Department of Veterans Affairs

Quality Enhancement Research Initiative (QUERI)

Chronic Heart Failure QUERI Center Application

Strategic Plan

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1. Executive Summary

The mission of our CHF QUERI Center is to efficiently improve survival and quality of life for all VA patients with heart failure through collaboration with other VA organizations to implement best practices. We believe the best way to achieve this mission is through **reducing unnecessary care** and **increasing use of care known to prolong survival and quality of life.**

Over the last decade the resources used to treat heart failure within the VA Health Care System have grown steadily. For example, VA outpatient encounters increased from 550,000 in fiscal year 2002 to over 1 million in 2011. Inpatient care, which accounts for the majority of the cost of heart failure care has also increased substantially. In 2009 there were over 96,000 VA hospitalizations where heart failure was listed as a diagnosis compared to just over 74,000 in 2002. The increase has been due in part to an increase in the number of Veterans but a significant contributor has been an increase in the amount of care per Veteran. While some of this care is unavoidable with present technology, CHF QUERI feels there is substantial room for improvement in increasing length of life, quality of life and reducing cost of heart failure care.

Our goals have been chosen based on **three core principles**. First, achieving the goal must contribute to **improved survival, improved quality of life, or improved efficiency in care delivery**. Second, any intervention associated with a goal (including implementation of the intervention) must have **value** to the VA. In other words, the cost expended per benefit must be a reasonable value to the VA. Third, the goal must address the most **immediate needs** of the VA. Needs are determined using a combination of potential for health improvement or cost reduction, current gaps in care, and number of Veterans affected. Needs may also be specified by VA program offices.

Our three goals address many measures of quality and performance for heart failure. These include those measures publically reported on HospitalCompare.gov (four inpatient process of care measures used in accreditation by The Joint Commission and two outcome measures) as well as additional performance measures endorsed by the National Quality Forum. The VA is doing very well on the four process of care measures which include: 1) measurement of left ventricular ejection fraction (currently near 100%) in patients presenting with heart failure, 2) use of angiotensin converting enzyme inhibitors in appropriate patients (95% use in those with a left ventricular ejection fraction < 40%, 3) documentation of patient education (97%) and 4) smoking

cessation counseling (98%). These values are slightly better than those of other U.S. hospitals. The outcome measures (30-day mortality and 30-day all cause readmission) are also similar to other U.S. hospitals with the VA doing slightly better on mortality and slightly worse on readmission.

Recent Accomplishments

During the past three years, CHF QUERI has expanded its Heart Failure Network of VA providers and quality improvement staff to over 900 members. In a randomized trial we demonstrated that the network can be used to increase facility enrollment in a national quality improvement initiative (Hospital to Home or H2H) where the VA is a strategic partner. We further demonstrated that HF Network facilitation was associated with initiation and sustainment of quality improvement initiatives at VA hospitals. We also demonstrated that those hospitals enrolling in H2H had more **early** cardiology **follow-up** (within 7 days as recommended) and had **fewer patient-hospital days** in the year following admission.

There has been great focus nationally on the 30-day all cause readmission rate following a heart failure admission due to the belief that the majority are preventable. In response to this interest, CHF-QUERI has focused on studies that would either help to understand the degree of preventability or would attempt to reduce readmission rates directly. During this work we have found that 30-day all-cause readmission rates are likely much less preventable than others have assumed. In addition, QUERI investigators have found that it is difficult to predict potentially preventable readmissions. While improving the transition of care for patients discharged with heart failure is still an objective of CHF QUERI we feel we will make as much or more of an impact by improving outpatient care known to reduce admissions and improve survival.

Future Plans

A significant portion of outpatient care for heart failure is delivered by Patient Aligned Care Teams (PACTs-primary care). We have found that at least a third of patients with heart failure with a primary care provider do not see a cardiologist (VA or non-VA). Another third of patients have dual care with VA primary care and non-VA cardiology care. In order to have the greatest impact on VA heart failure care, our interventions must address both PACTs and specialty care providers. We have initiated multiple projects examining interventions (patient lists/reminders) and education (e.g. SCAN-ECHO) to impact PACT care of heart failure. In addition, we are examining the impact of dual care provided by VA primary care and non-VA specialty care.

CHF QUERI continuously reviews published literature and presentations to identify potential new areas for improvement within the VA. One treatment that has been recently identified is the use of **aldosterone antagonists** in mildly symptomatic patients which improved survival and reduced hospitalizations in a large randomized trial. Accordingly, we have made this the primary objective of our goal of improving survival.

In revising our Strategic Plan we have simplified our main goals from five to three using the three principles outlined above. These goals are 1) reducing unnecessary care including hospitalization and cardiac imaging, 2) increasing treatments that reduce mortality, 3) and increasing care that improves quality of life. Each goal has specific objectives that can be evaluated with metrics. Each objective was chosen following an extensive process of review of current VA care, analyses of cost-effectiveness of care strategies, surveys of providers in our heart failure network, surveys of potential VA Central Office partners, and discussions with our Executive Committee. In the Appendix (B) we also list areas focus that were considered but ultimately not prioritized to be goals for CHF QUERI.

An additional objective is to **contribute to the science of implementation.** Our implementation science objectives are linked to the **PARIHS framework** of evidence context and facilitation and **Rogers' Diffusion of Innovation Theory**. The goals include a better understanding of how evidence is viewed by VA providers, how facility characteristics impact implementation of heart failure interventions, the ability to identify and activate opinion leaders to improve care, and the use of a network of heart failure providers (the **VA HF Network)** to improve care. We have conducted a randomized trial using the VA HF Network to implement the H2H initiative that demonstrated it was effective in enrollment, launching, and maintaining local quality improvement programs for the transition of care from inpatient to outpatient heart failure care. The next steps are to determine what features of the HF Network have led to its success. We use the framework of Wenger's Community of Practice to guide or evaluation of the HF Network.

We have designed our implementation projects using formative evaluations and randomized trials of different implementation strategies whenever possible. For example, rather than promote an intervention at all facilities simultaneously, we use a randomized staged roll-out approach where half of the facilities (providers) are exposed to the implementation intervention initially. This way the effectiveness of the implementation intervention can be compared to a

control group with no implementation intervention. A formative evaluation during this phase is used to revise the intervention as appropriate. The revised intervention is then used for the 2nd half of facilities that initially served as control. While such a strategy does not allow long-term evaluations (since all facilities/providers eventually receive the intervention), we feel it is the best option to achieve scientific rigor while avoiding delays in implementing successful interventions.

Other plans for the next three years include completing our evaluation of the **Hospital to Home (H2H)** Initiative of the Institute for Health Care Improvement and the American College of Cardiology. While 30-day all cause readmission is a measure of national focus, we believe the VA can develop a better measure of post-discharge care that would be more patient centered and more reflective of actual resource use. We plan to expand our focus on PACT care by evaluating several interventions including the use of local pharmacists to provide lists of patients to PACT teams for care changes. In addition, we will be examining the HF specific impact of SCAN-ECHO and E-consults. For each major outcome (survival, rehospitalization) and quality measure we plan to continue are examination of disparities in care based on race, gender, age, rural location, and mental health diagnosis.

2. Clinical/Healthcare Delivery Focus and Scope

CHF QUERI focuses on improving the care of ***symptomatic heart failure*** which spans the time from **first diagnosis (outpatient or inpatient) to end-stage care.** We have chosen this area because the condition is highly prevalent, associated with **high cost** (e.g. it is number one reason for medical admission to the VA system), and takes a substantial **toll on quality and length of life**. (1-6) The potential to improve practice is great as there are high quality studies (randomized trials) demonstrating that multiple therapies for heart failure will improve survival and reduce hospitalizations. In addition, through prior CHF QUERI work we have found **substantial variation in care provided to Veterans** with symptomatic heart failure. Some of these measures have been the focus of CHF QUERI (e.g. beta-blockers) and are now used at a high level. Thus, while the VA is doing well on use of many VA guideline recommended therapies there are **several care strategies in need of significant improvement** such as use of **aldosterone antagonists** which received a new guideline recommendation by Pharmacy Benefits Management in 2010 but remains at a low level of use.

Our focus on symptomatic heart failure is aligned with goals of additional Central Office partners including the Office of Specialty Care and the Office of Specialty Care Transformation. Both have targeted heart failure as a high priority condition. Their efforts include SCAN-ECHO and Hospital to Home (H2H), with the latter's implementation facilitated primarily by CHF QUERI. Inpatient heart failure is of direct concern to VA facility leadership as the **VA publically reports facility level data for four inpatient process of care and two 30-day outcome measures** to the Center for Medicare and Medicaid Services for facility level public reporting on HospitalCompare.gov (details below).

CHF QUERI has focused on improving the care of symptomatic heart failure regardless of etiology. Heart failure is often thought of as a spectrum of disease (7) starting with risk factors such as hypertension, diabetes and ischemic heart disease (Stage A). Patients often progress through an asymptomatic stage of structural heart disease (Stage B), followed by the onset symptoms (Stage C). Many of these patients will die of end-stage heart failure (Stage D). We have chosen Stage C as our area of focus as these patients account for the vast majority of VA hospital admissions, and there is the greatest opportunity to impact length of life and quality of life. Approximately half of all patients with heart failure have systolic dysfunction (left ventricular ejection fraction below ≤ 40%) and are candidates for life prolonging treatments. (7-11) While our focus will be symptomatic heart failure (Stage C) for the near future, we believe the potential scope of CHF QUERI work spans the spectrum of Stage B (asymptomatic) through Stage D (end-of-life care) heart failure. Inpatient care, which accounts for the majority of the cost of heart failure care has also increased substantially.

An alternative focus area for CHF QUERI is heart failure prevention which while important is already addressed partially by other QUERI centers as ischemic heart disease and diabetes are often precursors to heart failure. Aside from reducing risk factors such as hypertension, diabetes and ischemic heart disease there are minimal data showing that additional interventions can prevent heart failure. Thus, we believe our efforts are best focused on optimizing care of symptomatic patients until such VA care is uniformly at a high level.

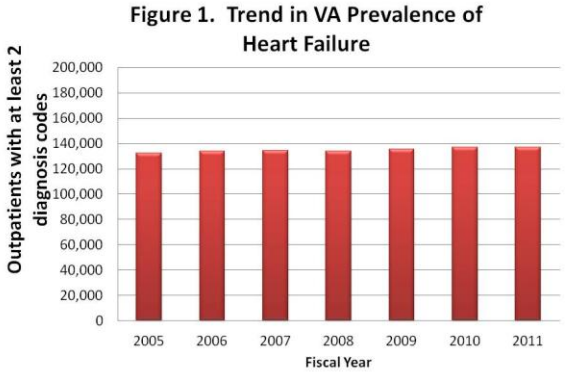
Selection of Projects in Relationship to Overall Goals for Implementation

Our implementation strategy is based on the **PARIHS framework** of Evidence, Context, and Facilitation. (12) The projects selected by CHF QUERI for implementation are chosen using relatively strict criteria for high levels of evidence (e.g. randomized controlled trials for heart

failure treatments). The heart failure interventions must be directed at existing VA performance measures, VA guidelines, or lacking VA guidance, professional society guidelines (7) that have the strongest level of recommendation (e.g. Class I for the American College of Cardiology and American Heart Association). In addition, they must meet our **three principles of impacting survival or quality of life, having value, and meeting immediate needs of the VA**.

