2011

Transitions Home For Patients With Heart Failure: A Pilot Program At A Critical Access Hospital

Rita M. Willey Dr.
rmwilley1@gmail.com

Transitions Home for Patients with Heart Failure: A Pilot Program at a Critical Access Hospital

A Capstone Scholarly Project Presented By:

Rita M. Willey, D.N.P.(c), M.B.A., B.S.N., R.N.

Doctor of Nursing Practice (DNP) Candidate

Family Nurse Practitioner (FNP) Track

University of Massachusetts, Amherst

May 16, 2011

Approved as to style and content by:

_____

Chair, Joan P. Roche, PhD, RN, GCNS-BC

_____

Member, Jean E. DeMartinis, PhD, FNP-BC

_____

Mentor, Doreen M. Hutchinson, MBA, RN

_____

Graduate Program Director
School of Nursing

Table of Contents

Abstract

Background: Heart Failure (HF) disease management programs (DMP) have shown to improve outcomes. The aim of this heart failure pilot program is an evaluation program. Measurement of functional capacity utilized the Duke Activity Status Index (DASI) questionnaire. Since the DASI uses the patient's ability to perform a set of common activities of daily living to gauge functional capacity based on the known metabolic cost of each activity in MET units, it is thought to be well suited for population studies in which assessment of functional capacity during follow-up is needed.

Setting: Rural Critical Access Hospital (CAH) with outpatient cardiology services.

Methods: This HF pilot is a program evaluation which involved a one group, pre-test and post-test design. Five additional variables were analyzed to determine if any relationship occurred with O2 uptake change as noted in changes in DASI. The five variables included key items for the pilot program: HF education, teach back method, inpatient nutrition consult, DC time out, and follow-up with a Nurse Practitioner (NP).

Results: There were a total of 17 patients who received the inpatient pilot program throughout their hospital stay until discharging home. Eleven of the 17 patients benefitted from the entire program (inpatient & outpatient) with continued care in the outpatient cardiology department. Thirteen patients completed the inpatient and outpatient Duke Activity Status Index (DASI). Paired T-Test was conducted to compare inpatient vs. outpatient of O2 uptake. There was no significant difference in scores for inpatient (M = 20.99, SD = 6.42) and outpatient (M = 19.26, SD 5.28), t (12) = .94, p = .36 (two-tailed). Wilcoxson Signed Rank Test, non-parametric test of differences, demonstrated no statistical difference between inpatient and outpatient oxygen (O2) uptake; [z = -.839[a], p = .40]. An independent-samples t-test was conducted to

compare O2 uptake changes based on gender. Difference between males' and females' ages was not statistically significant (p = .403; two-tailed). Pearson correlation or Spearman correlation was used to give the direction and strength of the relationship between variables. A moderate correlation was detected with age and O2 uptake change from outpatient vs inpatient, ($p < 0.05$). An independent-samples t-test was conducted to compare O2 uptake changes based on age. Average O2 uptake decreased by 7 for patients 70 or under (M = 7.00, SD = 4.82), and increases by 3 for those over 70 (M = 2.77, SD = 4.19); t (11) = 3.91, p = < 0.01. Explanations for this inverse detection are multi-factorial.

Five pilot program variables were analyzed to determine if any relationship occurred with O2 uptake change as noted in changes in DASI. "Teach back method**"** demonstrated that two patients were unable (M = 7.5, SD = 5.16); 11 patients were able (M = -3.41, SD = 5.49); (t (11) = 2.60, p = .024 [two tailed]). This is statistically higher at $p < 0.05$. Especially surprising about this result is that average O2 uptake change of 7.5 for 2 patients who were "unable to teach back" is significantly higher, than average O2 uptake change of -3.4 for 11 patients who were "able to teach back". The scores of the 2 patients that "were unable" went up, while those that "were able", went down on average.

Conclusion: The usefulness for clinical decision making regarding lower O2 uptake scores for those under 70 compared those over 70 cannot be fully described or understood given the nature of this result. The fact that other clinical factors are also independent predictors of functional capacity indicates that an uncomplicated course of inpatient heart failure designated care is not, in of itself, sufficient to guarantee an optimal functional outcome. This particular notion may also be apparent within the "teach-back" variable and O2 uptake change.

TRANSITIONS HOME FOR PATIENTS WITH HEART FAILURE: A PILOT PROGRAM AT A CRITICAL ACCESS HOSPITAL

Problem Identification

Hospitals and health care systems are focusing on improving performance and patient outcomes in cardiovascular services, with a particular focus on heart failure (HF). There is great interest in which aspects of HF management can prevent readmissions, decrease the cost per case, and improve the quality and satisfaction for this particular patient population (Hines, Yu, & Randall, 2010). The June 2007 and 2008 Medicare Payment Advisory Commission (MedPAC) Reports to Congress highlighted avoidable re-hospitalizations as an area of high cost and low quality (Boutwell, Jencks, Nielsen, & Rutherford, 2009, p. 2). According to Boutwell, Jencks and colleagues (2009), these reports have prompted leaders of health care systems across the country to begin to focus on avoidable re-hospitalizations in anticipation of potential changes in the healthcare market.

In a rural 25 bed Critical Access Hospital (CAH), quality data for fiscal year 2005 demonstrated that the CAH provided recommended HF care 79% of the time (Massachusetts Health Care Quality and Cost Information, 2006). The recommended care is a nationally recognized set of measures known as "Core Measures" (Joint Commission [JC], 2010), or guidelines, which identify the treatments a HF patient should receive (Massachusetts Health Care Quality and Cost Information, 2006). More recent data, however, demonstrates improvement in appropriate care with results fluctuating between 81% - 100% (Figure 1 & 2). Specific performance concerns at this CAH regarding HF appropriate care reside specifically within smoking cessation and discharge instruction measurements (Figure 1 & 4).

Statement of Problem.

