that adheres to industry standard measures and will enable participation in external benchmarking programs. Over 1,000 facilities currently submit in excess of 1 million records per quarter to the ACCF/NCDR PCI registry. CART's participation in NCDR is a model of transparency and consistency for comparisons of VHA to other health care systems. It is also consistent with efforts within VHA to submit data, when feasible, to respected external organizations for quality reporting consistent with community standards.

The first meeting of the CART Quality Management Committee was held in Denver May 19-20, 2008 to discuss pending developments, plans for implementation and adoption, and CART quality management and reporting. The committee provided recommendations to Drs. Jesse and Fihn, as leaders in PCS and OQP, on the CART Quality Oversight Program. The

CART Quality Oversight Committee will be analogous to the organizational structure and operations of the VA Cardiac Surgery Consultants Committee.

The CART-CPR (CART for in-hospital cardiopulmonary resuscitation) development team also met on May 19, 2008 in Denver to review drafts of data elements, screen layouts, and timelines for technical development, implementation and implementation evaluation. Funding for the development of CART-CPR is forthcoming from Patient Care Services, as in-hospital cardiac arrest has been named as a priority condition for quality evaluation and improvement by PCS.

In FY08, CART-CL began producing monthly, facility level QI reports for all CART sites, and comprehensive 'roll-up' reports to the National Program Director for Cardiology (Dr. Jesse), which has enabled VACO to monitor volumes of cath lab procedures and incidence of complications. Unlike many VA administrative databases that produce a significant lag in the availability of data, timely information is available from CART which facilitates a prompt response from VACO if problems are identified. As a specific example, CART-CL supports instant notification of deaths that occur in the cath lab to Dr. Jesse. CART-CL will directly support the activities of the CART Quality Management Committee, as well as by providing feedback reports to sites with benchmarking (within VA and VA/non-VA) via participation in the ACC's National Cardiovascular Data Registry.

We will continue activities to sustain and build on improvements in quality of care for the acute phase of IHD. We have used the extensive database developed for the Cardiac Care Clinical Follow-up Study (CCFCS) to assess improvements in performance measures and mortality since the Cardiac Care Initiative was launched in 2004. We have recently completed a study documenting improvements in mortality following acute myocardial infarction that has been submitted for publication (Table 1, goal 1.g). CCFCS data will be used in projects to better categorize consistently high and low performing facilities across a range of processes (Table 1, goal 1.f) and to explore the relationship of performance to organizational factors (Table 2, goal 1.b.2).

Drs. Fihn, Lowy and Maynard continue to use CCFCS data to promote new AMI risk-adjustment models (Table 1 goals 1.j and 1.l). Risk-adjusted 30-day mortality rates for Medicare patients are based on a model developed by Krumholz and colleagues. It is an administrative claims model suitable for profiling hospital performance based on 30-day mortality rates.[1] The model uses existing administrative data as opposed to more expensive

chart abstraction such as EPRP/CCFCS. Pending approval from Medicare to release model specifications, IHD QuERI, in conjunction with the Office of Quality and Performance, plans to apply this model to similarly aged veterans (65 and older) with AMI. The patient treatment and VA vital status files will be used to construct an analytic file to which the model will be applied. The notion of using administrative data to evaluate hospital quality is a very important concept, made possible by the development of hierarchical logistic regression techniques as well as better administrative data. This will potentially have a major impact on the way VA conducts cardiovascular performance measurement.

In FY 2009, we will continue our analysis of the effects of the Cardiac Care Initiative on processes and outcomes of patient care (Table 1, goal 1.j); analyses of AMI cost inside and outside VHA (Table 1, goal 1.h). As described in last year's Strategic Plan, our implementation goals for FY08 included facilitating implementation of the field-tested quality improvement strategies catalogued in the Emergency Department Quality Improvement Technical Assistance Project's (EDQI-TAP) ACS Quality Improvement Guide and publishing our systematic literature review of quality improvement tools and strategies to improve cardiac reperfusion treatment times. IHD QuERI has worked aggressively in the past year to accomplish this goal. As part of EDQI-TAP, Drs. Fihn, Helfrich and Lowy developed a facility-level, graphical feedback report for VHA's cardiac performance measures. The report was adopted by OQP and integrated into the automated quarterly performance notification system and compares facility performance to national averages and performance targets and includes a link to the quality improvement resources we helped develop on the EDQI-TAP web page.

With respect to addressing the chronic phase and prevention of IHD, our goals remain centered on developing multifaceted interventions that incorporate collaborative care techniques and exploit new technologies. Improving patient adherence to preventive medications is a goal of several projects. The recently completed Collaborative Cardiac Care Project (C3P) sought to improve quality of secondary prevention for chronic stable angina patients (Table 1, goal 2.a) by using Collaborative Cardiac Care Teams to conduct patient reviews and issue treatment recommendations in the form of unsigned orders or notes directly in CPRS, which primary care providers then have the prerogative to sign. Analyses to date have shown that patients in the intervention (collaborative care team review) and control (usual care) arms did not differ significantly with regard to main outcomes. However, scores on the Seattle Angina Questionnaire Angina Frequency Scale improved more from baseline to one year in the

intervention group than in the control group (p=.49). The intervention group showed more improvement for all but 3 outcome variables, but differences were not statistically significant, including change in overall physical and mental health status.

Dr. Rumsfeld is collaborating with members of the CHF-QuERI to initiate a similar multi-center randomized trial (recently funded) of a Patient-Centered Disease Management (PCDM) intervention for heart failure, that entails collaborative care, tele-monitoring, and embedded depression screening and management (Table 1, goal 2.c). In conjunction with Dr. Ho's Career Development Award, IHD-QuERI investigators are conducting two studies to assess the effectiveness of interventions centered on interactive voice response (IVR) systems to improve medication adherence and self-management for patients with hypertension (Table 1, goals 2.d).

Dr. Thomas Maddox, a cardiologist, is submitting a CDA proposal to evaluate CART-CL data on care coordination for patients with non-obstructive coronary artery disease and their quality of care for secondary prevention. A key objective of the study is to identify specific language within catheterization reports that is associated with guideline-concordant preventive care and to develop and test an intervention to improve quality of care (Table 1, goal 2.e). All of these projects seek to improve quality of care by using existing clinical resources or new technologies to streamline or automate care processes and reduce the burden on primary care providers.

In addition to the activities described that seek to directly improve care, we will continue or initiate a variety of projects to better understand patient, provider and contextual factors in order to identify gaps in care, opportunities for improvement, and organizational determinants of quality improvement. Dr. Bryson began work in FY08 on his IIR to study facility-level variation in rates of adherence to medications, including those prescribed to treat and prevent cardiovascular disease, and to identify organizational factors associated with differences in adherence (Table 2, goal 3.b.4). Dr. Alyson Littman will conduct an evaluation of the MOVE program at VA Puget Sound Health Care System in order to document the specific content of the intervention and describe changes in patient body mass index (BMI). This will contribute to developing an evidence base for a critical target for primary prevention: obesity (Table 1, goal 2.g; Table 2, goal 3.b.6).