3. Significance and Consequences: Epidemiology, Morbidity/Mortality, Quality of Life and Costs

Heart failure is a common condition associated with high mortality, poor quality of life, and is the number one reason for discharge from the VA Medical Service and Medicare hospitals. (1-7,13) The life-time prevalence for those without antecedent myocardial infarction is 1 in 9 for men and 1 in 6 for women. The Institute of Medicine has identified heart failure as one of 20 priority conditions in need of quality improvement based on its relevance to a large number of patients.



The mission of our CHF QUERI Center is to improve survival and quality of life for all VA patients with heart failure and those at risk for heart failure through collaboration with other VA organizations. In addition we seek to reduce unnecessary care including preventable hospitalizations, inappropriate tests and treatments. An additional objective is to **contribute to implementation science** as we work toward the above goals.

3.1 Prevalence and Incidence of Heart Failure in the VA

3.1.1. Outpatients

In 2011, 2.2% of the VA population had heart failure defined as at least two outpatient diagnosis codes during the year (4.4% had a single outpatient code for heart failure). This represents 2.5% of all heart failure patients in the United States. The number of Veterans with heart failure has been slowly increasing over the last five years (**Figure 1**) while the fraction of the Veteran population with heart failure has slightly decreased over time (peaking at 2.6% in 2004). Age

adjustment confirmed that the increase in Veterans with heart failure is due to more Veterans in the system and not to more heart failure diagnoses per capita.

The age adjusted incidence of heart failure in the VA health care system defined as two or more diagnostic codes within a year has declined slightly from 0.56% in 2005 to 0.48% of the population in 2011 developing heart failure every year. Figure 2 shows the VA trend in heart failure incidence for different age groups. The decline has been greatest for the oldest Veterans. Thus, while incidence is declining, prevalence is increasing as patients with heart failure are living longer.

Figure 2. VA Trends in Incidence of Heart Failure by Age Group

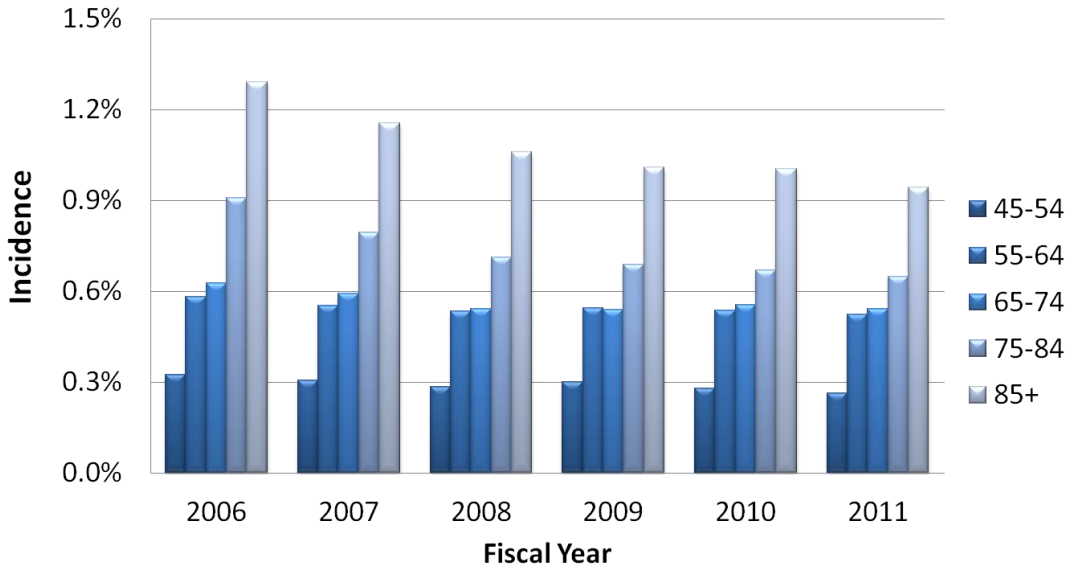
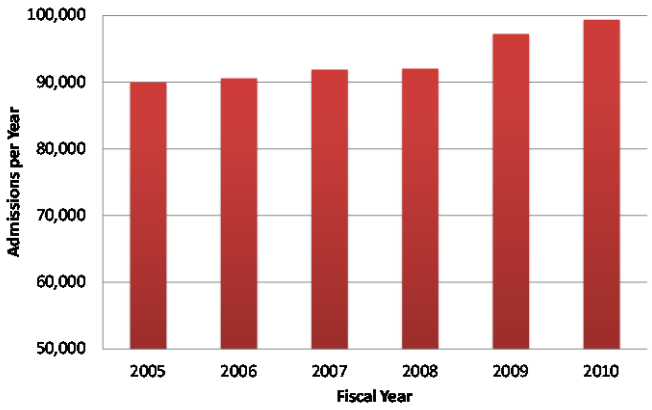


Figure 3. Trends in VA Heart Failure Admissions



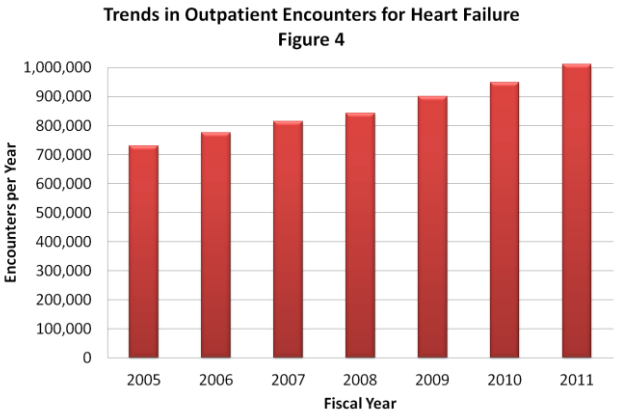
3.1.2 Inpatients. While most heart failure patients are not admitted for heart failure in any given year, hospitalizations for heart failure are often used as a marker of prevalence of disease. Admissions for heart failure in the U.S. have risen several fold since 1970 (399,000 to over 1,000,000 per year in 2004) due in part to an aging population. (3) The number of VA admissions for

heart failure have increased from 2005 to 2010 **(Figure 3).** Almost half (46%) of patients with heart failure are hospitalized each year where heart failure is a contributing, but not the primary, diagnosis. In 20% it is the primary reason for admission. These percentages have not changed significantly over the last 5 years. Thus, the increase in admissions related to heart failure is due to **more Veterans with heart failure and more repeat admissions for those with heart failure.**

Current **performance measures** for VA heart failure care that are **publically reported** include **process of care measures** that are all at a high level (measurement of left ventricular ejection fraction, angiotensin converting enzyme inhibitor use if the LVEF is < 40%, smoking cessation counseling, discharge instructions) and outcome measures (30-day mortality and 30-day all cause rehospitalization).

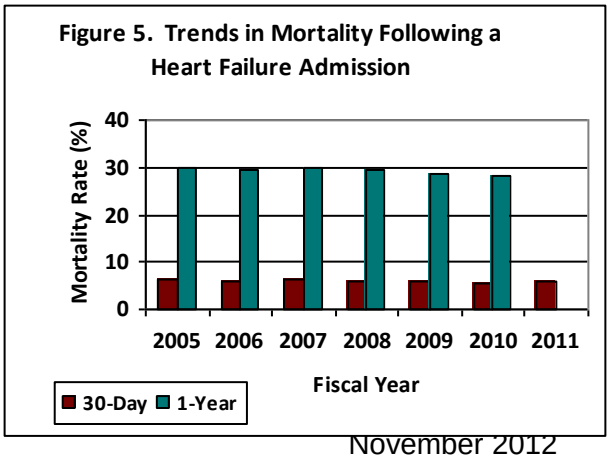
3.2 Health Burden in Veterans with Heart Failure

Over the last decade the number of resources used to treat heart failure within the VA health care system has grown steadily. For example, outpatient encounters for heart failure increased from 550,000 in fiscal year 2002 to over 1 million 2011 (**Figure 4**). While some of this care is unavoidable, CHF QUERI feels there is room for improvement in length of life, quality of life and cost of heart failure care.



Morbidity/Mortality. Mortality is high following a heart failure admission with close to 30% of patients dying within one year. However, the VA has seen a slow but steady decline in mortality following a heart failure admission (**Figure 5**). The mortality rate is highly dependent on age with half of those 85 and older dying within one year of hospitalization. Mortality increases with severity of symptoms and inversely with the left ventricular ejection fraction. (7)

Morbidity is also significant. Over half of patients with heart failure have daily symptoms of fatigue and shortness of breath.



Approximately 5% of patients will have symptoms with minimal activity. (7,9)

Quality of Life Consequences. Using the time-tradeoff method for utility assessment Fryback and colleagues found that subjects rated symptomatic heart failure as 0.71 (i.e. they were willing to give up 29% of their life expectancy in order to be returned to normal health). (13)

3.3 Costs to VA for Heart Failure Care

Heart failure episodes are expensive with direct and indirect costs for the five million Americans living with heart failure averaging $6,600 per patient. A recent VA study of heart failure patients (14) estimated that total annual cost of care ranges from $35,100 for 33% deemed to be high risk, $14,300 for 54% at moderate risk, $4600 for 13% at low risk. Heart Failure specific costs ranged from $8,900 (high risk) to $2,300 (low risk). Dr. Heidenreich and colleagues have estimated that the incremental U.S. cost of heart failure (adjusting for comorbidities which avoids double counting) was 25 billion in 2010. (15) The VA share attributable to heart failure in 2010 is $194 million. The cost of care for heart failure patients is high due to the cost of inpatient care which accounts for 50% of all heart failure related costs.

3.4 Access

The majority of patients have mild heart failure which can usually be well managed by primary care/PACT. Access issues exist for patients with more severe symptoms where the primary care provider wishes specialty input. VA cardiology clinics see approximately one third to one half of Veterans with heart failure and depressed ejection fraction and even a lower percentage of those with preserved ejection fraction. Many patients followed in community based outpatient clinics (CBOC)s have non-VA cardiologists usually paid by Medicare. For rural patients without outside insurance access to specialty care is an issue and is being addressed by the SCAN-ECHO and E-consult initiatives of the Office of Specialty Care Transformation. CHF QUERI is the specialty content reviewer for HF SCAN-ECHO program.

4. Treatment/Health Care Delivery Evidence Base

The potential to impact care for patients with heart failure depends on the left ventricular ejection fraction or LVEF (**Figure 6**.)