Issel's (2004) model for problem definition was used to construct the problem statement. The problem is stated as: Increased frequency of hospital readmissions among adult patients, > 18 yrs. of age, with exacerbation of known heart failure condition; as indicated by increased number of "same or similar" coded hospital admissions for same patients. These re-hospitalizations are related to de-compensating physiological processes, given existing vulnerable health, co-morbidities, and specific health practices. It is assumed that the re-hospitalizations are influenced by a lack of adequate primary care clinician teaching and regular follow up regarding disease management / prevention and the patients' own health behaviors.

Avoiding HF re-hospitalizations requires identification and mitigation of barriers to system-wide improvement, and coordination across the continuum of care (Institute for Healthcare Improvement [IHI], n.d.). On May 1, 2009, IHI launched *STate Action on Avoidable Re-hospitalizations* (STAAR) a multi-state, multi-stakeholder approach aimed to improve the delivery of effective HF care at a regional scale (IHI, n.d.). Other IHI initiatives to improve transitions and reduce readmissions includes *Improving Transitions in Care Collaborative* which focuses on creating an ideal transition for patients from the hospital to home with an aim to reduce 30-day readmission rates by 30 percent and increase patient and family satisfaction with optimal transitions and coordination of care (IHI, n.d.). This Critical Access Hospital 30-day all-cause HF readmission rate for 2010 is 11.76%, up from 2.38% in 2009 (Figure 3).

The Centers for Medicare & Medicaid Services (CMS) included a Care Transitions focus in its 9th Statement of Work, which started in 2008. As a result, Quality Improvement Organizations (QIOs) in 14 communities are now working to coordinate care and improve transitions with the specific aim of reducing re-hospitalizations (Boutwell, Jencks et al., 2009). Although there is currently no nationally adopted re-hospitalization measure, Boutwell, Jencks

and colleagues suggest that a number of states are preparing to publicly report 30-day re-hospitalization rates.

Evidence of Problem.

As previously stated, the hospital current 30-day all-cause HF readmission rate is 11.76%, a notable increase of over 9% since 2009. Success in improving transitions of care and reducing avoidable re-hospitalizations requires engaging clinicians and providers across the organization and service delivery types (Boutwell, Jencks et al., 2009). Reducing re-hospitalizations in a state or region will require coordinated effort among providers and organizations that lack financial and perhaps information-sharing relationships. Finally, the participation and engagement of patients and families is essential to improving coordination of care and accessing care at the right time, in the right place, that serves the needs of the individual (Boutwell, Jencks et al., 2009).

Results of Needs Assessment.

In a more narrowly defined, traditional sense, a needs assessment is the means by which one determines the gaps, lacks, and wants relative to a defined population and a defined, specific health problem (Issel, 2004, p. 121). The gap at the Critical Access Hospital (CAH) consists of a lack of a formal HF inpatient and outpatient program. Another hospital affiliate has a formal inpatient and outpatient HF program; yet it may be difficult for patients to access their outpatient program based on location and distance. Estimated mileage from the CAH to the affiliate hospital is approximately 21.8 miles; minimum of 38 minutes due to traffic. This estimate does not include areas south from the CAH. Furthermore, a majority of patients seeking HF care at the CAH are greater than 60 years old and have Medicare as their primary insurance; driving 21.8 miles north, or more, may be a difficult and daunting endeavor for this population group.

Prior to the start of the pilot project, every HF patient at the CAH received a HF education packet which included a HF book describing key factors in living with HF and symptom management. However, there was no system in place to document patient or caregiver understanding based on the education packet. Given the fluctuation in outcome measures for HF discharge instructions, opportunities for improvement existed in closing various gaps by ensuring all HF patients receive adequate and appropriate education and discharge instructions by a designated HF nurse.

Evidence of Stakeholder Support and Letter of Agreement

Critical Access Hospital (CAH). The primary stakeholders and/or key persons for this HF pilot program are based at the CAH and included the following: Vice President (VP) of Operations/Chief Nursing Officer (CNO); Chief of Medical Staff; Executive VP/Chief Financial Officer (CFO); Chairman of the Hospitalist Program; Medical Director of the Quality Management Department along with quality staff members; two Cardiologist's and NP in the outpatient Cardiology Department; outpatient Cardiology Department staff; Cardio-Pulmonary Registered Nurse who served as the program assistant to the program facilitator for this HF pilot; HF Nurses from Med-Surgical Unit (2MS) and CCU (total of 24 HF nurses); Case Management Department; and the Dietary Department.

Affiliate Hospital. Nurse Practitioner in the Cardiology Department located north of the CAH agreed to participate in this project by capturing HF patients who lived near the CAH by administering the pilot program while inpatient and then scheduling the same patient for outpatient cardiology services at the CAH.

Evidence of Agreement. On file with CEO/CNO at the CAH and at UMass, Amherst doctoral nursing faculty. The support of all these stakeholders was invaluable during the course

of this HF pilot. Each person and department listed proved to be instrumental to the overall success of this HF pilot project.

Evidence of the problem demonstrated in the literature.

According to Chan and colleagues (2008) disease management programs aim to address the barriers to successful treatment by patient education and multidisciplinary coordination. Poor discharge processes, lack of timely follow-up, uncertainty regarding self-management tasks, and confusions about medications all result in highly variable care at times of transitions and impact a large proportion of HF patients (Boutwell, Jencks et al., 2009).

Goals / Objectives.

This CAH HF Pilot Program will focus on patient education, assessment of understanding HF disease management, and follow-up through a multidisciplinary approach to coordination of care. This pilot includes designated HF nurses, Hospitalists involvement, post discharge phone follow-up by the program facilitator or program assistant, and outpatient intervention by an experienced Cardiology Nurse Practitioner. The goal was to implement this pilot with all HF admissions during the pilot timeframe of January 1, 2011 through March 31, 2011.

The overall long term outcome measures of success with the HF pilot program focused on readmission rates and mortality (Taylor, Bestall, Cotter, Falshaw, & Hood et al., 2009). Specific pilot program outcome measures are described under Program Goals for Specific Outcome Indicators: Table II – V of this paper.