Drs. Helfrich and Li have received funding to conduct two studies to refine instruments for assessing hypothesized organizational determinants of implementation of evidence-based practices. One study will validate an organizational readiness to change survey based on the

Promoting Action on Research Implementation in Health Services (PARIHS) framework (Table 2, goal 3.a.1). The other study seeks to determine whether the competing values framework scale, which composes one part of the VA All Employee Survey, is validated by predicted similarities in item variance between supervisors and non-supervisors, clinicians and non-clinicians, and between respondents to the 2004 and 2006 surveys. This is essential to accurately aggregate data and has important implications for the underlying theory of organizational culture (Table 2, goal 3.a.2).

Dr. Kari Nelson, who collaborates with members of the IHD-QuERI, has received funding for a study to examine the relationship among neighborhood characteristics, patients' behaviors such as adherence to medications and preventive health habits, and patient outcomes. She will link the ACQUIP data repository on Veterans to geo-coded databases from the RAND Corporation (Table 1, goal 2.f). Dr. Steve Bradley, a cardiologist and post-doctoral fellow, will study the process by which dispatchers for the 911 system in the city of Seattle determine that a caller is unable to receive instructions for CPR because s/he lacks fluency in English and assess the effect on time to CPR (Table 1, goal 1). He is also designing a study to examine how frequently providers prescribed full doses of medications recommended by guidelines from the American Heart Association and American College of Cardiology for patients with IHD and whether intensive therapy is associated with improved outcomes.

Thus, in FY 2009, IHD-QuERI will maintain a strong program of research and quality improvement directed at the acute phase of ischemic heart disease, and responding to feedback from the Research and Methodology Committee, will expand our efforts to address the chronic phase and prevention of ischemic heart disease and will more fully integrate implementation science goals in our activities, including economic analysis of intervention costs and dissemination of tools developed. We will continue our meaningful collaborations with VACO and field personnel, and build on our extensive data resources to better understand opportunities for improvement and key contextual factors. We will also continue to review and refine our specific aims with the guidance of our Executive Committee and the Research and Methodology Committee.

I. Center Mission, Goals and Scope

I.1 Clinical Focus and Scope

Ischemic heart disease (IHD) is responsible for 1 of every 5 deaths in the United States, and remains the single largest killer of Americans, men and women alike. In 2006, the total estimated cost (direct and indirect) for caring for patients with IHD exceeded $142 billion.[2] Over 500,000 VHA patients have a diagnosis of IHD, and it is a leading cause of mortality and hospitalization for veterans.[3, 4] In the past three decades, advances in diagnosis and treatment of IHD have produced dramatic improvements in survival.[5-7] These include detection and treatment of risk factors, the use of life-prolonging pharmacotherapy such as aspirin and beta-blockers, advances in coronary revascularization including both percutaneous coronary intervention (PCI) and coronary artery bypass grafting (CABG), advances in the treatment of acute coronary syndromes, and the proliferation of paramedic units in the community. Many of the risk factors for IHD are modifiable, as are risk factors for recurrent IHD (that is, for secondary prevention). Risk factors that promote atherosclerosis in both men and women include hypertension, diabetes mellitus, dyslipidemia, smoking and obesity. Life style modification and risk factor management have a positive impact on the recurrence of IHD[2],and we have made important advances in understanding the interplay of comorbidities, such as diabetes[8] and depression;[9, 10] patient behaviors, such as medication adherence;[11, 12] and systems factors such as availability of cardiac services[13, 14] and hospital performance on quality measures.[15, 16]

Despite advances in care, significant gaps remain in the US in the implementation of best practices for IHD. Between 10-40% of acute coronary syndrome patients (depending on the specific measure) do not receive guideline-indicated therapies at discharge even when they are eligible, and the gaps are almost certainly larger for outpatient management of IHD.[2] Quality of emergency care during admission falls short by an even wider margin with as many as 12% of high-risk patients' ECGs being misread[17] and as few as a third of eligible patients receiving cardiac reperfusion therapy within guideline specified timeframes.[18, 19] Moreover, there is consistent evidence of regional variations in care processes and patient outcomes that persists after risk adjustment.[20, 21]

Recent findings regarding percutaneous coronary intervention (PCI) have also raised important questions regarding the use of this common procedure for the treatment of acute coronary syndrome (ACS) as well as stable angina pectoris. First, investigators from the Clinical Outcomes Utilizing Revascularization and Aggressive Drug Evaluation (COURAGE) Trial reported a trial of aggressive, medical therapy was not associated with a higher risk of death, MI, or other cardiovascular events than initial PCI plus optimal medical therapy in patients with chronic stable angina.[22] Second, for patients with ACS, increased occurrence of late adverse events was associated with the discontinuation of clopidogrel after implantation of drug eluting stents.[23, 24] These findings raise important questions about the optimal duration of dual antiplatelet therapy following stent implantation for ACS as well as the appropriateness of PCI for patients with chronic stable angina.

Within the past five years, two studies comparing the VA to Medicare have raised concerns about worse outcomes for VA myocardial infarction patients and underuse of two evidence-based procedures, cardiac catheterization, and coronary revascularization.[25, 26] In November 2003, the VA launched a multi-faceted cardiac care initiative, in which IHD-QuERI continues to play a major role in both support and evaluation. Subsequent research suggests that observed outcome differences may be attributable to previously unrecognized differences in underlying risk for inpatient versus outpatient myocardial infarction,[27] and that mortality for AMI among Veterans has steadily declined from 2004 to 2006 and is equivalent between AMI patients treated in VA and Medicare patients treated in the community.

I.2 Significance and Consequences

Acute Phase of IHD

Acute Coronary Syndromes, including acute myocardial infarction (AMI) and unstable angina, are potentially life-threatening manifestations of IHD that result from rupture of an atherosclerotic plaque in a coronary artery. AMI manifests either as ST-segment elevation myocardial infarction (STEMI) or non-ST segment elevation myocardial infarction (NSTEMI). The distinction between these forms is based on interpretation of the electrocardiogram (ECG). Both forms involve elevation of serum biomarkers of cardiac ischemia; the most commonly measured are elevations in serum troponin levels.

Evidence-based treatment for STEMI differs from NSTEMI and Unstable Angina in the initial stages (generally the first 12-48 hours after symptom onset). Because the pathology of

STEMI typically involves complete occlusion of a coronary artery, these patients should receive immediate treatment with either thrombolytic (clot dissolving) drugs or emergency coronary angioplasty to open the occluded artery and restore coronary blood flow to the injured myocardium. Such therapies have been shown in large randomized trials to reduce mortality in patients with STEMI, while for patients with NSTEMI, such aggressive intervention has not been shown to improve survival. In VA, STEMI represents approximately 15% of acute coronary syndromes. NSTEMIs account for approximately 67% of ACS and unstable angina the remaining 18%.