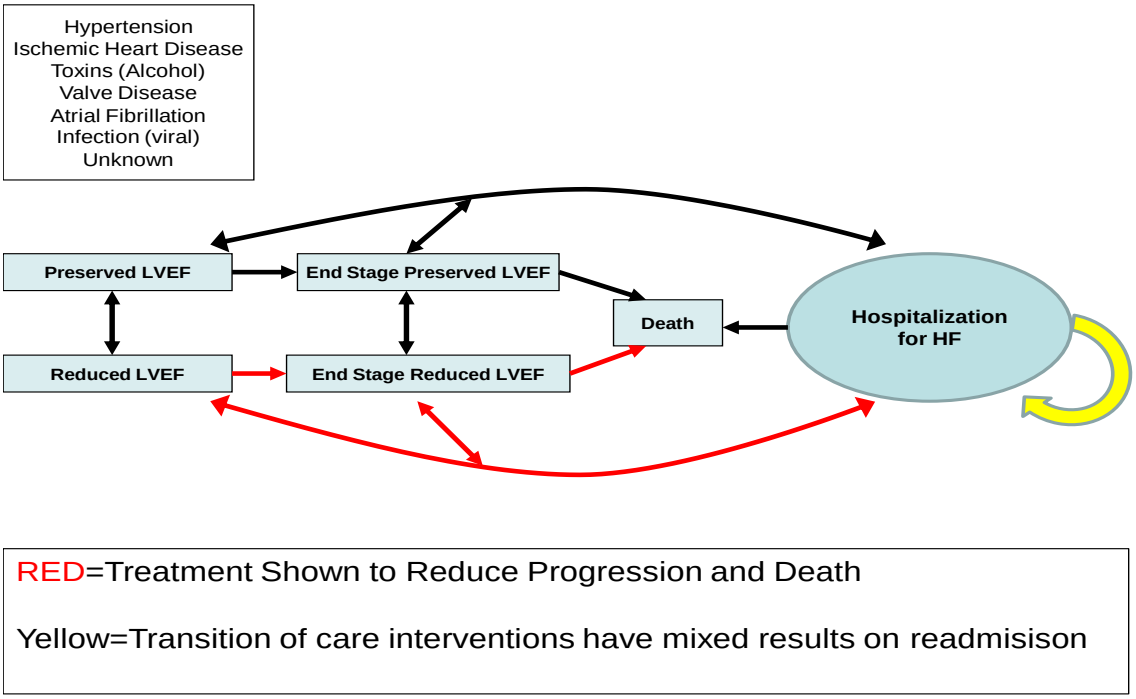


Figure 6. This figure displays a model of disease states and transitions for patients with heart failure. The red arrows indicating pathways where there is clear evidence that treatment can alter the course of disease. The yellow indicates limited ability to alter disease course. Black arrows indicate no treatment is available that alters the natural history. (7)

Numerous large multicenter randomized trials have established that angiotensin converting enzyme (ACE) inhibitors, beta-blockers, aldosterone antagonists, implantable cardioverter defibrillators (ICD)s and cardiac resychnronization therapy (CRT) improve survival in patients with heart failure and reduced heart function. (7) These trials have identified the left ventricular ejection fraction and level of symptoms as the primary determinants of benefit from treatment (Table 1).

Table 1. Life Prolonging Treatments by Stage of Heart Failure. (5)

Stage	Description	Left Ventricular Ejection Fraction (LVEF)	Guideline Recommended therapy
A	Risk factors for heart failure (e.g. hypertension, ischemic heart disease)	≥ 40% (by definition)	Treatment of the underlying disease
B	Asymptomatic, abnormal left ventricular function	≥ 40%	No heart failure specific therapy
		< 40%	**ACE inhibitors, beta-blockers**
		<30%	**ACE inhibitors, beta-blockers, ICDs**
C	Symptomatic NYHA class I (minimal)	≥ 40%	No specific therapy
		< 40%	**ACE inhibitors, beta-blockers**
	class II (moderate)	≥ 40%	No specific therapy
		35-39%	**ACE inhibitors, beta-blockers**
		< 35%	**ACE inhibitors, beta-blockers, ICDs, aldosterone antagonists**
	class III (moderate-severe)	≥ 40%	No specific therapy
		35-39%	**ACE inhibitors, beta-blockers, aldosterone antagonists**
		< 35%	Above plus **ICD** (with **biventricular pacemaker** if QRS > 120ms)
D	Symptomatic NYHA class IV (severe)	≥ 40%	No specific therapy
		35-40%	**ACE inhibitors, beta-blockers, aldosterone antagonists**
		< 35%	Above plus **biventricular pacemaker** if QRS > 120ms (no ICD)

ICD= implantable cardioverter defibrillator, ACE=angiotensin converting enzyme, NYHA= New York Heart Association, QRS = the QRS wave on the electrocardiogram

Heart Failure Stage. As noted above, patients in the first stage (A) have risk factors for the development of heart failure including hypertension and coronary artery disease.(7) Stage B occurs when the left ventricle is not functioning normally but symptoms have not occurred. Left ventricular function is often quantified using the fraction of blood expelled with each beat (ejection fraction). One large randomized trial found that treatment of patients who had a low ejection fraction with ACE inhibitors reduced progression to symptomatic heart failure. (8) Stage C occurs when symptoms have developed. Multiple randomized trials of patients with reduced left ventricular ejection fraction (<40%) have found that treatment with ACE inhibitors, beta-blockers, and recently aldosterone antagonists, improve survival. Stage D occurs when heart failure is considered end-stage and the patient is near death. The majority of Veterans are in stage A (risk factors for heart failure). Prevalence studies have found that Stage B and Stage C patients are similar in number. (4-6) At any one time there are relatively few stage D patients but they are at the highest risk of death.

Left Ventricular Systolic Function. Current evidence indicates that heart failure is due to left ventricular systolic dysfunction (LVEF < 40%) in approximately 50% of cases. (6) Patients with systolic dysfunction have worse survival after adjustment for other clinical characteristics. (6,9) Furthermore, life prolonging heart failure therapies have only been demonstrated for patients with systolic dysfunction.

New Therapies. It is important for CHF QUERI to monitor the literature and be ready to develop implementation strategies should they become recommended treatments. One such therapy is the combination of hydralazine and nitrates for black patients with heart failure and reduced left ventricular ejection fraction.

Hydralazine/nitrates. A prior study in the VA demonstrated an improvement in survival for patients taking the combination of hydralazine and long acting nitrates compared to those taking placebo, but the Food and Drug Administration did not approve the combination for heart failure treatment. (7) Further studies found that ACE inhibitors were superior to the combination of hydralazine and nitrates. (7) However, a recent trial has found that the combination of hydralazine and nitrates improves outcome in black patients who are already receiving standard treatment (e.g. ACE inhibitors and beta-blockers). (10) A major controversy exists regarding the

appropriate population for use. Many clinicians believe any recommendation should be limited to black patients since they were enrolled in the trial while others believe there is a biologic plausibility that all patients with heart failure will benefit.

Disease Management Programs. Many (but not all) randomized studies have found that multidimensional programs reduce hospitalizations and may improve outcome including survival. (16-20) They commonly include several of the following interventions: nurse case management, self-management, home monitoring, patient education, frequent phone follow-up, and multidisciplinary team evaluations. Unfortunately, these programs used multiple and often different interventions and it is difficult to determine which components of the heart failure programs are responsible for the success. **CHF, IHD, and Mental Health QUERIs are analyzing a VA funded randomized trial of a disease management program with a focus on depression treatment** that included collaboration between a generalist, cardiologist and psychiatrist.

Data for Early Follow-up After Discharge. Published observational Medicare data indicate that early follow-up following discharge is associated a small but significant decrease in readmission. (21) CHF QUERI is examining this association within the VA system.

Other Therapies. Diuretics and digoxin are frequently used to treat heart failure although there are no randomized trials indicating improved survival. Digoxin has been evaluated in randomized trials of symptomatic patients with depressed ejection fraction and found to improve symptoms and exercise capacity. (7) Thus, it is recommended for patients who remain symptomatic on life-prolonging therapy. Most patients eventually develop severe fluid retention without the addition of diuretics. Thus diuretics are standard of care (7) even though they have not been evaluated in a large randomized trial.

Identification of Candidates for Prevention. No trials of screening for asymptomatic left ventricular dysfunction (Stage B, for which treatment reduces the progression to symptomatic heart failure) have been performed. However, community studies have documented the sensitivity and specificity of several screening tests including echocardiography, electrocardiography and B-type natriuretic peptide (BNP). Dr. Heidenreich has published a cost-effectiveness analysis indicating that BNP followed by echocardiography in those with a positive test is a reasonable screening strategy if the prevalence of low ejection fraction (<40%)

is over 1%. (22) Echocardiography (more accurate but more expensive) was found to be a cost-effective screening strategy if the prevalence of depressed ejection fraction is near 10%.

5. Current Practices and Quality/Outcome Gaps

Inpatient Care. Over the last decade the VA has progressively increased its use of recommended medical treatments for heart failure. In 2005 the VA was clearly ahead of the U.S. community as measured by the Joint Commission core measures but by 2011 care as measured by these four inpatient measures was over 90% for both VA and non-VA facilities **(Figure 7).** These measures (also Joint Commission and Center for Medicaid and Medicare Services measures) include 1) measurement of left ventricular ejection fraction (currently at 100%) in patients presenting with heart failure, 2) use of angiotensin converting enzyme inhibitors in appropriate patients (95% use in those with a left ventricular ejection fraction < 40%), 3) documentation of patient education (97%) and 4) smoking cessation counseling (98%).

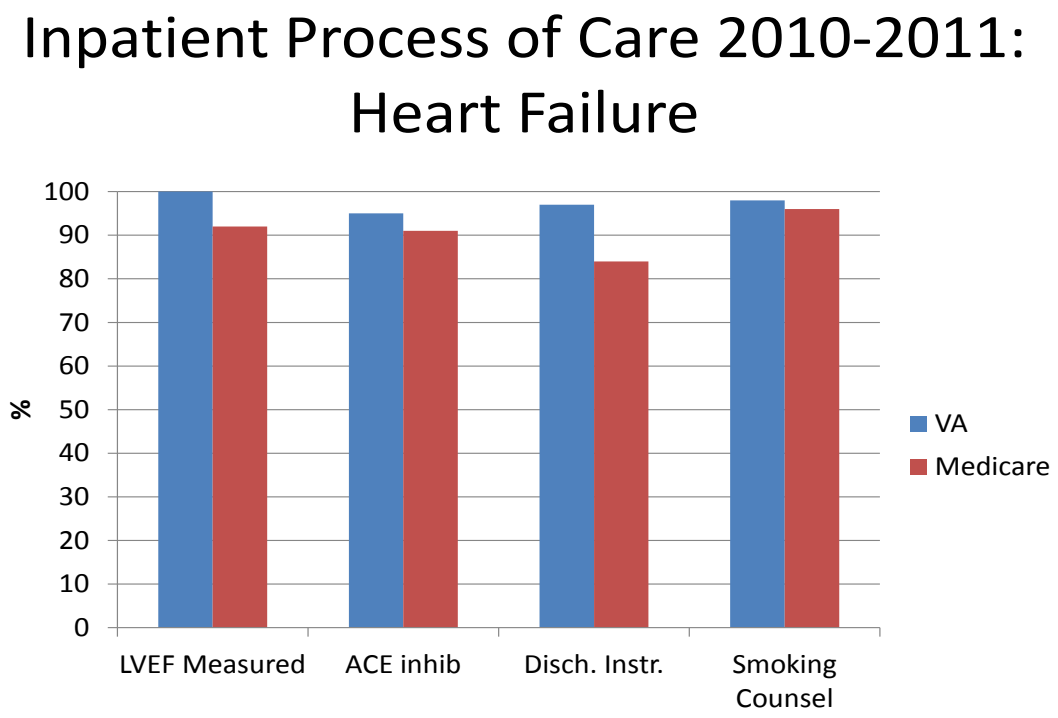


Figure 7. Performance data for VA and the Non-VA (Medicare) for heart failure core measures. The VA is significantly higher for each measure though both Medicare and VA mean use are very high.