Review of Literature

Heart Failure (HF) affects nearly six million people in the United States, with about 670,000 people being diagnosed with it each year (Centers for Disease Control and Prevention

[CDC], 2010). In 2010, HF will cost the United States 39 billion dollars which includes the cost of health care services, medications, and lost productivity (CDC, 2010). Hospitals and health care systems are focusing on improving performance and patient outcomes in cardiovascular services, with a particular focus on how the management of HF can prevent readmissions, decrease the cost per case, and improve the quality and satisfaction for this particular patient population (Hines, Yu, & Randall, 2010).

Heart Failure is a complicated disease which requires lifestyle modifications involving complex medication regimens, ensuring adequate exercise and dietary discretion, and keeping a close eye on daily weights (White, Howie-Esquivel, & Caldwell, 2010). The majority of HF care is performed at home by the patient and family or caregiver, however if these individuals do not know what is required, fail to see its importance, or face barriers to engagement in self-care, they will not participate effectively (Lindenfeld, Albert, Boehmer, Collins, Ezekowitz et al., 2010). While this concept is understood among healthcare providers, there is evidence suggesting that patients themselves remain unclear about their role in managing this disease (White et al., 2010; Chan, Heidenreich, Weinstein, & Fonarow, 2008).

A recent study by Jencks, Williams, and Coleman (2009) investigated Medicare claims data from 2003-2004 in order to describe the patterns of re-hospitalizations and characteristics of hospitals. In the case of 50.2% of the patients who were re-hospitalized within 30 days after a medical discharge to the community, there was no bill for a visit to a primary care or specialty physician's office between the time of discharge and re-hospitalization (Jencks et al., 2009).

Conducting a literature review to evaluate evidence regarding intervention strategies in HF and disease management may provide meaningful evidence leading to specific changes in HF

interventions prior to discharging patients from the hospital to home; thus, reducing future readmissions (Willey, in press).

A comprehensive search of the literature for HF and disease management evidence included the following databases: PubMed of the National Library of Medicine, Cochrane, and Cumulative Index of Nursing and Allied Health Literature [CINAHL]. The following MeSH terms were used for the PubMed search: "heart failure" (HF) and "disease management" (DM) and "randomize [publication type]"; however, the third term was alternated in PubMed to include an additional MeSH search term, "meta-analysis". The Cochrane search terms for the MeSH descriptor included: "heart failure" exploding all trees with qualifier "Nursing". Additionally, the Cochrane Database of Systematic Reviews listed 18 studies for HF. The following terms used in CINAHL included: "heart failure" and "disease management" with third terms alternating from randomized controlled trials, meta-analysis, and prospective randomized study.

Disease management (DM) is defined within PubMed MeSH term as a broad approach to appropriate coordination of the entire disease treatment process that often involves shifting away from more expensive inpatient and acute care to areas such as preventive medicine, patient counseling and education, and outpatient care (Woodward, 1995). This concept includes implications of appropriate versus inappropriate therapy on the overall cost and clinical outcome of a particular disease.

Seventy-two articles were retrieved from the search of the above databases using the selected MeSH terms and accessing the Cochrane Database of Systematic Reviews. Inclusion criteria consisted of full-text articles published in the English language. Due to the rapidly changing evidence in HF research, studies were identified only from the last 6 years (2005 - 2010). Of these, one was a duplicate, one was non-English, one was expert opinion regarding a

previous RCT study, numerous studies combined HF interventions with other disease states, one study displayed conflicts of interest, two studies were on-going with pending results, two studies failed to include sample size and/or statistical results, one study focused on public policy, and one study demonstrated questionable inclusion criteria. Also excluded were two studies which duplicated one another without focusing on specific HF interventions, one study was descriptive with 13 subjects from a parent RCT study; and seventeen were conducted prior to 2005. In summary, of 72 articles, 53 had to be eliminated leaving 19 studies to be examined (See Appendix A). Discussion of studies follows herein.

Telephonic Monitoring and Telephone Interventions

Copeland and colleagues (2010) assessed the effects of a telephone intervention which included access to a nurse advice line for symptoms and counseling 24 hours a day 7 days per week, medication compliance reminders, fluid weight management, diet, scheduled nurse education, vital signs monitoring, early treatment for escalating symptoms, along with faxed alerts being sent to the participant's physician about signs and symptoms of decompensation. Results demonstrated modest improvement in weight monitoring and physical well-being with higher total costs of care, but no survival benefit. However, the intervention may have prompted needed medical service utilization by facilitating access to care, resulting in higher costs of care, including outpatient and HF related care costs.

Findings from the randomized, intent-to-treat design conducted by Esposito and fellow investigators (2008) in a population-based program providing primarily telephonic patient education and monitoring services showed virtually no overall impact on hospital or emergency room use, quality of care, or prescription drug use for the 33,000 enrollees. However, for

beneficiaries with HF who resided in high-cost South Florida counties, the program reduced Medicare expenditures by 9.6 percent.

Ramachandran and fellow researchers (2007) demonstrated significant improvement with telephonic helpline access along with regular telephone calls reinforcing HF information and modification of drug dosages. Results demonstrated improvements in functional capacity measured by the 6-minute walk test (p <0.05), drug therapy with beta-blockers (p <0.05), and a larger number of patients improved in NYHA functional class (p <0.004). There were no significant differences in the number of emergency room visits or admissions in either group. Furthermore, these researchers suggest that their results may be due to cultural conditioning in the setting of a developing country which may not work in other geographical areas and may need to be adapted to local environments.

Riegel and colleagues (2006) tested the effectiveness of telephone case management in decreasing hospitalizations and improving health-related quality of life (HRQL) and depression in Hispanics of Mexican origin with HF. While HF DM may be effective in other population groups, findings from this study suggest that a different approach may be needed in Hispanics since no statistical differences were found in HF readmission rates, HF days in the hospital, HF cost of care, all-cause hospitalizations or cost, mortality, HRQL, or depression.