Recommended treatment regimens for NSTEMI and unstable angina are rapidly evolving. However, there is evidence to suggest that some patients experiencing these forms of ACS require relatively early definitive diagnosis and treatment. Following treatment for the acute event, the focus of ongoing therapy is the control of symptoms (e.g. angina) and prevention of recurrent events (secondary prevention).

Drs. Stephan Fihn, Michael Ho and Harlan Krumholz were on the AHA task force to develop performance standards for STEMI and non-STEMI myocardial infarction.[28] By improving measurements of cardiovascular healthcare quality, ACC/AHA performance measures may facilitate translation of scientific evidence into clinical practice in both VA and non-VA facilities. These performance measures will provide a mechanism through which quality of care can be measured and improved.

Chronic Phase of IHD

Chronic angina due to underlying IHD is common among VA patients, with a prevalence of 32% in VA primary care clinics. Data gathered as part of the HSR&D-funded ACQUIP study [29] indicate that the management of this common but serious problem is suboptimal, reflecting a substantial gap between evidence-based guidelines and actual practice. One uncontrolled study has shown that careful management can reduce the severity and frequency of angina, and improve physical function and quality of life of patients with chronic angina.[30] In contrast to the proliferation of expensive technologies such as cardiac catheterization and coronary care units and programs to manage cardiac risk factors, relatively little effort has been directed at improving the care of chronic stable angina, the most common clinical manifestation of IHD. Angina seriously impairs the quality of life and function of patients with IHD and is often a harbinger of impending complications, including ACS. Taken together, the evidence supports

improving recognition and treatment of angina in order to improve the quality of life of patients with IHD, and reduce the risk for acute events. As mortality in IHD decreases, there should be increasing emphasis on quality of life outcomes for patients suffering from one of the most common chronic forms of IHD, who often express a preference for quality over quantity of life.[31-33]

Secondary Prevention

All patients who have suffered an AMI benefit from specific pharmacotherapy for prevention of recurrent events (secondary prevention).[34, 35] Principal therapies include statins or other dyslipidemia therapies, beta-blockers, aspirin and clopidogrel, management of hypertension, ACE inhibitors, and modification of risk factors such as smoking and obesity. Estimates of the number of VA users who would benefit from these therapies range from 500,000 to over 1 million. There is increasing evidence that improvement in life expectancy is primarily a result of adhering to recommended guidelines for secondary prevention.[15]

I.3 Treatment and Management Evidence Base

The VA/DoD Clinical Practice Working Group updated the guidelines for the management of IHD in November 2003,[34] with a further update in 2004 following the release of updated guidelines for the management of STEMI. This document is a large, omnibus guideline covering each of the three foci: acute phase, chronic illness care, and secondary prevention, and synthesizes national guidelines, notably those from the American College of Cardiology (ACC), the American Heart Association (AHA), the American College of Physicians, the American Society of Internal Medicine (ACP-ASIM), and in part on other national guidelines, such as the Joint National Council on Hypertension VII Report (JNC-VII)[36] and the National Cholesterol Education Program, Adult Treatment Panel III (NCEP-ATPIII).[37, 38] The ACC/AHA also produce guidelines for management of chronic stable angina,[39] and these have been adopted by VHA. These guidelines are being incorporated into a new guideline for Stable Ischemic Heart Disease and VHA will likely adopt these as well.

Most treatment guidelines are similar for patients experiencing acute coronary syndromes and for secondary prevention. For example, antiplatelet therapy (notably aspirin), beta blocker treatment, ACE Inhibitor use, and lipid management are all known to be effective in reducing mortality in IHD patients both in acute coronary syndromes as well as in secondary

prevention.[34] Levels of evidence for these treatments are Class I (Level A) to Class IIa (Level B). Other treatments, such as the use of thrombolytic treatment and primary percutaneous coronary interventions (PCI) are exclusive to STEMI patients, and are highly time dependent,[40] while they are not indicated (Class III) in patients with NSTEMI and unstable angina.

There is a substantial gap in knowledge regarding the most appropriate care of patients with coronary stents, both drug eluting (DES) and bare metal stents (BMS). Stents are routinely placed during percutaneous interventions, and there has been a shift from BMS to common off-label use of DES. Most data available on mortality and complications cover a relatively short period after the procedure. While DES may have a lower rate of immediate complications, they may be associated with a higher rate of late thromboses as compared to BMS. Current data resulting from IHD-QuERI analyses have provided additional evidence regarding the risks of stent thrombosis for both drug-eluting and bare-metal stents for patients taking and not taking clopidogrel [23] We have also made novel observations about short-term risks of late stent thrombosis following the discontinuation of clopidogrel that will likely influence discussions and recommendations about the duration of clopidogrel administration following stent placement.

Assessment of risk factors is critical in evaluating whether a patient may need interventions to improve outcomes. Appropriate medical treatment has been proven to save lives for all patients with IHD; this includes beta-blockers, aspirin, and lipid-lowering therapy, as well as ACE inhibitors for many patients.[34, 41] VHA has had performance measures for the treatment of IHD with beta blockers, aspirin, and ACE inhibitors for several years.

As a risk factor for cardiovascular disease, hypertension is associated with considerable morbidity and mortality. The JNC-VII[36, 42] convenes periodically to synthesize the research on hypertension for busy clinicians and public health workers in the form of a guideline report. JNC-VII has found success in meeting the goals of the program specifically in increasing awareness, increasing the rates of treatment, and increasing the rates of blood pressure control to below 140/90 mm/Hg. These changes have been associated with highly favorable trends in morbidity and mortality attributed to hypertension. Although improvements have been made, control rates in the United States are still unacceptable. Approximately 30% of adults are still unaware of their hypertension, greater than 40% of individuals with hypertension are not on treatment, and two-thirds of hypertensive patients are not being controlled to BP levels less than 140/90 mm Hg. A study by Borzecki and colleagues[43] showed that hypertension control has improved over time in

the VA. However, many patients continue to have uncontrolled blood pressure, with measurements above recommended levels.

I.4 Current Practices and quality/Outcome Gaps

As noted earlier, concerns have been raised about acute VA cardiac care. We continue to assess patient risk factors and variation in care for acute coronary syndromes, including emergency care, processes of care during hospitalization and transfer, and use of cardiac catheterization and coronary revascularization procedures, which have proven efficacious in saving lives and controlling symptoms of IHD. Our collaboration with the Office of Quality and Performance, Office of Information, and the Office of Patient Care Services on various aspects of the Cardiac Care Initiative continues to yield insights into the quality of acute phase care for IHD patients throughout VHA.