Outpatient Care. There are additional outpatient potential performance measures that are endorsed by the National Quality Forum (Table 2).

Table 2. National Voluntary Consensus Standards For Ambulatory Care, July 2007, National Quality Forum.

MEASURE TITLE	MEASURE DESCRIPTION
Heart Failure (HF): Assessment of Activity Level	Percentage of patient visits or patients with HF with assessment of activity level.
HF: Assessment of Clinical Symptoms of Volume Overload (Excess)	Percentage of patient visits or patients with HF with assessment of clinical symptoms of volume overload (excess).
HF: Beta-blocker therapy	Percentage of patients with HF who also have LVSD who were prescribed beta-blocker therapy.
HF: Warfarin Therapy Patients with Atrial Fibrillation	Percentage of patients with HF who also have paroxysmal or chronic atrial fibrillation who were prescribed warfarin therapy.
HF: Weight Measurement	Percentage of patient visits for patients with HF with weight measurement recorded.

Of those measures listed above only beta-blockers are documented to improve survival. (7) Accordingly, we have focused previously on interventions to improve the use of beta-blockers in the VA. Use of beta-blockers recently reached 90% in the VA system and we therefore no longer have increased beta-blocker use as our top priority.

Racial Disparities

Racial disparities in most care and outcome of patients with heart failure are now minimal. This is true for the VA and non-VA populations. As part of a Rapid Response Project, we evaluated racial disparities among 43,697 Veterans hospitalized for heart failure from 2005-2007. There were no significant differences in process of care between white and black Veterans. Differences in outcome were divergent (blacks had better mortality than whites but had more rehospitalizations at 30 days). Non-VA data have also found no racial differences for inpatient process of care (23). Age adjusted incidence rates for a diagnosis of heart failure remain higher

among blacks. This work suggests we need a better understanding of the reasons for repeat admission among black Veterans.

Other Disparities

We have found many differences in treatment and outcome in sub-groups of patients based on age, gender, and history of psychosis. In general the very elderly and female Veterans were less likely to receive guideline recommended care. Patients with a history of psychosis were more likely to die by 30 days following admission (7.5% vs. 5.7%, $p<0.0001$). We plan to look for disparities in care based on race, gender, age, history of mental health issues, and location (urban/rural) and academic status of the medical center for all measures of performance for heart failure care.

Devices

Although use of implantable cardioverter defibrillators (ICDs) is of interest to the VA given their high cost, potential for improvement in survival, and increased attention paid to them by U.S. society, increasing implantation rates is not a top priority for CHF QUERI. We believe a better measure of quality would be documentation of a discussion with the appropriate patient regarding ICD implantation. This is a new performance measure of the American College of Cardiology / American Heart Association (ACC/AHA). (24) However, there are currently no data systems that allow measurement of ICD discussions. When evaluated at VA Palo Alto we found 50% of patients without an ICD already had such a discussion. In a randomized trial a reminder to primary care providers increased referral to a cardiologist for discussion of a possible ICD.

In the past, VA has trailed the rest of the U.S. in performance of invasive procedures such as coronary angiography (both necessary and unnecessary). Appropriateness of ICD implantation has recently been questioned among non-VA providers. (25) Appropriateness with the VA was recently evaluated as part of a an HSR&D Funded project (Heidenreich co-PI) which found that rates of inappropriate ICD implantation were small and half that reported for non-VA populations.

6. Significant Influences on Current Clinical Practices and Outcomes

CHF and IHD QUERIs in conjunction with operations have recently completed a survey of VA Cardiology Section and Medicine Chiefs that requested data regarding disease management for

heart failure. Preliminary results indicate the structured disease management programs are rare. Although some form of home telehealth is used, the number of patients enrolled with heart failure is very low.

Through chart review at VA Palo Alto we have found that approximately one third of Veterans, those primarily at Community Based Outpatient Clinics (CBOCs), are managed by non-VA cardiologists in addition to their VA PACT. Another third are managed only by a VA PACT with no cardiology input. While our VA HF Network has been useful for modifying care delivered by cardiology we need additional strategies to influence PACT-only care. We also need a better understanding of those receiving "dual" care from VA and non-VA providers.

Opportunities for **changing care through PACTs** are already in place. Many VISNs use a clinical dashboard where performance on selected care strategies is displayed for each PACT. PACT providers can drill down on any area to identify patients that may benefit from a change in management. Thus, one strategy for CHF QUERI to impact primary care is by adding heart failure specific treatments to the clinical dashboard. Clinical reminders are the most common method for attempting to alter primary care practice and many facilities have reminders for heart failure related care. Local pharmacists have also contacted PACTs directly with lists of patients that may benefit from care changes. CHF QUERI is evaluating opportunities to use all of these types of active interventions with PACT. However, there is a limit to the number of active interventions that can be successful at any one time using reminders and dashboards. Thus, there is a parallel interest in improving provider education through projects such as SCAN-ECHO.

The VA Heart Failure Network

This network of VA staff with expertise in clinical heart failure and/or quality improvement was created in 2006 and has grown to over 900 members from 150 facilities. Our goals for this network are to 1) share evidence-based HF programs and updates in HF care, 2) understand the context (e.g., facility, culture, leadership style, HF program), 3) learn about barriers and facilitators to improving care, 4) establish collaborations/networking among members of the HF network, and 5) provide opportunities to identify/involve local champions at facilities.

The Heart Failure Network as a Community of Practice. The VA Heart Failure Network has many features of a community of practice as described by Wenger and others. (26-28) They

list three fundamental elements of a community of practice including a *domain of knowledge*, a c*ommunity of people* who care about the domain, and a *shared practice* that is developed to be effective in the domain. In the case of the HF Network, heart failure and quality improvement are the domains and the shared practice is the change to care delivery that results from interaction with other members of the Network. The community includes individuals who have expertise in heart failure care, quality improvement or both. Through web based teleconferences and email the community (HF Network) shares their practices and experience.

Cross QUERI Collaborations

Heart failure prevention, while not our main area of focus, has overlap with work by the **Ischemic Heart Disease (IHD) and Diabetes (DM) QUERIs**. IHD QUERI and CHF QUERI collaborate on numerous projects since there is frequent overlap of ischemic heart disease and heart failure. The majority of patients with heart failure have ischemic heart disease and approximately a third have diabetes. **Atrial fibrillation** links CHF QUERI to **Stroke QUERI** as it is a common comorbidity for patients with heart failure and a frequent cause of stroke. We have a planned collaboration with Stroke QUERI to evaluate the care and outcome for patients with heart failure and atrial fibrillation. The impact of **alcohol dependence** on incidence, treatment and outcome of heart failure in the VA is not well understood. We plan to collaborate with **Substance Use Disorders (SUD) QUER**I to better understand the epidemiology of alcohol related cardiomyopathy and its impact on quality of heart failure care.

Treatment/Health Care Delivery Evidence Base

Conceptual Model of VA Implementation for Heart Failure

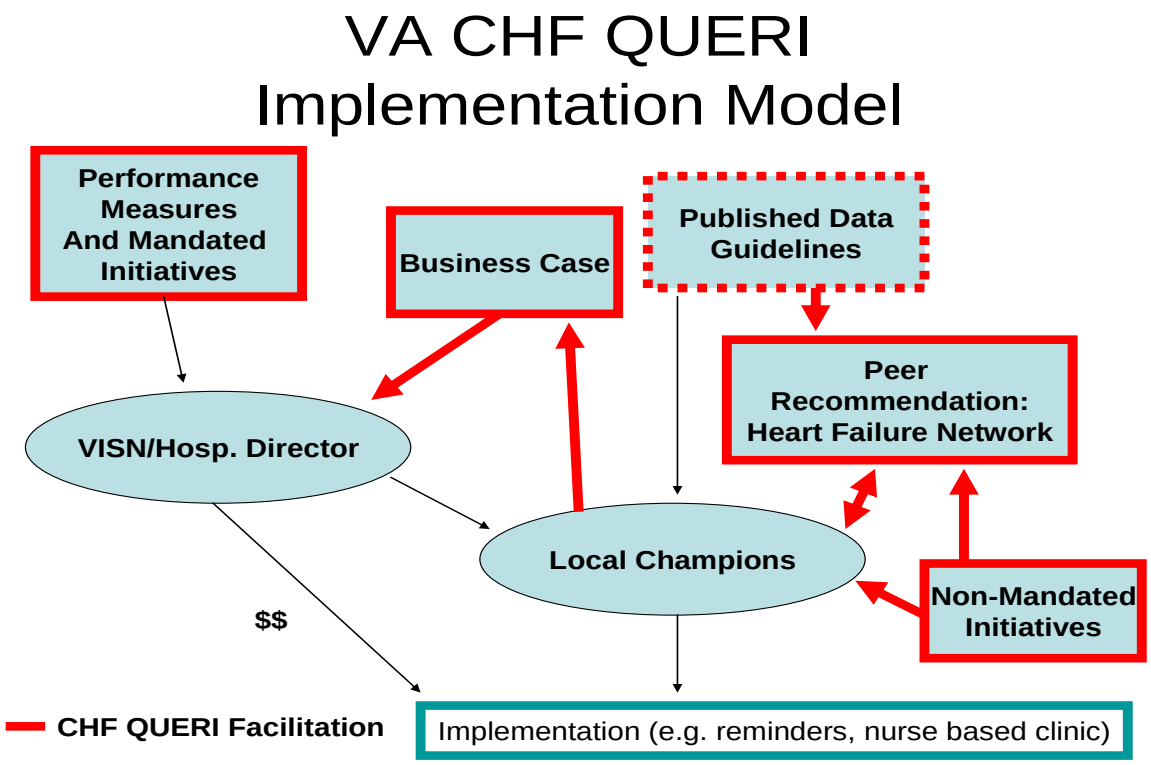


Figure 8. Conceptual model of implementation of heart failure related interventions within the VA system is shown along with the areas of facilitation by CHF QUERI. A key component is the Heart Failure Network (HF Network) which will serve to educate providers on facilitators and barriers at other facilities. Other impacts of CHF QUERI include the creation of quality indicators/performance measures and the development of the business case for each intervention, both general and individualized for the institution.