A literature review which was located outside of the mesh term search yet is worthy of inclusion since the primary purpose was to examine advanced practice nurse (APN) directed versus registered nurse (RN) directed telemanagement programs for HF patients. According to Delgado-Passler and McCaffrey (2006) research findings from three RCTs confirm establishing the APN role as an effective approach since APNs are able to change medication and dosages, order outpatient testing, and were better educated in the pathophysiology of HF; thus, reducing

frequent hospitalizations. Outcomes from all three RCTs demonstrated statistically significant results in re-hospitalization rates with APN directed telemanagement care ($p < 0.05$).

While the efficacy of structured telephone support or telemonitoring as a successful individual component of a HF program remains inconclusive as noted with various RCT findings included in this review, the systematic review conducted by Inglis and colleagues (2010) meta-analyzed 25 peer-reviewed studies: 16 evaluated structured telephone support (5613 participants), 11 evaluated telemonitoring (2710 participants), and two tested both interventions (included in counts). Results demonstrated the following: telemonitoring reduced all-cause mortality ($p < 0.0001$) with structured telephone support demonstrating a non-significant positive effect ($p = 0.08$); all-cause hospitalization data revealed that structured telephone support was effective in reducing the risk of all-cause hospitalizations in patients with HF ($p = 0.02$), as was telemonitoring ($p = 0.02$); both structured telephone support ($p < 0.0001$) and telemonitoring ($p = 0.008$) reduced HF-related hospitalizations.

This systematic review provides further confirmation of the efficacy of structured telephone support and telemonitoring interventions as an effective component of contemporary multidisciplinary HF management (Inglis et al., 2010). However, Inglis and fellow researchers suggest that future use of structured telephone support and telemonitoring should be to use these interventions tailored to HF DM programs, population needs including geography of the population, available resources and most importantly, to patient preferences. In addition, these researchers suggest that more work is required on the business models underlying the cost-effectiveness of telemonitoring in particular.

Implantable Hemodynamic Monitoring

The safety and efficacy of the use of an implantable hemodynamic monitor (IHM) management strategy to reduce the rate of heart failure related events (HFRE) in patients with diastolic heart failure (DHF) who were already receiving optimal medical care in a HF DM program, was analyzed by Zile and colleagues (2008). Patients included in the DHF subgroup were previously described in the COMPASS-HF trial (Bourge et al., 2008) and had New York Heart Association (NYHA) Class III or IV HF, and were managed in a HF program with optimized standard medical therapy for at least 3 months before enrollment (Zile et al., 2008).

Data presented in this subgroup of 70 DHF patients support the following conclusions: IHM was shown to be safe and was associated with a very low system-related and procedure-related complication rate in DHF patients, and within the context of the limited power of this subgroup analysis, IHM-guided care did not result in a statistically significant reduction in HFRE rate or reduction in relative risk of a HFRE in DHF patients (Zile et al., 2008). Similar finds were found in the COMPASS-HF study which demonstrated that the IHM guided care did not significantly reduce total HF-related events compared with optimal medical management (Bourge et al., 2008).

Heart Failure Disease Management Programs

Seven RCT studies evaluated the effectiveness of heart failure disease management (HF DM) programs with three studies evaluating the effectiveness of a nurse-led disease management program (Hebert et al., 2008; Jaarsma et al., 2008; Krantz et al., 2008). Hebert and fellow researchers (2008) demonstrated better physical functioning throughout the 12-month nurse-managed intervention, except for out-patient procedures, which were more costly in the nurse-managed group. This trial was conducted in an ethnically diverse, inner-city neighborhood and may not be generalized to other settings.

Jaarsma and colleagues (2008) demonstrated no benefit of a nurse-led management program 18 months after hospital discharge. Findings demonstrated a slight increase in the number of short hospitalizations yet it is unclear how many of those patients were severely ill. Furthermore, it is unclear what the criteria for admission entailed, pointing to possible low thresholds for re-hospitalization.

Krantz and affiliates (2008) compared 6-month re-hospitalization rates among patients assigned to pre-discharge B-blockade coupled with post-discharge nurse management (intervention) versus usual care. Results demonstrated at 6 months, B-blocker utilization was higher ($p = < .001$), mean NYHA class improved ($p = .01$), and total HF re-hospitalizations were reduced by 84% ($p = .02$), a trend toward improved LVEF was also observed. This study suggests that pre-discharge B-blocker initiation coupled with nurse follow-up improves outcomes among HF patients with LV systolic dysfunction. However, since these researchers used a hybrid treatment strategy combining both medication initiation and nurse follow-up, it is impossible to quantify the contribution of each program component to the observed improvement in outcomes.

The remaining four RCTs evaluated the effectiveness HF DM programs (Nguyen et al., 2007; Del Sindaco et al., 2007; Nucifora et al., 2006; Ojeda et al., 2005). Nguyen and fellow investigators (2007) assessed the long-term impact on the number of recurrent hospital admissions, ED visits, and mortality after a 6-month course in a HF DM program. After a mean follow-up of 2.8 ± 1.7 years, there was no difference in all-cause death, hospital admissions, and ED visits between those patients initially in the HF management program group and the controls. After multivariable adjustment, there was no difference in all-cause death alone between those initially assigned to the HF clinic and those receiving usual care.

Del Sindaco and colleagues (2007) studied the long-term effects of a hybrid DMP involving cardiologists, primary care practitioner's (PCPs) and nurses in older HF outpatients aged $\geq$ 70. Results demonstrated that the DMP was associated with a 42% relative risk reduction of an unplanned hospital admission due to HF, 25% fewer patients with at least one hospital admission for any reason, length of hospital stay for all causes or HF admission was significantly shorter in the DMP group ($p = 0.0025$), and a 36% reduction in all-cause death.