IHD QuERI has conducted several analyses of VHA data, from a variety of sources, documenting gaps in lipid management best practices for secondary prevention in IHD patients. Findings from our first study, which included 24 VA Medical Centers in four VISNs (Lipid Measurement and Management Study [LMMS]), showed that approximately 30% of all patients with IHD did not have current LDL-c measurement, and over 50% were not being treated appropriately with a statin or other lipid-lowering agent. Further analyses using data from VISN 20 showed that once patients are prescribed a statin, compliance with statin prescription is higher in VHA than outside VHA[44], but a previously unidentified group of patients at high risk for not receiving therapy includes those with comorbid mental health and substance abuse disorders[45]. Overall, in terms of adequacy of secondary prevention, VHA appears to be doing well in prescribing guideline-recommended therapies after an acute event, but a high proportion of those with prior events were found not to be receiving the full complement of life-preserving therapies,[46] and it is not clear how adherence to recommended therapies persists as the time from most recent cardiac events grows longer.

In the ACQUIP study, which included 7038 patients with IHD, only 3771 (54%) were being managed with therapies fully consistent with the VA and American College of Cardiology/American Heart Association/American College of Physicians-American Society of Internal Medicine (ACC/AHA/ACP-ASIM) Practice Guidelines for IHD.[47] This suggests that there are important gaps in managing the chronic care and secondary prevention aspects of IHD. In

addition, depression is a common and often under-diagnosed sequela following acute coronary syndrome. This disease has a major impact on quality of life, and can lead to further morbidity.[9, 48]

I.5 Significant Influences on Current Clinical Practices and Outcome

Quality improvement activities that were initiated following the 2003 external evaluation of VHA's cardiac care program,[49] which raised concerns about processes and outcomes for AMI, continues to be a major emphasis for the Office of Patient Care Services, the Office of Quality and Performance, field operations, and IHD QuERI. The broad-ranging VHA initiatives that were spurred by this evaluation included retrospective chart review of all patients with acute coronary syndromes, updating of all clinical practice guidelines and performance measures for all ischemic heart disease patients, development of a national cardiac catheterization lab database, a major initiative for patient education, and operational changes in the structure and delivery of cardiac care to ACS patients. The offices involved in this endeavor are: Office of Quality and Performance (OQP), Patient Care Services (PCS), the Office of Information (OI), Employee Education Services (EES), the Evidence Based Practice Work Group, formerly the National Clinical Practice Guidelines Council (NCPGC), and Health Services Research & Development (HSR&D, principally IHD-QuERI).

National entities influencing current clinical practice include most notably the AHA and the ACC. Members of the IHD-QuERI Executive Committee are involved in national ACC and AHA committees as well as in their scientific sessions. The AHA has conferences throughout the year and the VA has partnered several times with the AHA to co-sponsor an outcomes conference on cardiovascular disease, which occurs in April or May of each year. Most IHD QuERI Executive Committee members participate in this conference, and IHD-QuERI typically holds its Executive Committee meeting in conjunction. This permits extensive interactions with leading researchers within and outside VHA.

The ACC has developed measurement systems which have had enormous impact in the field of cardiology. In particular, the National Catheterization Data Registry (NCDR) is the most widely known registry on cardiac catheterization procedures and outcomes in the country. To date, few VHA cardiac catheterization laboratories participate in ACC-NCDR, but most would prefer strongly to be able to participate in order to understand how their processes of care and outcomes compare with others, and as a tool for quality improvement. IHD-QuERI has been

involved in negotiations spearheaded by Dr. Robert Jesse to join the NCDR. As a result, the VA will participate in the NCDR which will be used to bench-mark VA practices and certify the Cardiac Assessment Reporting and Tracking System for Catheterization Laboratories (CART-CL) software.

I.6 IHD QuERI Center Goals

Our mission is to improve the quality of care and clinical outcomes for Veterans who have ischemic heart disease and its complications and those who are at risk for IHD by identifying, assessing and promoting implementation of evidence-based best practices; fostering collaboration among researchers and operational units; and advancing the sciences of evidence-based medicine and evidence-based management.

Our primary goals are to improve quality of care for (1) Veterans with IHD in the acute phase (including cardiovascular procedures), and (2) Veterans with IHD in the chronic phase and those at risk for IHD. Our third goal is to build our implementation science knowledge base in the service of quality improvement. Within these broad goals are a range of specific goals, each reflected in one or more current or planned activities. These specific goals are cataloged in Table 1, Clinical Goals, and Table 2, Implementation Science Goals.

Implementing a nation-wide cardiac catheterization laboratory data collection and reporting system (CART-CL) and exploiting that system for clinical improvement and research purposes remains a top priority that contributes to all three primary and secondary goals. CART-CL is our largest implementation project to date, and serves as the basis for a growing number of studies and interventions, such as linking VA data to external performance databases for benchmarking, and using catheterization reports to identify recommendation language that is associated with guideline-concordant preventive care. CART-CL implementation is the subject of a mixed methods implementation study for the purpose of formative evaluation and contributing to the research base on contextual factors and facilitators determining facility-level implementation of IT innovations.

Within Goal 1, addressing acute IHD, our primary focus is building on the work of the past three years to extend improvements made in rapid diagnosis, triage and treatment of ACS patients through implementation of field-proven quality improvement strategies. A parallel goal is to continue contributing to research on priority groups, evidence-based clinical practices and performance gaps (QuERI steps 1, 2 and 3) by maintaining and exploiting our extensive data

resources, CART-CL and CCFCS. Specific areas in which we seek to further develop the evidence base for clinical practices are the use of clopidogrel and drug-eluting stents, AMIs among inpatients admitted for other conditions, and understanding the spectrum of ACS patients. We also seek to improve understanding of contextual factors affecting implementation of evidence-based best practices, specifically in the measurement and analysis of organizational factors such as culture, centralization of authority, and in the measurement of organizational performance.

Within Goal 2, addressing chronic IHD and prevention of IHD, our primary focus is to develop and test interventions that improve evidenced-based secondary prevention, particularly among chronic angina patients, and primary prevention among hypertension patients, both areas where IHD-QuERI affiliated investigators have contributed to research revealing potential gaps and opportunities for improvement in care.[11, 39, 50, 51] Specifically, we seek to implement and test collaborative care models for care of cardiac patients and promising new technologies such as interactive voice response (IVR) and tele-monitoring. A common principle underlying these interventions is to make better use of existing resources and to automate or streamline care delivery in order to minimize burden on primary care providers while keeping primary care at the center of patient care management. Measuring and improving medication adherence is a particular interest. As with Goal 1, we seek to contribute to more fundamental research (QuERI steps 1, 2 and 3) to better understand gaps in care, identify subgroups among ACS and chronic stable angina patients, and advance research on environmental contributors to IHD.