Our conceptual model of implementation for the VA (**Figure 6.**) incorporates the three elements of **evidence, context, and facilitation** of the **Promoting Action on Research Implementation in Health Services (PARIHS) Framework.** (12) Evidence for effectiveness is crucial for provider acceptance, and development of performance measures, while a persuasive business case will be needed for acceptance by the medical center administration. The organizational context or environment must be understood and will vary depending on the complexity and cost of the intervention. CHF QUERI will facilitate implementation of optimal heart failure care through development and promotion of appropriate performance measures (e.g. for beta-blockers or aldosterone antagonists), promotion of heart failure guidelines and peer

recommendations through the VA Heart Failure Provider Network we have established, and development of the business case for each intervention. We have also relied on Roger's Diffusion of Innovation Theory (29) with providers participating in the HF Network being potential change agents who would influence local leadership and other providers to improve performance and care for their heart failure patients. Accordingly, we plan to use the HF Network to identify opinion leaders at each facility to further improve our ability to rapidly disseminate new innovations. We are validating our model (and in the process contributing to implementation science) with studies focusing on the interaction of non-mandated initiatives, the HF Network and the local champions. We test different methods of interaction to determine the most efficient means of implementation.

Our **interventions to induce provider change for heart failure care will vary depending on the whether the provider is specialty or PACT**. For PACTs, we are evaluating patient lists, reminders and clinical dashboards. For specialists (those with an interest in heart failure) we are evaluating use of the VA Heart Failure Network in addition to clinical reminders.

Other Influences on VA Heart Failure Practice and Outcome

A recent survey of VA primary care providers and cardiologists found that the most frequently reported influences on ischemic heart disease practice were **local cardiologists, cardiology journals, and cardiovascular professional organizations**. It is highly likely that these are the main influences in heart failure practice as well. Outside of the VA, three specialty organizations exert a strong influence on heart failure care in the United States. The American College of Cardiology and the American Heart Association jointly create and publish a clinical practice guideline for heart failure. These two organizations also publish the two premier cardiac journals (Circulation and the Journal of the American College of Cardiology) and hold annual meetings where results of heart failure treatment trials are first released. Dr. Heidenreich is the incoming Chair of their Performance Measure Task Force that oversees creation and publication of performance measures for heart disease including heart failure. The Heart Failure Society of America is a smaller specialty organization that maintains a website where clinical treatment guidelines are available.

The treatment of heart failure patients is also influenced by several VA offices (Table 3). The **Office of Analytics and Business Intelligence** abstracts data from all heart failure admissions and a random subset of outpatient visits for heart failure through the External Peer Review

Program (EPRP). Performance on several heart failure specific quality measures are reported back to each VISN and VA center in the form of performance measures. Pharmacy Benefits Management produces a guideline for the medical treatment heart failure care that is available over the internet.

The affiliated medical schools are likely to contribute to current clinical practice. We have shown that academically affiliated VA hospitals have higher rates of compliance with clinical practice guidelines for heart failure than non-affiliated VA hospitals. (30)

Finally, **patients can be a major force** in receipt of quality of care. Many therapies are now patient initiated. Therefore, we have developed interventions directed at the patient but on the national level through **My Health E-Vet**. We have provided tools for patients to examine their health status and quality of their heart failure care. By making patients educated partners in their care it is more likely that high quality care will be delivered.

Table 3. VHA Programs/Entities

VHA Program or Entity	Influence on Heart Failure Practice and Outcome
Office of Analytics and Business Intelligence (OABI)	This office oversees guidelines and creates performance measures for heart failure.
Performance Management Workgroup (PMWG)	This committee has developed performance measures for heart failure.
Office of Information	Within the computerized medical record (CPRS) several reminders have been developed to improve care for heart failure.
Committee on Pacemaker and Implantable Cardiac Defibrillator Placement (ICD)	This committee develops guideline for placement of ICDs for patients with heart failure.
Deputy Under Secretary for Health and Operations Management	This office provides support and guidance to the VISN directors.
Office of Care Coordination	This office is overseeing the distribution of

	various telemonitoring devices and algorithms for care for patients with heart failure.
National Program Director for Cardiology and Patient Care Services	The Director (John Rumsfeld) works closely with the CHF and IHD QUERIs to improve care
Inpatient Evaluation Center (IPEC)	This center is charged with monitoring inpatient outcomes including hospitalization rates for heart failure.
Pharmacy Benefits Management (PBM)	This group oversees the VA formulary and conducts quality improvement interventions with local pharmacists, often targeting patient care for heart failure. They also write the medication guideline for VA heart failure care.
Collaborative on Advanced Clinical Access	This national group of VA providers and administrators is sharing ways to improve access to heart failure care.

7. QUERI Center Coals

Process for selecting goals

Our goals have been selected based on **three core principles through input from VHA key stakeholders including providers, administrators and Central Office partners.** The first principle is that achieving the goal must contribute to either **improved survival or improved quality of life**. Second, any intervention associated with a goal (including implementation of the intervention) must have **value** to the VA. In other words, the cost expended per benefit must be a reasonable value to the VA. Third, the most **immediate needs** of the VA as defined by stakeholders with (VA providers, local, regional and Central Office administrators) must be addressed by the goals. To obtain stakeholder input we conducted a lengthy survey process beginning with the VA Heart Failure Network. The 900+ providers and quality of care managers in the network were asked to rate 14 areas of care (Appendix B) as well as suggest additional

goals for CHF QUERI. There results were discussed with our Executive Committee leading to a refinement of the survey which was then sent to 22 Central Office stake holders for their reviews (Appendix B). These results were discussed with the Executive Committee leading to the final set of QUERI goals for 2013. Items not selected as goals are listed in the Appendix (A) along with justification for not selecting the goal.

7.1 Changes to Goals From the Prior CHF QUERI Strategic Plan

Our revised strategic plan has combined prior Goals 1 (Decrease hospitalization rates.) **and 5 (**Improve appropriateness of heart failure treatments and tests) **into a new goal 1 that focuses more generally on reducing unnecessary care. Our Prior Goal 4 (**empower patient and caregiver for self-management) is now included under Goal 3 (increasing use of therapy that improves quality of life).

Goal 1. Decrease Unnecessary Hospitalizations, Tests and Treatments for Heart Failure

The overall aim of this goal is to **increase the efficiency of VA heart failure care**. A reduction in avoidable care is our primary goal because it is a major economic burden for the VA due to the high cost of inpatient care ($1000 per day, for a typical 5-6 day stay) (7) and concern over excessive use of cardiac imaging. (31)

Preventable readmissions and 30-day all-cause readmission rates. During the last three years, a primary goal has been reducing 30-day all-cause readmissions. While reducing the 30-day all-cause readmission rate remains an interest due to it being **publically reported on HospitalCompare.gov**, ongoing HSR&D (Rosen PI) and QUERI funded studies (Rector PI) suggest that **preventable readmissions are much less common than previously thought** and potentially preventable readmissions are difficult to predict. For this reason we feel our efforts best spent on additional areas of potential overuse including overall admissions for heart failure (not just readmissions). We are also evaluating alternatives to the 30-day readmission rate that capture resource use following discharge and are more patient centered. An example is the number of days alive out of the hospital during the year following admission.

In order to achieve this goal we have defined five specific objectives. Fortunately, treatments that improve mortality (goal 2), and quality of life (goal 3) also reduce admission rates. Thus many of our strategies to achieve one goal will help achieve all three goals (e.g. increased use of aldosterone antagonists). (5) The first objective is to identify and predict preventable

admissions for heart failure. The second is to improve transition of care following hospital discharge. This practice should improve overall care, even if such improvement is not reflected in a reduction in the 30-day readmission rate. The third objective is to enhance coordination of primary care (PACT) and specialty care (heart failure). The fourth and fifth objectives aim at reducing inappropriate care in the VA and duplicate care for those receiving VA and Non-VA care.

Objective 1.**Identify and predict preventable admissions for heart failure**.

a. **Plans for Achieving This Goal.** The VA has developed an algorithm to identify patients with heart failure at risk for admission and has made that available to facilities. As part of our survey of HF Network members we will determine how the sites are using this data to reduce admissions.

   In contrast to predicting admission during any given year, it is much harder to predict 30 day readmission rates following a heart failure admission which is the metric publically reported on the CMS website HospitalCompare. However, few of the prior models used laboratory data now available in the VA such as B type natriuretic peptide (BNP) which is correlated with severity of heart failure. We are determining if adding such data to prior models can increase our ability to predict readmission and admissions for outpatients. During the past three years CHF QUERI has supported work to determine the fraction of VA rehospitalizations that are preventable and to determine predictors of preventable rehospitalizations. While the final results are not complete, they indicate that preventable all-cause hospitalizations are quite difficult to predict.

b. **Anticipated Key Impacts.** If successful, a key impact of this work will be development of a realistic measure of our ability to predicting readmission, and a more accurate estimate of the fraction of readmissions that are preventable.

c. **Primary Partners.** This work will be done in conjunction with the Office of Analytics and Business Intelligence.

d. **Implementation Science Contribution.** An implementation science contribution of our work will be the determination of the spectrum of interventions that facilities use to reduce admission risk in those patients identified by the Office of Analytics high risk list that is provided to each VA facility.

e. **Disparities.** Past work has not found racial disparities in risk of readmission, however admission rates have been higher in black than in white Veterans. We will examine if

racial differences in admission are due to facility specific effects or other effects that exist across facilities.

Objective 2. **Improve transition of care interventions (inpatient to outpatient).**

a. Plans for Achieving This Goal. We will continue our facilitation and evaluation of the **Hospital to Home Initiative (H2H)** of the **Institute for Healthcare Improvement (IHI)** that focuses on the transition of care following a heart failure admission (32-39). In this initiative, participating hospitals focused on at least one of three transition of care interventions (medication management, early follow-up and symptom education). We will determine if specific transition of care interventions are associated with reduced readmission rates, reduced hospital days, or improved health status (not available nationally but some facilities are collecting it). Figure 7 displays our analytic framework that shows the relationship between interventions to improve the transition of care, rehospitalization, intermediate endpoints, and clinical endpoints.

b. Anticipated Key Impacts. A key impact of this project will be sharing and implementation of these successful interventions at other facilities.

c. Primary Partners. CHF QUERI is collaborating with Patient Care Services on the H2H initiative. The H2H Initiative is a National Program Sponsored by the American College of Cardiology and the Institute for HealthCare Improvement (IHI).

d. Implementation Science Contribution. Implementation science contributions will include more detailed information on resources required to implement the different projects and their sustainability. We expect additional implementation science advances regarding the use of the provider networks to aid in the implementation of national quality improvement initiatives such as H2H.

e. **Cross QUERI collaboration.** H2H targets both acute myocardial infarction and heart failure so IHD QUERI is a natural collaborator.