Nucifora and fellow researchers (2006) evaluated effects of a HF management program which included patient education, regular outpatient contact with a HF nurse, and outpatient visits with an internal medicine doctor planned at 15 days, 1 and 6 months after discharge. Results demonstrated no difference in the rate of symptom improvement, hospital readmissions, or hospital discharge to death between the intervention and control groups. Additionally, unplanned outpatient visits were fewer in the intervention group ($p < 0.001$) with the mean number of unplanned outpatient visits per patient was 0.4 ± 0.9 in the intervention group and 1.0 ± 1.3 in the control group ($p < 0.001$). These results suggest that in order to reduce the number of hospital admissions for HF patients, a more intensive and long-term intervention may be needed than what was adopted in this HF management program study.

Ojeda and fellow investigators (2005) evaluated whether improvements obtained during an HF intervention program were maintained after an average period of 16 ± 8 months when the intervention was stopped. During the 16 ± 8 month treatment period, patients in the intervention group had a lower rate of HF readmissions (17% vs. 51%, $p < 0.01$) and less all-cause mortality (13% vs. 27%, $p= 0.03$). One year after stopping the intervention, there was no difference in HF readmissions (28% vs. 25%, $p= 0.72$) or all-cause mortality (14% vs. 17%, $p= 0.64$). Thus, the positive effects of a HF program were clearly reduced when it was stopped.

Two of the meta-analysis studies evaluated effects of Disease Management Programs (DMPs) on HF clinical outcomes (Gohler et al., 2006; Roccaforte et al., 2005). Results demonstrated that DMPs have the potential to reduce morbidity, mortality, and hospitalizations in HF patients. Both studies found a substantial reduction in the rates of all-cause hospital re-admissions and HF-related hospitalizations.

Gohler and colleagues (2006) conducted a systematic literature search on RCTs investigating the effect of DMPs on HF outcomes and performed meta-analyses and meta-regressions comparing DMPs and standard care for mortality and re-hospitalization. Their meta-analysis of 36 RCTs for a total of 8,341 patients yielded a statistically significant pooled differences in the following: first all-cause re-hospitalization of 8% (95% CI 5-11%, $p < .0001$), subsequent all-cause re-hospitalizations of 19% (95% CI 2-35%, $p < .0001$), and a statistically significant pooled mortality difference of 3% (95% CI 1-5%, $p < .01$); all favoring DMPs over standard care.

Similarly, Roccaforte and fellow researchers (2005) conducted a systematic literature search on RCTs investigating the effect of DMPs on HF outcomes and performed meta-analyses. This study also explored whether specific types of DMPs, or different components, timing and duration of the program, were likely to be most beneficial. Results from 33 RCTs demonstrated that mortality was significantly reduced by a DMP compared to usual care ($p = 0.003$), all-cause and HF-related hospitalization rates were also significantly reduced ($p = 0.00001$) respectively. In addition, different DMP approaches appeared to be equally effective as observed across several sensitivity analyses. According to Roccaforte and colleagues, in high quality studies and programs lasting 3-6 months, findings were most consistently associated with a significant reduction in all outcomes considered. These researchers concluded that a comprehensive DM

program for HF patients reduced mortality and hospitalizations and are potentially cost-saving in moderate to high risk populations.

In contrast, the objective of Phillips and fellow researchers (2005) meta-regression analysis was to determine whether a hierarchy of effectiveness exists with respect to published protocols of HFDM incorporating specialist nurse-led HF clinics. These researchers reviewed and deconstructed published protocols from randomized trials of HFDM with specialist nurse-led HF clinics. Meta-regression analysis was conducted to study the relationship between differences in complexity of intervention and readmission rate, mortality, the combined endpoint of mortality and hospitalization, HF readmission, the number of hospital days utilized per patient during follow-up, quality of life (QOL), and cost of care. They reported that complex programs that included hospital discharge planning and no delay in post-discharge clinic follow-up were the most successful showing a trend towards 70% relative reduction in risk for first readmission, two fewer hospital days utilized per patient per readmission ($p = 0.02$), and a 70% reduction in risk of HF readmission relative to usual care ($p = 0.01$). Less complex programs did not impact readmission or hospital days utilized during follow-up relative to usual care.

The systematic review conducted by Yu and colleagues (2006) indicated that DMPs are effective in ameliorating poor discharge outcomes. The purpose of the systematic review was to identify the characteristics of DMPs which are crucial to reducing hospital readmission and/or mortality of hospitalized elderly HF patients. Their results suggest that an effective DMP should be multi-faceted and consists of an in-hospital phase of care built into the DMP with care focused on intensive patient education, self-care supportive strategies, exercise, and psychosocial counseling along with developing a post-discharge plan to address the individualized risk factors of poor discharge outcomes.

Finally, the objective in the systematic review by Taylor and fellow researchers (2009) was to assess the effectiveness of DM interventions for patients with HF. These researchers classified interventions from 16 trials involving 1,627 patients into three models: multidisciplinary interventions (a holistic approach bridging the gap between hospital admission and discharge home delivered by a team); case management interventions (intense monitoring of patients following discharge often involving telephone follow up and home visits); and clinic interventions (follow up in a HF clinic). Conclusions from this review demonstrated the following: the single RCT of a multidisciplinary intervention showed reduced HF related readmissions in the short term with little evidence to support clinic based interventions; case management tended to be associated with reduced all cause mortality but these findings were not statistically significant ($p = 0.23$), although the evidence was stronger when analysis was limited to the better quality studies ($p = 0.04$), there was weak evidence that case management interventions may be associated with a reduction in admissions for HF and unclear what the effective components of the case management interventions are; no evidence of any benefit from clinic interventions due to the lack of sufficient evidence and statistical power. The data abstracted from this review does not allow formulation of firm recommendations for practice.