Finally, within Goal 3, advancing implementation science, we continue to focus on two broad goals of improving the validity and reliability of measurement of factors related to evidence, context and facilitation, and improving our understanding of organizational factors that influence capacity to implement and institutionalize evidence-based practices and contribute to variation in quality of care and outcomes.

We also are focusing on barriers and facilitators to implementation of tools and programs developed. For example, Dr. John Rumsfeld and Tamara Box are submitting a proposal in FY09 to assess the implementation and effectiveness of the national VA cardiac device sentinel surveillance network (CART-Net). They will compare the incidence of adverse events (AE) reporting to the FDA by VA cath labs after the initiation of CART-Net versus annualized incidence from the prior five years and will describe the volume, timeliness, and types of AE reporting using CART-Net. Frequency, type, and amount of targeted communications to

providers in CART-Net will be described, and user satisfaction of the reporting process, network, and communications will be assessed.

Dr. Helfrich is evaluating the implementation of the intervention employed in the Collaborative Cardiac Care Project (C3P). He is examining how clinician-level characteristics influenced the effectiveness a Collaborative Cardiac Care Team intervention (C5P). He will assess: the extent to which clinicians' caseloads of patients with IHD was associated with variation in guideline concordant care in the intervention and control arms at baseline and post-intervention; the extent to which clinicians' identification with VA mission and practice environment was related to variation in guideline concordant care; and the extent to which the effects of clinicians' IHD caseload and institutional identification on guideline adherence may have modified the effect of the Collaborative Cardiac Care Team intervention on guideline concordant care. The purpose is to understand how contextual factors influence the effectiveness of a collaborative care model.

Dr. Helfrich is also developing a merit review proposal with investigators from Mental Health and Spinal Cord Injury QuERIs to complete further validation of the Organizational Readiness to Change Assessment, a survey based on the Promoting Action on Research Implementation in Health Services framework to reliably measure organizational factors that strongly influence the implementation of new, evidence-based practices. This proposal integrates instrument validation into three existing QUERI implementation projects, and will improve the quality of measurement tools at our disposal. This is a contribution to implementation science that will enhance our ability to efficiently evaluate implementation projects in the future.

Our implementation goals relative to improving quality for acute care and secondary prevention are to conduct effectiveness trials of promising multifaceted interventions that leverage health information technology (e.g. Interactive Voice Response and tele-monitoring with collaborative care-based models for IHD, CHF and depression) with the objective of scaling up effective interventions for regional implementation. All projects will be subject to implementation evaluation (See Figure 1: PCDM, BP-CO, WTLOSS, SEC-CAD, SEC-NOCAD, C3P, C5P).

Table 1 IHD-QuERI Clinical Goals Update for FY 2009

Clinical Goals	Time Frame
Goal 1: Improving Quality of Care for Veterans with IHD: Acute Diseases and Cardiovascular Procedures.	
a) Collaborate with OQP, OI, and PCS to complete and sustain implementation of CART-CL in all VA cardiac catheterization labs and develop proposals for ongoing CART Program support (Fihn, Rumsfeld and Jesse)	Long term
b) Continue with expansion of CART to peripheral vascular interventions (e.g. carotid stenting) that are increasingly done by VA cardiologists and with the possible expansion to the capture of implantable cardioverter defibrillator device procedures (Fihn, Rumsfeld and Jesse)	Medium term
c) Obtain separate funding for development effort to implement CART-CPR to track in-hospital cardiopulmonary resuscitation in all VA facilities (>160).	Medium term
d) Evaluate the patient characteristics, processes of care, longitudinal care, and risk-adjusted outcomes for patients undergoing catheterization procedures in the VHA (Rumsfeld, Tsai, Maddox, Ho, Plomondon)	Long term
e) Continue collaboration with PCS and OQP to engage in external comparisons of VA care with non-VA providers, focusing on registries such as the ACC-NCDR (Jesse, Rumsfeld, Fihn)	Long term
f) Understand how organizational culture relates to improvement on ACS performance measures and develop organizational culture profiles of high performing, low performing and rapidly improving facilities. (RTC, ME/IA, Helfrich)	Short term
g) Maintain data on system-wide performance and outcomes to facilitate continued analysis of variation in acute coronary syndromes, using data collected by OQP through the External Peer Review Program (CCFCS, Fihn)	Long term
h) Analyze the costs associated with AMI care provided within VHA and care provided outside of VHA for which VA was responsible; further analyses will include examination of factors associated with differences in costs of care as well as those associated with outpatient AMI care and AMI-related procedures (AMI-COST, Lowy)	Short term

Clinical Goals	Time Frame
i) Complete analysis of ACS care in nine VA Medical Centers to assess quality of care and patient outcomes, including health-related quality of life, prospectively evaluate quality of care for acute coronary syndromes in VHA. Includes analysis of patients with elevated troponin but no diagnosis of ACS (ACS Study Objectives 1 - 3, Fihn and Larsen co-PIs)	Short term
j) In collaboration with PCS, evaluate the effects of system-wide change, the Cardiac Care Initiative, on processes and outcomes of patient care (ACS, CCFCS; Fihn, Larsen, Rumsfeld)	Short term
k) Evaluate safety and quality measures for invasive diagnostic and interventional cardiac studies using the CART-CL database.	Long term
l) Continue to monitor and analyze AMI performance measures including mortality.	Long term
m) Better understand the etiologies, risk factors, and outcomes of acute myocardial infarctions that occur after a patient is admitted to the hospital for another medical problem. This type of AMI represents 10% of all AMIs within VHA and carries a mortality that is three-fold greater than for AMIs that are present at the time of admission. (In-hospital AMI, Fihn)	Medium term
Goal 2: Improving the Quality of Care for Veterans with IHD: Risk Factor Management/Secondary Prevention and Chronic Disease Management	
a) Evaluation and publication of results of the Collaborative Cardiovascular Care Project (C3P) (Fihn and Rumsfeld)	Short term
b) Improve post-discharge care for patients with acute coronary syndrome, evaluating gaps in performance across VHA in short and long term follow up for these patients (CCFCS and ACS Study Objectives 1-3; Fihn, Larsen, Rumsfeld)	Short term
c) Collaborate with CHF-QUERI to test the effectiveness of a Patient-Centered Disease Management (PCDM) intervention for heart failure. The intervention centers on collaborative care, tele-monitoring, and embedded depression management in addition to CHF management. The research is being conducted in collaboration with PCS, Office of Care Coordination and Mental Health QUERI (Rumsfeld, PI; Heidenreich co-PI)	Medium term
d) Develop and test multifaceted interventions centered on interactive voice response (IVR) technology to improve hypertension management for Veterans (BP Colorado, Ho and Rumsfeld; IVR-HTN, Dr. Michael Ho, CDA awardee; Rumsfeld, Goldstein and Sales, mentors)	Medium term

Clinical Goals	Time Frame
e) Assess differences in communication of secondary prevention recommendations between Veterans with obstructive and non-obstructive CAD, and determine if differences are associated with patient outcomes (SEC-CAD, SEC-NOCAD, CART-CL; Maddox, Rumsfeld, Fihn)	Medium term
f) Determine the relationship of neighborhood characteristics, such as community resources, safety, physical design, SES and services, to patient outcomes for chronic conditions including ischemic heart disease (ENVIRO, Nelson)	Medium term
g) Evaluate outcomes of the MOVE weight loss program in VISN 20 and compare characteristics of participants and eligible non-participants.	Short term

Short term = 1 – 2 years, Medium term = 2 – 4 years, Long term = 5 or more years.