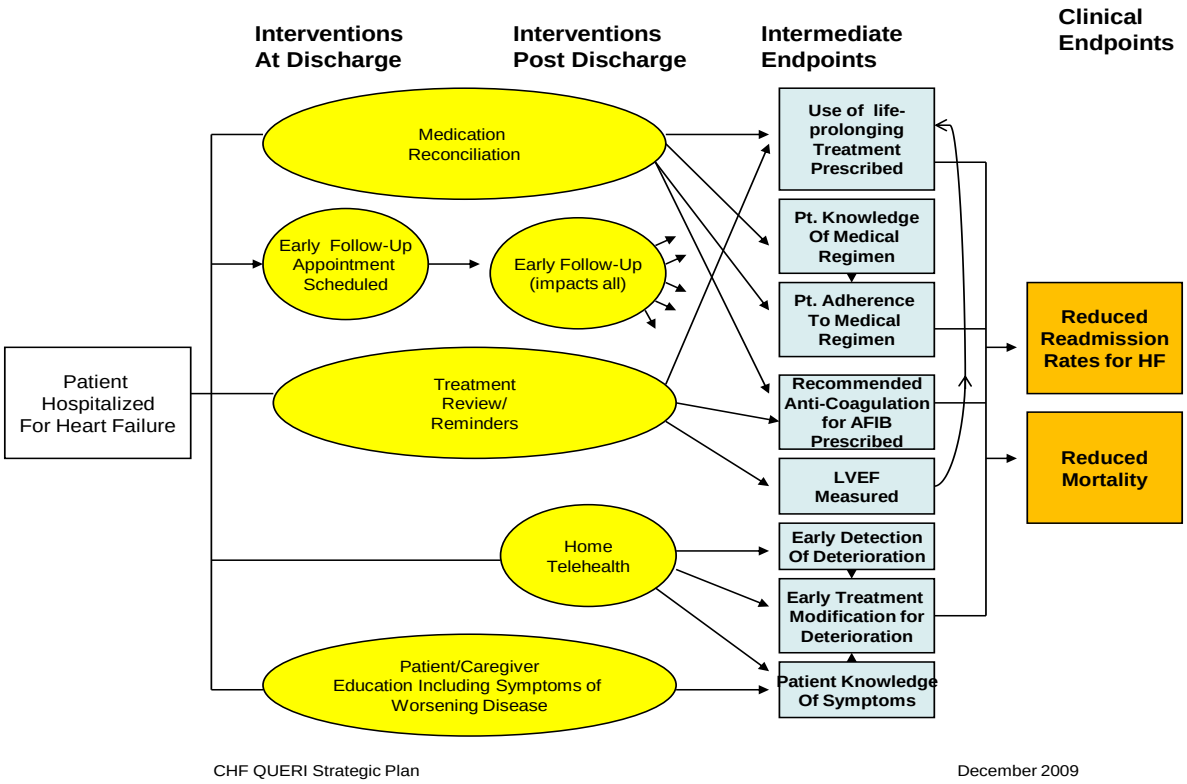


Figure 9. Analytic framework for CHF QUERI intermediate outcomes and clinical endpoints associated with the transition of care.

Objective 3. **Enhance coordination of primary care (PACT) and specialty care (heart failure).**

Over half of patients with heart failure do not see a VA specialty care provider due in part to limited access. Our long term goal is to identify the optimal methods of improving coordination between PACT and specialty care.

a. Plans for Achieving This Goal. This work will be done in collaboration with the Office of Specialty Care Transformation which is examining ways to improve access though the E-consult program, and improve primary care provider competencies through the SCAN-ECHO program. There are two funded evaluation centers that are examining the overall impact of the programs, but there is an additional need for disease specific evaluations. In particular, we will examine if E-consults or SCAN-ECHO impact the number of cardiology visits, ED visits, hospitalizations and diagnostic tests compared to facilities not using E-consults and SCAN-ECHO.

We will also pursue projects examining the use of specialists as mangers of patient populations, providing proactive consultation and advice to PACTs.

b. **Anticipated Key Impacts.** We will determine heart failure specific impact of E-Consults and the SCAN-ECHO program on resource use, emergency department visits, and hospitalization
c. **Primary Partners.** Office of Specialty Care Transformation
d. **Implementation Science Contribution.** In the process of working toward this goal we will determine facility variation in the implementation of E-consults and SCAN-ECHO for heart failure and the facility characteristics associated with this variation.

Objective 4. **Evaluate impact of dual care (VA and Non-VA) on testing and treatment for Veterans with heart failure.**

Our prior work has found that a combination of non-VA and VA care is common for Veterans with heart failure. In particular, patients of CBOCs have a non-VA cardiologist in addition to their VA primary care provider. It is likely that poor communication between VA and non-VA providers has led to duplicate testing and/or poor monitoring of treatment.

a. **Plans for Achieving This Goal. As part of an HSR&D funded study we have identified Medicare encounters for VA patients with Heart Failure.** We will quantify the degree of additional testing, and clinic visits that occur for patients seeing both PACT and non-VA provider and compare this to Veterans seeing only VA providers (cardiology and PACT)
b. **Anticipated Key Impacts.** The initial impact will be the determination of the amount of duplicate (unnecessary) care that occurs if patients see both VA and non-VA providers. We will also determine the association of dual care with emergency department visits, readmission rates and survival.
c. **Primary Partners.** This project will be conducted in collaboration with Patient Care Services.
d. **Implementation Science Contribution.** This project is a pre-implementation study with the later goal of developing a communication intervention for use with VA and non-VA providers.

Objective 5. **Decrease inappropriate tests for measurement of left ventricular ejection fraction.**

Cardiac Imaging has grown exponentially in the United States without a comparable increase in benefit for patients. (31) Much of this imaging is for documentation of the left ventricular ejection fraction (LVEF). While an occasional measurement is consistent with good care, routine testing without a change in health status has been labeled as inappropriate care by the American College of Cardiology, (40) Any unnecessary test has, by definition, a slight negative impact on quality of life. The variation in use of cardiac imaging (both appropriate and inappropriate) within the VA has not been well described.

a. **Plans for Achieving this Goal.** CHF QUERI has recently documented that the use of left ventriculography during cardiac catheterization varies from < 1% at several VA facilities to over 95% at others. A RRP is in progress that will survey of providers regarding their attitudes toward left ventriculography to inform subsequent interventions to change provider behavior. In addition, we will develop appropriate use measures for left ventriculography, conduct an analysis of compliance with these newly formed appropriate use criteria, and implement an audit and feedback mechanism to decrease inappropriate use. We will also complete our randomized trial of clinical reminders to reduce unnecessary follow-up echocardiography. If successful, this echocardiography based reminder will be promoted to VA echocardiography laboratory directors, many of whom are already members of the VA HF Network.
b. **Anticipated Key Impacts.** The Key impacts from this work will be development of Appropriate Use Criteria for left ventriculography, and the development of an audit and feedback intervention using CART-CL, the national VA catheterization laboratory database. Another impact may be a clinical reminder to reduce unnecessary echocardiography. Ultimately, our impact will be less inappropriate cardiac testing (deimplementation).
c. **Primary Partners.** Patient Care Services including the National Program Director for Cardiology will be the main partners. We have already partnered on a survey to determine individual provider beliefs that may explain the extreme variation in use of left ventriculography.
d. **Implementation Science Contribution.** As part of our funded RRP, we will determine provider attitudes toward left ventriculography that will help guide development of the audit and feedback intervention. We will also determine facility and provider factors that

are associated with success of the audit and feedback intervention for left ventriculography and for the clinical reminder to reduce echocardiography use.

e. **Cross QUERI collaboration.** IHD QUERI is collaborating with CHF QUERI on the funded RRP project focused on left ventriculography.

Goal 2. Increase Use of Life-Prolonging Therapy

While there are multiple treatments known to prolong survival in patients with heart failure and depressed ejection fraction, many are already at a high level of use (angtiotensin converting enzyme inhibitors, beta-blockers). Devices such as implantable cardioverter defibrillators and cardiac resynchronization therapy are expensive, and while reasonably cost-effective by most estimates, they are not as high value (benefit per cost) as medication use. The one medication still used in a minority of candidates is **aldosterone antagonists** and for this reason is a primary objective of Goal 2. (41)

Objective 1. **Improve use and safety of aldosterone antagonists**

a. Plans for Achieving this Goal. We have already begun work on improving the safety of aldosterone antagonist use in collaboration with Pharmacy Benefits Management (PBM). As noted above, aldosterone antagonists may increase serum potassium levels to dangerous levels and monitoring of potassium levels is recommended early after a new prescription. CHF QUERI and PBM will be examining an intervention to increase appropriate monitoring at 10 VA facilities. This intervention will use local pharmacists to **target PACTs** to increase appropriate monitoring of potassium. Subsequent strategies to improve safety and use of aldosterone antagonists include a campaign of the VA Heart Failure Network (targets specialty providers more than PACT) and addition of aldosterone antagonists to PACT dashboards.

b. Anticipated Key Impacts. If this is successful a key impact will be improved monitoring of potassium, reduced episodes of hyperkalemia and reduced sudden death.

c. Primary Partners. The primary partner for this objective is **Pharmacy Benefits Management.**

d. Implementation Science Contribution. The contribution to implementation science will be a determination of the barriers and facilitators to the PBM intervention.

e. Disparities. We will determine if certain racial, gender or vulnerable populations (those with mental illness) are more likely to receive appropriate aldosterone antagonists and have appropriate monitoring.

f. **Data Development, Implementation, Evaluation.** If the PBM project targeting local providers (PACT) through local pharmacists is successful the next phase will be expansion to all VA facilities.

Objective 2. **Evaluate the Cost-Effectiveness of Life-Prolonging Devices, Medications and Diagnostic Tests.**

a. **Plans for Achieving this Goal.** Members of the CHF QUERI Executive Committee are active in evaluating the cost-effectiveness of heart failure treatments. We will continue this work.
b. **Anticipated Key Impacts**. A ranking of heart failure therapies by value.
c. **Primary Partners.** The primary partner for this objective is **the Health Economics Research Center.**
d. **Implementation Science Contribution.** This is a pre-implementation goal that will help inform subsequent Strategic Plans.

Objective 3. **Improve the use of recommended therapies in vulnerable / historically undertreated populations.**

a. **Plans for Achieving this Goal.** We will examine disparities in heart failure care based on race, gender, age, rural vs. urban location, mental illness, alcohol dependence, infection with the human immunodeficiency or hepatitis C virus, and renal insufficiency. We have already shown that for the mainstay treatments of ACE inhibitors and beta-blockers there are no important racial disparities, while they do exist for device use (e.g. defibrillators). We will focus on newer therapies (aldosterone antagonists) and therapies specifically recommended patients of African descent (hydralazine / nitrate combinations).
b. **Anticipated Key Impacts.** This work will lead to identification of patient populations that should be targeted for additional interventions aimed at improving life prolonging care.
c. **Primary Partners.** The primary partner for this objective is **Patient Care Services.**
d. **Implementation Science Contribution.** This is a pre-implementation goal that will help inform subsequent implementation strategies.
e. **Cross QUERI Collaborations.** We will collaborate with **SUD QUERI and HIV/Hep C QUERI** to better understand treatment and quality of care for heart failure patients with **alcohol dependence, HIV and hepatitis C**.

Goal 3. Increase Use of Therapy that Improves Quality of Life

Progress on goals 1 and 2 will also lead to an improvement in quality of life because the treatments that improve readmission and survival also usually improve symptoms. However, there are select areas not directly related to survival that we will target for the ability to improve symptoms. The first objective is to address a common comorbidity of heart failure: atrial fibrillation. A second objective is to increase the abilities of patients and their caregivers to improve self-care care for heart failure. The third objective is to improve palliative care at the end-of-life.