This literature search revealed HF and DM MeSH terms resulted in several studies linked specifically to DMPs. However, HF DM programs vary in their content as demonstrated in this review which is further supported within the American College of Cardiology and American Heart Association (ACC/AHA) Guidelines for the Diagnosis and Management of Heart Failure in Adults (Hunt et al., 2009). Findings from the RCTs on HF DM do not allow one to draw strong conclusions about the benefits of various HF DM interventions because they were different in structure, content and intensity. Several factors may have contributed to these

findings including sample size, intervention features vary from one DMP to another, usual care (the control group) was poorly defined and described or not described at all, and length of follow-up may not capture all long term effects. In addition, according Gohler and colleagues (2006) due to the nature of DMPs, blinding of patients and care providers to the intervention is not possible. Ultimately, that particular aspect may result in bias during a subjective assessment of outcomes (Melnyk & Fineout-Overholt, 2005).

A systematic reviews or meta-analysis of available evidence regarding any problem or solution contains information representative of multiple studies distilled into a succinct summary derived from the synthesis of the evidence and authors include specific details that demonstrate the strength of the evidence with the strongest level of evidence graded as Level l. Because Level 1 studies combines the samples of each study included in the review to create one larger study, the summary statistic is more precise than the individual findings from any one of the contributing RCT studies alone (Melnyk & Fineout-Overholt, 2005). Results of this review from Level 1 evidence demonstrated positive benefits from heart failure disease management (HF DM) programs, structured telephone support, and telemonitoring interventions as an effective component of contemporary multidisciplinary HF management (Inglis et al., 2010; Gohler et al., 2006; Yu et al., 2006; Roccaforte et al., 2005).

Two meta-analyses (a meta-analysis is a form of retrospective research or investigation) demonstrated that DMPs reduced mortality and hospitalizations in HF patients (Gohler et al., 2006; Roccaforte et al., 2005) with one meta-regression analysis suggesting that specialist nurse-led HF clinics are a promising alternative and an appealing strategy for selected patients (Phillips et al., 2005). Multidisciplinary care teams with an effective structure, using a wider range of

expertise, were found to be most effective in addressing the complex heath care needs of HF patients (Gohler et al., 2006).

A widely accepted method and simple metric is The New York Heart Association (NYHA) classification system that grades heart failure I through IV, based on the extent of dyspnea and fatigue which is experienced and reported by the patient (Delgado-Passler & McCaffrey, 2006). The majority of patients who have recurrent and frequent hospitalizations belong to either class III or class IV, yet without including this classification, it is difficult to gauge response to therapy (Lindenfeld et al., 2010). According to Lindenfeld and colleagues, therapeutic recommendations often are directed toward patients within particular NYHA classes, thus functional capacity/activity level and severity of clinical disease should be evaluated and recorded based on the HYHA functional classification for all HF patients. Success of therapy may be indicated by improvement of at least 1 functional class.

Finally, another classification system developed in 2001 by the American College of Cardiology and the American Heart Association (ACC/AHA) Task Force on Practice Guidelines emphasized the classification of HF based on development and progression of the disease (Hunt et al., 2009). They identified 4 stages involved in the development of the HF syndrome with the first two stages (A and B) not being HF, but are an attempt to help healthcare providers with the early identification of patients who are at risk for developing HF (Hunt et al., 2009). Stage C denotes patients with current or past symptoms of HF (the bulk of patients with HF), and Stage D designates patients with truly refractory HF who may be eligible for specialized and advanced treatment strategies (Hunt et al., 2009). This classification system, according to Hunt and colleagues (2009), is intended to complement but in no way replace the NYHA functional

classification, which primarily gauges the severity of symptoms in patients who are in Stage C or Stage D.

Implications of the Evidence Review

Findings from this critique demonstrated positive benefits from heart failure disease management (HFDM) programs, structured telephone support, and telemonitoring interventions as an effective component of contemporary multidisciplinary HF management (Inglis et al., 2010; Gohler et al., 2006; Yu et al., 2006; Roccaforte et al., 2005), yet building a clinical case for HF programs requires cost monitoring and revenue analysis which are important in demonstrating the business case for HFDM programs and/or interventions (Hines, Yu & Randall, 2010; Inglis et al., 2010).

Heart Failure is a syndrome rather than a primary diagnosis with many potential etiologies, diverse clinical features, and numerous clinical subsets (Lindenfeld et al., 2010). This critique supports the notion that patients recently hospitalized for HF and other patients at high risk for HF decompensation should be considered for comprehensive HF DM and/or structured HF interventions including telephone support (Inglis et al., 2010; Gohler et al., 2006; Roccaforte et al., 2005). Lindenfeld and colleagues (2010) describe high risk patients as those with renal insufficiency, low output states, diabetes, chronic obstructive pulmonary disease, persistent New York Heart Association (NYHA) class III or IV symptoms (Stage C or D HF), frequent hospitalization for any cause, multiple active co-morbidities, or a history of depression, cognitive impairment, inadequate social support, poor health literacy, or persistent nonadherence to therapeutic regimens.

Based on the evidence documented, recommendations are provided by this author which may aid in reducing re-hospitalizations and mortality in HF patients (Table I). However, it must

be recognized that the evidence supporting recommendations is based on various population responses that may not always apply to every individual or specifically for this pilot program. Additionally, national guidelines can best serve as evidence-based recommendations for management, not as mandates for every patient (Lindenfeld et al., 2010).