Table 2 IHD-QuERI Implementation Science Goals Update for FY 2009

Implementation Science Goals	Time Frame
Goal 3: Contribute to the implementation science knowledge base	
a. Improve the validity and reliability of instrumentation to measure factors related to evidence, context and facilitation	
1) Psychometrically validate an organizational readiness to change instrument based on the Promoting Action on Research Implementation in Health Services framework (RTC, Helfrich, Li)	Short term
2) Measurement Equivalence \ Invariance Analysis of Organizational Culture (ME/IA, Helfrich, Li)	Short term
3) Establish criterion validity of the organizational readiness to change assessment (ORCA) using implementation outcomes from three quality improvement projects (ORCA IIR, Helfrich)	Medium term
b. Increase understanding of organizational factors that influence readiness or capacity to implement and institutionalize evidence-based practices	
1) Complete the study of CART-CL implementation to describe provider, facility and network level factors related to speed and extent of facility-level CART-CL implementation (CART-Eval; Rumsfeld, Helfrich)	Short term
2) Analyze performance measure and supporting indicator data for acute myocardial infarction to model quality of care as a facility-level latent variable (CCFCS, Helfrich, Li, Spertus, Sales, Rumsfeld, Fihn)	Medium term
3) Assess the relationship of degree of facility centralization of authority, employee morale and adherence to evidence-based guidelines for AMI care (Helfrich, Bryson)	Short term
4) Use survey and interview data to assess organizational correlates of patient adherence to medications (OCAM, Bryson)	Medium term
5) Assess degree of provider identification with VA mission and practice environment as a potential effect modifier of collaborative models of care for unstable angina (C5P, Helfrich, Maddox, Rumsfeld)	Short term
6) Conduct staff interviews and use VISN 20 data warehouse to conduct a formative evaluation of the MOVE! weight loss program. Among eligible patients, compare characteristics of participants and non-participants.	Short term
c. Actively disseminate tools developed	Long term

Implementation Science Goals	Time Frame
d. Maximize opportunities for implementation evaluation; why an intervention does or does not work and differences between early and late adopters	Long term
e. Incorporate economic/cost effectiveness measures and analyses for implemented interventions	Long term

Short term = 1 – 2 years, Medium term = 2 – 4 years, Long term = 5 or more years.

I.7 Plans for Achieving IHD QuERI Center Goals

To achieve our goals of improving quality of care and outcomes for Veterans with IHD, Drs. Fihn and Rumsfeld lead a diverse team of investigators and staff in executing an extensive portfolio of research and quality improvement projects. They also devote significant effort to forging and maintaining collaboration with VHA Central Office, other QuERI Centers and experts and thought leaders outside the VA. Our investigators and staff, and their respective roles, are detailed in our Management Plan below, and each of the specific goals enumerated in the tables above reflect one or more current or planned activities that are described in more detail in our FY 2008 Annual Report. For reference, we include Figure 1, Implementation Pipeline, and Figure 2, Wiring Diagram, from the Annual Report to map these activities and illustrate our collaborations, respectively (see Appendices).

Sustaining implementation of a national cardiac catheterization laboratory data collection and reporting system, CART-CL, and exploiting that system for clinical improvement and research remains our top priority for addressing goals 1 through 3. We continue to work hand in hand with PCS and the Office of Information Technology to support CART-CL implementation. Specific implementation activities include generating monthly reports for VHACO to disseminate to the field and using CART-CL to provide workload capture. CART-CL is itself our largest implementation project to date, and is serving as the basis for a growing number of studies and interventions, such as linking VA data to private sector performance databases (CART-ACC/NCDR, Jesse, Rumsfeld, Fihn and Peterson) to provide external benchmarks, and using catheterization laboratory reports to examine how care recommendations differ for different risk groups of coronary artery disease patients (SEC-CAD, Maddox). CART-CL implementation is also providing one of our best opportunities to examine contextual and facilitation factors that determine implementation (EVAL-CART, Rumsfeld & Helfrich).

Specifically within Goal 1, addressing acute IHD, our plans are to build on the improvements made over the past three years in the rapid diagnosis, triage and treatment of ACS patients. We are doing this by promoting implementation of field-proven quality improvement strategies identified from the evaluation of the Cardiac Care Initiative and the EDQI-TAP. We are collaborating with PCS and OQP to develop and test a multifaceted intervention based in part on enhanced performance feedback reports linked to quality improvement tools developed from the EDQI-TAP project (Helfrich & Fihn). To contribute to understanding about gaps in ACA care, we will pursue a study of AMIs among inpatients

admitted for other conditions (IHAMI, Fihn, Bradley, Bryson, Ho, Rumsfeld), and assessment of CPR instructions to non-English speakers calling 911 (LEP, Bradley). We will continue and initiate studies of organizational factors in collaboration with investigators at COLMR including organizational culture, centralization of authority and employee morale as correlates of facility level performance (Helfrich).

Within Goal 2, addressing chronic IHD and prevention, we are completing and conducting studies to test interventions to improve evidenced-based secondary prevention among chronic stable angina patients (C3P, Fihn & Rumsfeld) and primary prevention among hypertension patients (PCDM, Rumsfeld & Heidenreich). In C3P (completed in FY 2008), Collaborative Care Teams delivered care recommendations via unsigned orders and notes directly in CPRS, and in PCDM, being conducted with investigators from CHF-QuERI, the intervention incorporates Collaborative Care teams, tele-monitoring and screening and treatment of depression in the care of heart failure patients. We will continue trials of multifaceted interventions centered on automated interactive voice response (IVR) systems to improve patient medication adherence and care for hypertension patients (BP-CO, Ho & Rumsfeld). We are also conducting observational studies of the relationship among neighborhood characteristics, patients' behaviors such as adherence to medications and preventive health habits, and patient outcomes (ENVIRO, Nelson), and organizational correlates of facility-level variance in medication-adherence rates (OCAM, Bryson). These observational studies will lay the groundwork for future improvement efforts. We are conducting an evaluation of the national MOVE weight loss program at the VA Puget Sound to help build the evidence base for effective interventions for primary prevention of IHD through reduction of obesity (MOVE-E, Littman).