Objective 1. **Enhance understanding and increase the use of recommended treatments for atrial fibrillation.**

This is a relative new objective for CHF QUERI that was included due to a change in CMS performance measure. CMS expanded their performance measures to include use of anti-coagulation for patients with atrial fibrillation at significant risk of stroke. **It is also the only associated comorbidity that is part of heart failure performance measure endorsed by the National Quality Forum (NQF).** Atrial fibrillation is commonly associated with heart failure, and heart failure patients with atrial fibrillation are at high risk of stroke.

a. **Plan for achieving goal.** We have created VA nationwide datasets of all patients with atrial fibrillation and heart failure that includes both VA and Medicare encounters. We are determining variation in compliance with recommended care for atrial fibrillation and predictors of optimal care. Comparative effectiveness studies will be conducted of commonly used atrial fibrillation therapies (digoxin, amiodarone) that have not been evaluated sufficiently with randomized trials in patients with heart failure. We will also determine variation in anticoagulation treatment for patients in the VA and its potential impact on outcome.
b. **Anticipated Key Impacts.** This work will result in determination of quality of care for Veterans with heart failure and atrial fibrillation across facilities and patient subgroups.
c. **Primary Partners.** Patient Care Services.
d. **Implementation Science Contribution.** This project is primarily pre-implementation but will help target future implementation studies.
e. **Cross-QUERI contribution.** Anti-coagulation related work is being conducted in collaboration with Stroke QUERI.
f. **Disparities.** Racial differences in quality of atrial fibrillation care will be determined as part of this project.

g. **Data Development, Implementation, Evaluation.** As noted above, we have already created a dataset of all Veterans with heart failure and atrial fibrillation that includes both Medicare and VA data.

Objective 2. **Evaluate strategies to empower patients and caregivers for self-management.** Encouraging the patient to become an active partner in their care is important to the success of our goals of reducing preventable admissions, improving survival and quality of life.

a. **Plan for achieving goal.** QUERI investigators have ongoing pilot and RRP funded projects that are evaluating different aspects of patient self-management. We plan to work with My Health E-vet to enhance our patient education materials and tools for evaluating quality of care. We will work with the Office of Care Coordination to evaluate the impact of the standardized Disease Management Protocol for home telehealth that CHF QUERI created in 2011 which was recently been implemented system wide.
b. **Anticipated Key Impacts.** These include improved my-Health E-vet options for Veterans with heart failure and a measure of the impact of the Heart Failure Disease Management Protocol used as part of home telehealth.
c. **Primary Partners.** My Health E-vet and the Office of Care Coordination.
d. **Implementation Science Contribution.** We will determine barriers and facilitators to using the Heart Failure Disease Management Protocol by both patients and facilities.
e. **Health Information Technology (HIT) development, implementation, evaluation.** As noted above this objective includes an evaluation of the home telehealth Disease Management Protocol for heart failure.

Objective 3. **Improve use of palliative care and advance planning.**

a. **Plan for achieving goal.** CHF QUERI investigators have several pilot studies ongoing to improve and expand palliative care for patients for heart failure. While data on DNR status are not easily available within the VA nationally, these data are available for California hospitals, and some analyses (predictors of DNR use) will likely be informative for VA projects. There are currently no guidelines on when palliative care should be ordered for patients with heart failure due in part to the difficulty in predicting 6 month survival using current models (as opposed to survival in patients with many cancers). Thus part of this work will be to determine if current computerized VA data can identify those at very high risk of death that may be useful to PACT and other heart failure providers. A determination of variation of palliative care across VA facilities and factors

associated with palliative care referral will allow identification of those facilities with high rates of palliative care use and a determination of their care strategies.

b. Anticipated Key Impacts. CHF QUERI work in this area should provide at least one promising intervention for improving palliative care. We will also be able to provide a better understanding of the distribution in use of palliative care by facilities including facility characteristics that are associated with more use.

c. Primary Partners. Patient Care Services.

d. Implementation Science Contribution. An implementation evaluation will determine facility and patient characteristics that are associated with greater use of any palliative care intervention.

e. **Cross-QUERI contribution.** Many of these studies will be done in collaboration with IHD QUERI.

f. Disparities. CHF QUERI will examine differences in palliative care, hospice use and DNR ordering for patients of different race and gender. Our initial findings suggest that female and white patients with heart failure are more likely to have DNR orders entered (after adjustment for age and other characteristics) compared to male and non-white patients.

g. **Data development, implementation, evaluation.** This work will add “use of palliative care” to the existing national heart failure database annually created by CHF QUERI.

Table 4. CHF QUERI Goals

Goal	Description	Number of Projects Related to the Goal	Time Frame
MAJOR GOALS			
1	**Decrease Unnecessary Hospitalizations, Tests and Treatments for Heart Failure**		1-3 years
1A	Improve identification of preventable admissions and readmissions for heart failure.	3	2 years
1B	Improve transition of care interventions (inpatient to outpatient).	>5	1-2 years
1C	Evaluate impact of dual care (VA and Non-VA) duplicate testing and treatment for patients with heart failure.	2	2-years
1D	Enhance coordination of primary care (PACT) and specialty care (heart failure).	2	3-5 years
1E	Decrease inappropriate tests for measurement of left ventricular ejection fraction.	2	1-2 years
2	**Increase Use of Life-Prolonging Therapy**		1-5 years
2A	Improve use and safety of aldosterone antagonists.	2	1-3 years
2B	Evaluate the Cost-Effectiveness of Life-Prolonging Devices, Medications and Diagnostic Tests.	1	1-5 years
2C	Improve the Use of Recommended Therapies in Vulnerable / Historically Undertreated Populations.	2	3 years
3	**Improve Use of Therapy that Improves Quality of Life**		3-5 years

Goal	Description	Number of Projects Related to the Goal	Time Frame
3A	Enhance understanding and increase the use of recommended treatments for atrial fibrillation.	3	1-3 years
3B	Evaluate strategies to empower patients and caregivers for self-management.	4	3-5 years
3C	Improve use of palliative care and advance planning.	3	3-5 years

Implementation Science Goal. We have a specific implementation science objective that spans all of the other goals. This is an improved understanding the **Heart Failure Network as a Community of Practice** (26-28) and its impact on implementation.

a. **Plan for Achieving Goal.**
   We will increase our understanding of the HF Network as a Community of Practice through a mixed methods approach using quantitative surveys and qualitative interviews with HF network members. We will continue to conduct randomized trials of the HF Network to determine the types of interventions whose implementation can be enhanced by network facilitation.
b. **Anticipated Key Impacts.** Information on the strengths and weaknesses of a provider network can be used to design similar networks of other providers with a shared expertise.

8. Metrics

We have developed performance metrics that can be used to evaluate our progress. This includes a mix of project based measures where we have substantial control, and implementation, and outcome measures where we must work with partners to be successful. Metrics for 2013 have been revised to reflect changes in current goals and the progress made on metrics for 2012.

Table 5. Metrics for CHF QUERI

Category	Metric	Scope	Impact	Time Frame
Projects (Goal 1)	1. Identify post-discharge outcome measures of quality that are superior to 30-day all cause readmission.	HF population at multiple facilities	Improves quality measurement of transition of care	1 year
Projects (Goals 1-3)	2. Participate in Cross-QUERI collaborations to improve quality of care for patients with chronic diseases.*	Multiple QUERIs	Increases cross-QUERI work and productivity	2 years
Projects (Goal 1,2)	3. Conduct a project with Pharmacy Benefits Management's using the Pharmacy Network at 5 VA Medical Centers for implementation.	Multiple VA Facilities	Examines central method of identifying patients for treatment with local implementation	2 years
Projects (Goal 1)	4. Examine impact of E-Consults and SCAN-ECHO HF projects on PACT Care and access to specialty care.	PACT	Identifies the impact of HF care	2 years

Projects (Goals 1-3)	5. Update our VA HF Database.	HF population at all facilities	Creates a resource for tracking quality of care and outcomes in addition to data from the Office of Quality and Performance	1 year
Projects (Goals 1-3)	6. Increase the tools for providers available on the CHF QUERI website.	CHF QUERI Website Materials	Provides support and knowledge about evidence based practice to providers to improve their quality of care for HF patients	1 year
Projects (Goals 1-3)	7. Document usage of new CHF QUERI tools on MHV website.	Website Activity	Helps HF patients and caregivers with self-management of health conditions	2 years
Implementation (Goals 1-3)	8. Expand the number of providers participating in the Heart Failure Network.	VA Providers	Increases the impact of HF Network	1 year

Implementation (Goal 1)	9. Implement an Audit and Feedback program to decrease inappropriate imaging.	VA Providers	Decrease inappropriate care	2 years
Process Outcomes National Measure (Goal 1)	10. Decrease use of left ventriculography in the VA that is not deemed appropriate by 20% from 2011 levels.	VA Facilities	Increases beta-blocker use leading to improved survival and reduced hospitalization	2 years
Process Outcomes National Measure (Goal 2)	11. Increase safety of aldosterone antagonist use by increasing early potassium monitoring by 10% from 2011 levels.*	VA patients	Reduces potentially life threatening hyperkalemia	2 year
Process Outcomes National Measure (Goal 1)	12. Increase the fraction of heart failure patients who are seen within 7 days by 10% from 2011 levels*	VA patients	Reduced the probability of early readmission	3 years
Clinical Outcomes National Measure (Goal 2)	13. Reduce risk-adjusted mortality by 10% from 2011 levels.*	HF patients and caregivers using MHV	Improves survival	5 years

Clinical Outcome National Measures (Goal 1)	14. Reduce risk-adjusted hospitalization rates for heart failure by 10%*	VA patients	Reduces hospitalization and cost of care	5 years

* Multiple organizations /entities contribute to this metric

9. Management Plan

CHF QUERI is organized into nearby Coordinating Centers. Although labeled as Research and Clinical, the centers work jointly with the Coordinators serving as Co-Principal Investigators on most projects.

The **Research Coordinating Center:** is affiliated with the Center for Health Care Evaluation (CHCE), the HSR&D Center of Excellence based at the VA Palo Alto Health Care System (Dr. Steven Asch, Director). The CHCE is closely affiliated with the Health Economics Research Center (HERC), a national center that assists VA health economics researchers, and the VA Cooperative Studies Program (CSP). The integration with CHCE allows the CHF-QUERI to have access to a wide array of experts in health services research, health economics, statistics, medical sociology and implementation research. Dr. Paul Heidenreich is the Director; Dr. Anju Sahay PhD is the Implementation Research Coordinator and Dr. Mary Goldstein serves as co-investigator.

The **Clinical Coordinating Center** is located at the San Francisco VA Medical Center and affiliated with the Interdisciplinary Research Program to improve care for Older Veterans, a HSR&D Research Enhancement Award Program. Dr. Massie, the Clinical Coordinator, Theresa Marsh, the Administrative Coordinator, Dr. Michael Shlipak, and Dr. Michael Steinman (investigators) all contribute to CHF-QUERI. Drs. Massie, Shlipak, and Steinman are faculty members at the University of California at San Francisco. The Clinical Coordinating Center works closely with the VA National Defibrillator Surveillance Center, based at the San Francisco VA Medical Center and Directed by Dr. Edmund Keung. Work with the defibrillator center assists CHF-QUERI to determine trends in use of ICDs, outcome and cost of care for Veterans receiving defibrillators.