Table I. Key Elements of a Heart Failure Disease Management Program

Functional Capacity/Activity Level Development and progression of the disease	Key Elements: • Evaluation and recording of functional capacity/activity level and severity of clinical disease based on the NYHA functional classification for all HF pts. during every admission or follow-up visit (Lindenfeld et al., 2010). • Evaluation and recording on development and progression of the disease: Stages A-D (Hunt et al., 2009).
Disease Management	Key Elements: • In-hospital phase of care built into the DMP with care focused on optimizing the patients' clinical status, self-care supportive strategies, medication regimens, and on developing a post-discharge plan to address the individualized risk factors of poor discharge outcomes (Yu et al., 2006). • Comprehensive education and counseling with patients and families prior to discharge from an acute care setting (Yu et al., 2006). • Consider screening for depression prior to discharge (Riegel et al., 2006). • No delay in post-discharge appointment with their PCP or clinic visit scheduled within 7-10 days post discharge (Phillips et al., 2005). • Continuation of post-discharge HF education during clinic follow-up (Hunt et al., 2009) • Consider structured telephone interventions (Inglis et al., 2010). • Consider telephone interventions for

	medication counseling and review by an APN with prescriptive authority (Delgado-Passler & McCaffrey, 2006). • Consider a multidisciplinary care team as an effective structure in managing HF patients on an inpatient and outpatient basis (Lindenfeld et al., 2010; Hunt et al., 2009; Gohler et al., 2006).
Key Performance Indicators	Key Elements: • Consider outcome measures of a DMP focusing on readmission rates and mortality (Taylor et al., 2009).
Cost / Benefit Monitoring	Key Elements: • Conduct cost/benefit analysis in order to determine business case for in-patient and out-patient HF program(s) (Hines et al., 2010; Inglis et al., 2010).

To ensure high-quality and efficient care for HF patients, the consistent use of clinical practice guidelines developed by the American College of Cardiology (ACC), American Heart Association (AHA), and the Heart Failure Society of America (HFSA) should be promoted during and after hospitalization (Hunt et al., 2009; Lindenfeld et al., 2010). The HFSA guideline incorporates elements and components for a HF DMP (Lindenfeld et al., 2010). The recommended components include: comprehensive education and counseling individualized to patient needs; promotion of self care, including self-adjustment of diuretic therapy in appropriate patients (or with family member/caregiver assistance); emphasis on behavioral strategies to increase adherence; vigilant follow-up after hospital discharge or after periods of instability; optimization of medical therapy; increased access to providers; early attention to signs and

symptoms of fluid overload; and assistance with social and financial concerns (Lindenfeld et al., 2010).

In addition, a four-step process has been outlined by Hines and colleagues (2010) as a guideline for evaluating an organization's current processes and developing new approaches to better manage the care of HF patients. Strategies for reducing HF readmissions require significant analysis, planning, preparation, and appropriate execution in order to achieve positive outcomes (Hines et al., 2010; Yu et al., 2006). According to Hines and fellow researchers (2010) new payment models are currently being proposed within the US healthcare system which creates a more compelling business case to manage post-acute care more effectively. Given the significant volume of HF readmissions, as well as numerous potential policy changes focused on reducing costs, HF patients may benefit from hospital initiatives focusing on readmission reduction which is a key feature of the STAAR program.

The STAAR program provides acute care centers in Massachusetts an opportunity to create an ideal transition home for HF patients. This initiative is supported by the Commonwealth Fund with additional involvement and support from several organizations including: Institute for Healthcare Improvement (IHI), Massachusetts Hospital Association (MHA), Centers for Medicare and Medicaid Services (CMS), and Mass. Coalition for the Prevention of Medical Errors (Massachusetts Hospital Association, 2009). Project leaders have signed on 20 hospitals to pilot the STAAR Initiative's "Transitions Home Collaborative" with participating facilities located throughout the Commonwealth (Massachusetts Hospital Association, 2009). The STAAR program provides acute care centers with an opportunity to reduce re-hospitalization rates by 30% with implementing various strategies which may result in

an increase of patient and family satisfaction with coordination and transitions in care (Massachusetts Hospital Association, 2009).

Theoretical Basis for Change in Practice: Awareness-to-Adherence Model

Clinical practice guidelines have been created for HF and disseminated by numerous authorities in the hope that clinicians will follow professionally advised prescriptions for best clinical practice; however, clinicians do not always follow the practices recommended. The Awareness-to-Adherence Model was proposed by Pathman, Konrad, Freed, Freeman, and Koch (1996) is a framework for physician compliance which can be expanded and applied to additional providers such as nursing.

Pathman and colleagues (1996) proposed that when clinicians comply with practice guidelines, they must first become aware of the guideline, then intellectually agree with them, then decide to adopt them in the care they provide, and then regularly adhere to them at appropriate times. This model may prove useful in identifying ways to improve physicians' and/or clinicians adherence to a variety of guidelines by demonstrating where they fall off the path to adherence. Additionally, which are at greatest risk for not attaining each step in the path and factors associated with a greater likelihood of attaining each step toward guideline adherence. A number of potentially important explanatory variables which did not appear in their analyses include physician and/or clinician use of performance feedback and use of prompts placed on charts by office staff to alert clinicians to guideline needs.

The Heart Failure Society of America (HFSA) guideline incorporates elements and components for a HF DMP which includes strong evidence (Lindenfeld et al., 2010). The Awareness-to-Adherence Model applied the HFSA guideline as a key reference source for the

program. The HF pilot used this model to increase practitioner use of the guideline recommendations with HF patients during the acute care hospitalization and discharge process.

Protocol and Program Tailoring for HF Pilot Program

Project Design. An evaluation design was chosen for the Capstone Project. The HF Pilot Program (HFPP) was designed to evaluate the efficacy and impact of a multi-disciplinary, nurse managed Heart Failure Disease Management Program for patients admitted to the hospital for HF that was modified specifically for the Critical Access Hospital. The design included pre-test and post-test methods for the one group of patients seen during the HF Pilot Program which will be referred to throughout this paper as "HFPP" from this place forward.

Sample. Sample inclusion criteria limited sample selection to those patients admitted for HF who could be discharged home and then seen in the outpatient cardiology department for their follow-up appointment 7-10 days post discharge. Prior to starting this pilot, it was determined that patients who would be discharged to an extended care facility or to another acute care facility will be excluded due to likelihood of loss to follow-up.

Program Facilitator/Capstone Project Director. The Critical Access Hospital (CAH) HF Pilot Program (HFPP) Facilitator and Director of the Capstone Project is a University of Massachusetts, Amherst, School of Nursing, Doctor of Nursing Practice candidate (DNPc) and Family Nurse Practitioner candidate (FNPc) student who is affiliated with this CAH and author of this project.