Finally, within Goal 3, advancing implementation science, we received funding in FY08 to conduct two studies in to improve valid and reliable measurement of implementation factors by validating an organizational readiness to change survey instrument based on the PARIHS model (RTC, Helfrich & Li), and assessing survey measurement and equivalence of the Competing Values Framework scale from the VA All Employee Survey (ME/IA, Helfrich & Li). As noted above, several of our studies seek to identify organizational correlates of guideline-line concordant care (OCAM, Bryson; EVAL-CART, Rumsfeld & Helfrich).

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II. Management Plan Update

Coordination

The activities of IHD-QuERI continue to be managed across two locations: the IHD-QuERI Research Coordinating Center in Seattle, Washington and the Clinical Coordinating Center in Denver, Colorado. Dr. Stephan Fihn, the Research Coordinator, Dr. Christian Helfrich, the Implementation Research Coordinator, Mary McDonell, the Administrative Coordinator, and IHD-QuERI staff and investigators are located in the Northwest HSR&D Center of Excellence at the VA Puget Sound Health Care System. Dr. John Rumsfeld, in the Section of Cardiology, Denver VA Medical Center, is supported by several key staff members and IHD-QUERI investigators (Drs. Ho, Maddox and Tsai) in his work as IHD-QuERI Clinical Coordinator and CART-CL Clinical Director. He collaborates closely with Drs. Fihn and Helfrich on the operation and direction of IHD-QuERI and its projects.

In February 2008, Dr. Fihn accepted the position of Chief Quality and Performance Officer for VHA. He splits his time between Washington D.C. and Seattle and remains actively engaged as the IHD QuERI Research Coordinator as well as PI for several IHD QuERI projects. Because of IHD QuERI's long-standing relationship with OQP, this transition has gone smoothly. It has provided a setting for even more collaboration with national leaders at OQP and PCS and will provide IHD QuERI with additional opportunities for program implementation and evaluation and dissemination of materials to the field.

Executive Committee

Although membership on our EC in the past year has been unchanged, we have planned for several transitions in the coming year. Our committee has traditionally benefited from very strong representation from cardiology, internal medicine, and nursing. As we seek to expand the expertise and views represented on the EC, we will rotate off two to four members who have been long-standing members (many since the inception of IHD QuERI). At the same time, we are recruiting new members for 2009 in the following areas previously identified by the R&M committee and EC members as priorities for expanding expertise:

- Internist with a background in CV epidemiology, prevention, and outcomes research (ideally with policy implications) since many of our interventions take place in primary care
- A second nurse outcomes researcher with focus on CV disease
- Implementation Science expert

- Health economist/cost effectiveness expert
- Pharmacist
- Emergency Medicine clinician

The senior IHD QuERI investigators are also committed to bringing up the “next generation’, that is, those that can and should step into QuERI leadership roles in the future, by involving them on the EC or EC subcommittees. This includes some of our current IHD QuERI investigators at our coordinating centers in Seattle and Denver (Mike Ho, Chris Bryson, Tom Maddox, Tom Tsai, and Steve Bradley), as well as national junior investigators in cardiovascular outcomes research in the VA (e.g. Brahmajee Nallamothu, Ann Arbor VA; Sunil Rao, Durham VA; Salim Virani, Houston VA: Jeffrey Whittle, Milwaukee VA; and Sundar Natarajan, New York VA.).

Investigators

Several new investigators joined IHD QuERI in 2008. Their skills and interests will assist us in bridging gaps in our work and broadening our scope.

Thomas Tsai, MD, MSc is a cardiovascular outcomes researcher in the Section of Cardiology, Denver VAMC. Dr. Tsai is Director of Interventional Cardiology at the Denver VA and is an Assistant Professor at the University of Colorado. Dr. Tsai is new Co-Clinical Director of CART and will assist Dr. Rumsfeld with CART program development, expansion and evaluation and clinical site support, particularly with regard to peripheral vascular interventions and their outcomes, the primary area of research and clinical expertise of Dr. Tsai.

Paul Hebert, PhD is an investigator with the VA HSR&D Northwest Center of Excellence (NWCoE) in Seattle and a Research Associate Professor in Health Services at the University of Washington. Dr. Hebert’s research background and interests are health economics and policy. Dr. Hebert will assist IHD QuERI investigators with economic and cost effectiveness analyses.

Jason Linefsky, MD is a cardiology fellow at the HSR&D NWCoE. He will participate in analyses of the ACS and CCFCS data and is mentored by Chris Bryson.

Salim Virani, MD is a Staff Cardiologist at Michael E. DeBakey VA Medical Center, Houston, TX and Assistant Professor, Division of Atherosclerosis and Vascular Medicine, Baylor College of Medicine. Dr. Virani is mentored by Dr. Laura Peterson who serves on our EC. He will use CCFCS data to address objectives included in a Career Development Award proposal to be submitted in December 2008. He is interested in non-HDL cholesterol as a marker of recurrent events in patients with ACS.

Jeffrey Whittle, MD, MPH is an Associate professor of Medicine, General Internal Medicine, at the Medical College of Wisconsin and a Researcher at the Milwaukee VAMC. Dr. Whittle is an experienced Health Services Researcher, having served as the Director of Health Services Research, Geriatric Research, Education and Clinical Center, VA Pittsburgh Healthcare System, Pittsburgh, PA from 1991-2001. Dr. Whittle will collaborate with CCFCS investigators.