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Appendix A. Potential Goals/Objectives not Selected by CHF QUERI

Potential Goal/Topic	Outcome Impact	Value	Gap in Care	Implementation Potential	Comment
Alcoholic Cardiomyopathy Treatment	Minimal Studies	Unclear	Unclear	No interventions Identified	Needs traditional HSR, Epidemiology work to determine if alcoholic specific interventions are needed.
Quality of Heart Transplantation	Improves Outcome	Unclear	Unclear	Impacts a small	Affects very few Veterans
Increase Defibrillator Use	Improves Survival	Fair	Gap is narrow as many patients refuse	Pilot studies successful of reminders	Fair value and moderate gap make this lower priority than other interventions.
Heart Failure Symptoms Addressed	Minimal Studies	Unclear	Unclear	No interventions identified	requires chart review to capture, NQF measure,
ACE or ARB or low LVEF	Improves Survival	High	Small:((> 90% use)	Already widely implemented	Fits with Goal 2 but already at a high level. NQF measure,
Heart Failure: Left Ventricular Ejection Fraction Assessment (Outpatient Setting)	Identifies patients for life-prolonging therapy	High	Minimal:(> 95% use)	Already widely implemented	NQF Measure and TJC Core Measure

Heart Failure - Use of Beta Blocker Therapy	Improves Survival	High	Small:(> 90% use)	Already widely implemented	Fits with Goal 2 but already at a high level. NQF measure,
Hospitalized Patients Who Die an Expected Death with an ICD that Has Been Deactivated	Limits excessive care	High	Unknown	Difficult to determine expected deaths in advance.	NQF Measure.
Proportion of patients with a chronic condition that have a potentially avoidable complication during a calendar year.	Limits morbidity	Unclear	Unclear	No interventions identified	NQF Measure.
High Risk for Pneumococcal Disease - Pneumococcal Vaccination	Improves morbidity and survival	High	Low	Already implemented as a reminder within CPRS	NQF Measure

Appendix B. CHF QUERI 2013-2015 Strategic Planning Process

Input from Key VHA Stakeholders:

We sought input from the following 3 groups of key stakeholders to revise the CHF QUERI's goals:

1. HF Network Members (multi-disciplinary/multi-level/multi-facility providers)
2. CHF QUERI Executive Committee and Local Advisory Board Members.
3. Key VHA Partners whose names are provided in Table 1 below.

Appendix B, Table 1: Key VHA Partners Surveyed for CHF QUERI Goals

Partner Name	Role
Agarwal, Madhu	Deputy Under Secretary for Health for Policy and Services
Almenoff, Peter	Director, Operational Analytics and Reporting
Alt-White, Anna	Director, Research & Academic Programs
Barnett, Paul	Director, HERC
Burris, James	Chief Consultant, Geriatrics & Extended Care SHG
Cunningham, Fran	Director, Center for Medication Safety
Darkins, Adam	Chief Consultant, Office of Care Coordination
Davies, Michael	National Director of Systems Redesign
Edes, Thomas	Director, Geriatrics & Extended Care Operations
Eisen, Seth	Former Director, HSR&D Service
Fihn, Steve	Director, Office of Analytics and Business Intelligence
Francis, Joe	Director, Clinical Analytics and Reporting
Freeman, Elizabeth	Director, Palo Alto VA HCS
Graham, Glenn	Clinical Consultant, Specialty Care Transformation
Jain, Rajiv	Chief Patient Care Services Officer
Jesse, Robert	Principal Deputy Under Secretary for Health

Johnson, Mary Anne	Chief Medical Officer, VISN 21
Kahwati, Leila	Deputy Chief Consultant for Preventive Medicine: NCP
Kinsinger, Linda	Chief Consultant for Preventive Medicine: NCP
McGlynn, Geraldine	Director, CIDER
Mittman, Brian	Former Director, CIPRS
Moseley, Marthe	Associate Director, Clinical Practice
Murawsky, Jeffrey	VISN 12 Network Director
Nazi, Kim	MHV Performance and Evaluation Manager
Rubenstein, Lisa	Director, CIPRS
Rumsfeld, John	Director, National Cardiology Program
Rusch, Roxane	Acting ADUSH for Quality, Safety and Value
Schectman, Gordon	Acting Chief Consultant for Primary Care
Shay, Kenneth	Director, Geriatric Programs
Shekelle, Paul	Staff Physician
Smith, Amy	VISN 16 Deputy CMO
Stark, Richard	Director of Primary Care Clinic Operations

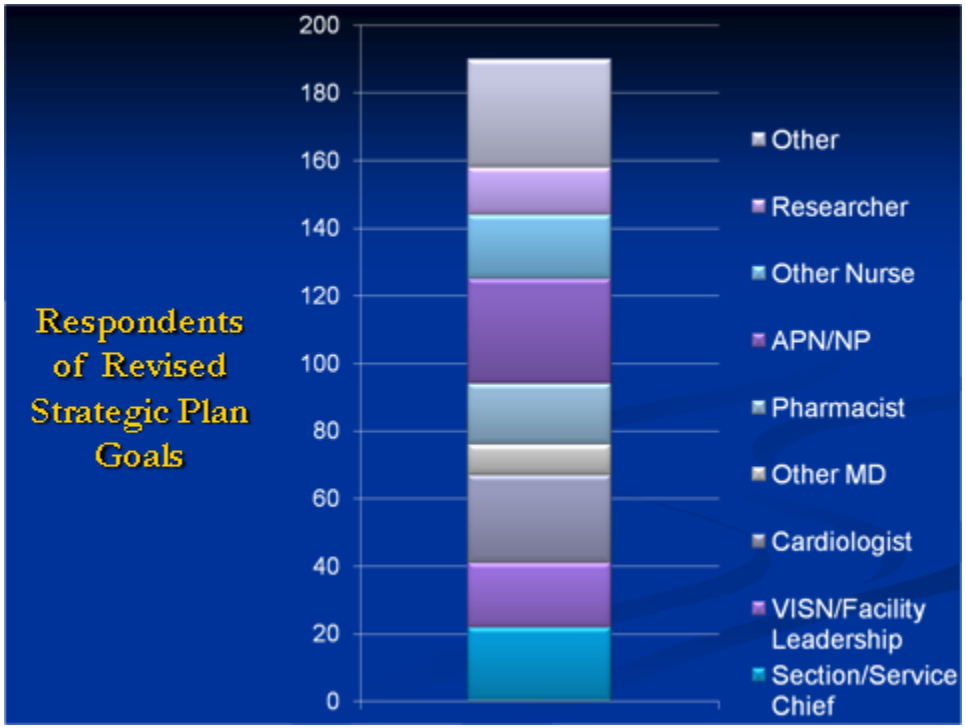
Procedure Adopted to Revise Goals:

Step 1: The Strategic Plan Priority Survey was sent to all the **HF Network Members** (n=834). This survey included a list of current and suggested new goals for the CHF QUERI. Members were asked to:

i. Choose up to 3 goals which seemed best to them
ii. Rate the selected goals as 1, 2 and 3 in order of their priority
iii. Suggest up to 2 new goals
iv. Identify their primary role at the VA.

A total of 194 members responded with a 24% response rate. These self-identified roles at the VA have been presented in Appendix B, Figure 1 below.

Appendix B, Figure 1. Self-Identified VA Roles by the HF Network Member



Step 2: Goals selected and prioritized by these HF Network members were then categorized and presented at the **Executive Committee In-Person Meeting on April 10, 2012 at the Hyatt Regency Hotel, Burlingame, CA.** Members and QUERI leadership reviewed and discussed the goals.

Step 3: The refined list of these goals was then sent to the **Executive Committee Members and the Local Advisory Board Members** (n=22). Members were requested to:

i. Review and add new goals considered appropriate by them

ii. Suggest up to 2 new goals

iii. Review the existing list of names of the VHA Key Partners who would provide feedback about CHF QUERI goals in the context of their needs and priorities related to heart failure. We also asked members to suggest other key partners to compile a comprehensive list.

A total of 17 members participated in this process (77%).

Step 4: Based on the input from the Executive Committee members and the Local Advisory Board members an updated Strategic Plan Priority Survey was sent to **VHA Key Partners** (n=32). This survey is provided in Table 2 below. Partners were requested to:

i. Choose up to 3 goals which seemed best to them
ii. Rate the selected goals as 1, 2 and 3 in order of their priority.
iii. Suggest up to 2 new goals.

A total of 23 partners responded with a 72% response rate.

Appendix B, Table 2. Strategic Plan Priority Survey

1. Listed below are the current and suggested goals. Please choose up to 3 goals which seem **BEST** to you and rate them 1, 2 and 3 in order of YOUR priority.

__ Increase use of life prolonging heart failure medications
__ Increase use of life-prolonging devices (ICD/CRT)
__ Improve transition of care interventions (inpatient to outpatient)
__ Refine risk models to identify high risk patients for preventable HF readmission
__ Improve advanced heart failure care (e.g. use of LVADs, transplantation)
__ Improve end-of-life heart failure care
__ Reduce overuse of procedures/tests for heart failure
__ Understand cost of heart failure care
__ Understand impact of non-VA heart failure care by veterans
__ Understand /improve primary and specialty care interactions
__ Increase use of home-monitoring/care coordination
__ Increase patient engagement / use of My Health e-Vet (MHV)
__ Evaluate methods of patient education

__ Identify patients with unrecognized heart failure
__ Improve the safety of heart failure care
__ Develop tools for providers to improve heart failure care

2. (OPTIONAL) Suggest up to 2 new goals in the space provided below:

Goal 1. _____

Goal 2. _____

Step 5: Responses from the VHA Key Partners were compiled and discussed during the conference call attended by the Executive Committee Members, Local Advisory Board and QUERI leadership on September 21, 2012 (n=18).

Responses from both the HF Network Members and VHA Key Partners are provided in Table 3 below.

Appendix B, Table 3. Strategic Plan Priority Survey

Goals	Number of Responses from HF Network Members	Number of Responses from Key VHA Partners
Develop tools for providers to improve HF care	Item not included in survey	3
Evaluate methods of patient education	Item not included in survey	3
Improve use of home-monitoring/care coordination	49	6
Identification of patients with unrecognized HF	23	0
Improve advanced heart failure care (e.g. use of LVADs, transplantation)	26	1
Improve end-of-life care	40	3
Improve other outpatient care to reduce admissions / improve quality of life	137	Item not included in survey
Improve safety of HF care	Item not included in survey	2

Improve transition of care interventions to reduce readmissions	102	13
Increase use of life prolonging medications	41	5
Increase use of life-prolonging devices (ICD/CRT)	16	0
Increase patient engagement/use of My Health e-Vet (MHV)	10	7
Reduce over use of procedures	28	5
Refine risk models to identify high risk patients	45	5
Track symptoms and function	Item not included in survey	1
Understand cost of HF care	10	1
Understand impact of non-VA care by Veterans	8	3
Understand/improve primary and specialty care interactions	54	5

Step 6: Based on this sequential process involving all the VHA stakeholders the revised goals for the CHF QUERI for the next 3 years from 2013-2015 are presented in the 2012 Strategic Plan.