Table 3. IHD QUERI Staff, Executive Committee, Subgroup Members

Name	Degrees	Role	Institution/ Facility	Street Address	City, State Zip	Telephone	Fax	E-mail
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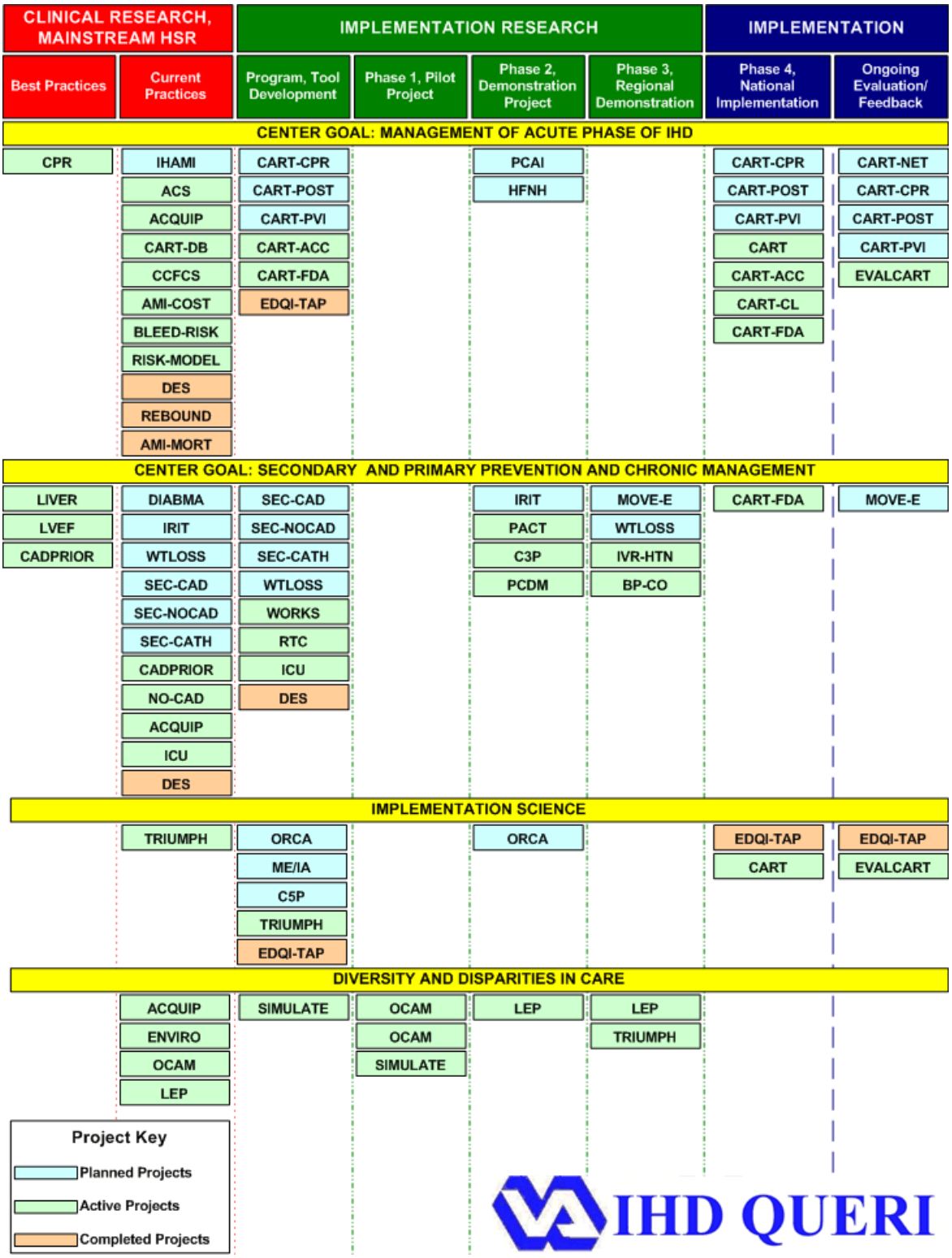
Appendix 1

Figure 1: QUERI Center Implementation Pipeline



Appendix 2

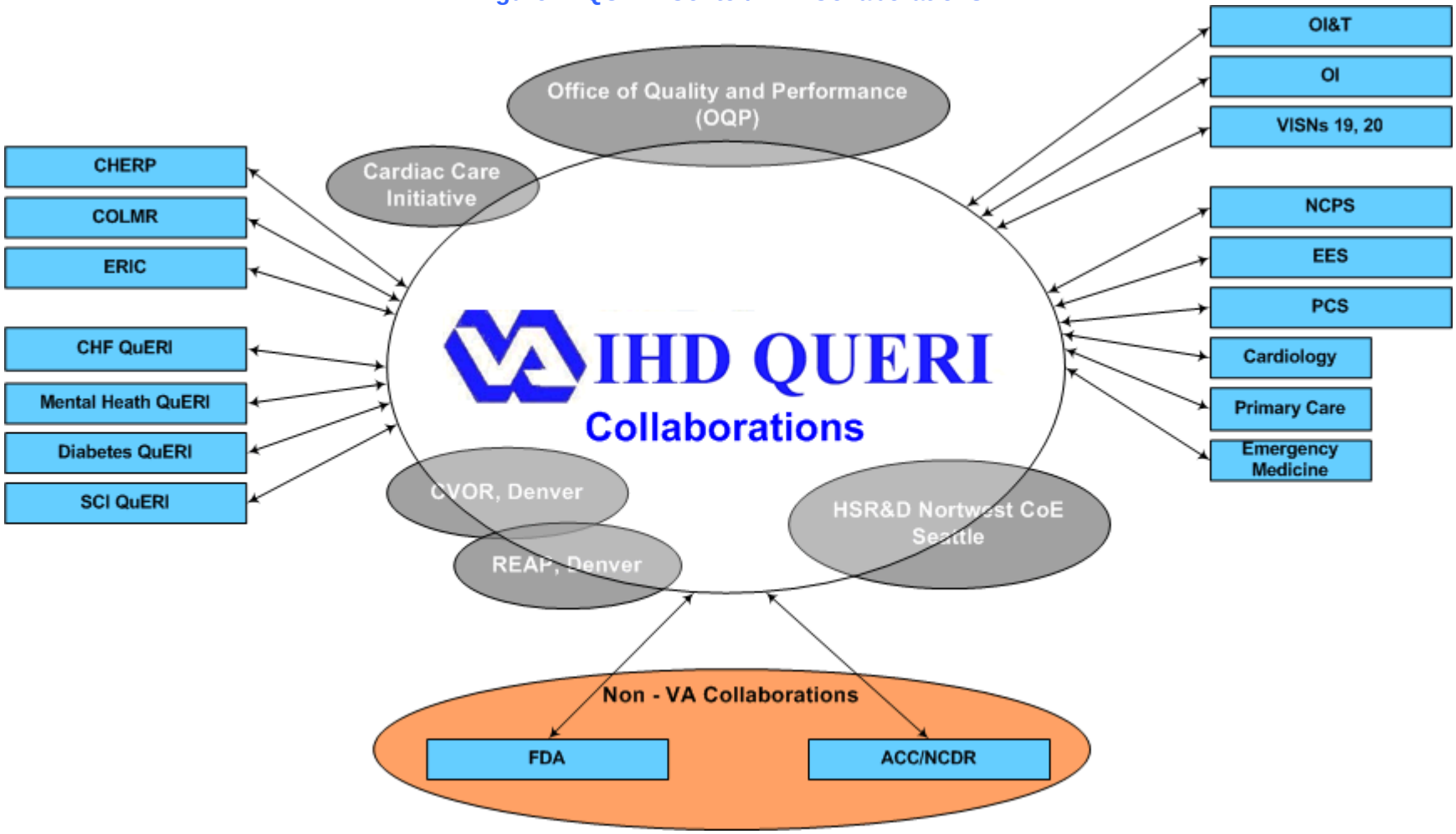



Figure 2: QUERI Center/VHA Collaborations