Institutional Review Board (IRB) Approval / Exemption. The HFPP Capstone Project was designed as an evaluation project which was presented to the Critical Access Hospital health system IRB and approved on December 22, 2010. All patient information was protected according to hospital IRB policies as well as policies surrounding Health Insurance Portability

and Accountability Act (HIPPA) (U.S. Department of Health & Human Services [HHS], n.d.). Protection of data collection forms was maintained under double lock within the hospital and will be destroyed at the earliest opportunity unless these data collection forms are found to be pertinent for medical record justification.

Discussion of Outcome Measures to be used in HF Pilot Program

The HFPP outcomes for patients included patient satisfaction, readmission, mortality, and functional capacity of the HF patients.

Patient Satisfaction. A patient satisfaction survey was developed by the program facilitator and program assistant with submission of an amendment to the IRB for approval to administer with HFPP patients; acceptance received on January 3, 2011 (Figure 8). All HF nurses were informed that this survey would be provided to all HF patients during their outpatient cardiology appointment as well as for those patients who may be lost to follow-up. These surveys were completed anonymously with no patient identifier being listed on the form. For those that were lost to follow-up, the survey was mailed to them asking to complete two sections: Inpatient and Overall, and asked to return via an enclosed postage paid envelope.

Readmission. The population impact variables for the patients were re-hospitalization rate and measurement of functional capacity. Re-hospitalization rates are currently measured and reported by the CAH based on 30 day all-cause readmission rate (Figure 3). Mortality will be discussed later in this paper under the Results, Data Analysis, and Interpretation section.

Functional Capacity. Functional capacity was obtained by a self-administered questionnaire known as The Duke Activity Status Index [DASI] (Hlatky, Boineau, Higginbotham, & Lee, Mark, Califf et al., 1989) (Figure 6). The DASI was administered to each participant during their inpatient hospitalization period and after discharge during their

outpatient appointment within the Cardiology Department. Additionally, it was determined that if a particular patient was being discharged to home and would be unable to follow-up in the outpatient program, the DASI would be administered 7-10 days post-discharge by the program assistant or the program facilitator via telephone contact. This protocol change was approved by the Critical Access Hospital IRB.

The DASI is a 12-item scale that assesses whether patients can perform a spectrum of activities without difficulty and provides insights into selected aspects of their perceived quality of life (Jaeger, Hlatky, Paul, & Gortner, 1994). Therapeutic efficacy is usually assessed in clinical cardiovascular studies by measuring endpoints such as mortality or myocardial infarction; yet these "hard" endpoints do not provide a picture of the effect of medical care on the patient (Hlatky et al., 1989). A reliable and valid measure of ongoing patient outcomes in terms of patient functional status would assess more subtle effects of therapy, and provide patients and clinicians with information relevant for therapeutic decision-making. In addition, the DASI measures functional capacity in metabolic equivalents (METS) which is a useful and convenient way to describe the intensity of a variety of physical activities (Thompson, Gordon, & Pescatello, 2010).

Defining physical activity, exercise, and physical fitness has been accomplished using several methods, including percentages of maximal oxygen consumption (VO_{2max}), oxygen consumption reserve (VO_2R), heart rate reserve (HRR), maximal heart rate (HR_{max}), or metabolic equivalents (METs) (Thompson et al., 2010). Using METs allows values to be obtained for each intensity category provided across a range of functional capacities (Armstrong, Balady, Berry, Davis, Davy, & Davy et al., 2009). One MET represents an individual's energy expenditure while sitting quietly (Haskell, Lee, Pate, Powell, Blair, et al., 2007). Further

defined, 1 MET = 3.5 mL-kg^{-1} –min^{-1} (Armstrong et al., 2009). Light physical activity is defined as requiring <3 METs, moderate activities 3-6 METs, and vigorous activities >6 METs (Thompson et al., 2010). Since the DASI uses the patient's ability to perform a set of common activities of daily living to gauge functional capacity based on the known metabolic cost of each activity in MET units, it is thought to be well suited for population studies in which assessment of functional capacity during follow-up is needed (Ainsworth, Haskell, Leon, Jacobs, & Montoye et al., 1992; Hlatky et al., 1989).

Furthermore, individualized modifications in treatment plans can be made based on a patient individual DASI scores comparing pre and post testing measures during their outpatient cardiology appointments. From a physiologic function capacity standpoint, this data can provide clinicians an indication of whether or not the patient is improving physiologically enough to endure activities of daily living (ADL). Without this data, the clinician will not know if a patient can perform certain ADL's. Results from the Women's Ischemia Syndrome Evaluation (WISE) Study demonstrated usefullness of the DASI before exercise testing can risk stratify symptomatic patients and may improve identification of higher-risk, functionally impaired subjects that would benefit from pharmacologic stress imaging and targeted risk management (Shaw et al., 2006).

Program Goals for Specific outcome indictors. According to Issel (2004) goals are broad, encompassing statements about the outcome to be achieved, whereas objectives are specific statements about impacts to be achieved and are stated in measurable terms.

The goals for this program were:

Goal I: All inpatient HF patients will benefit by the Critical Access Hospital HFPP.

Goal II: HF patients who are discharged home will have individualized discharge follow-up in the outpatient cardiology department at the Critical Access hospital.

Goal III: HF patients who are seen in the outpatient cardiology department will have individualized care.

Goal IV: The overall pilot program and population effectiveness will be continually monitored.

The program team identified specific objectives for each program goal, with clear outcome measures for each of the objectives. The program objectives, outcome measures and results are presented in Tables II-V. Examples of Expected Outcome Results listed in the following Tables are discussed in detail in the Evaluation Section.

Table II – Inpatient HF Pilot Program
Goal: All Inpatient HF patients will benefit by the Critical Access Hospital HF Pilot Program

Objectives	Outcome Measures	Results
Program Objective: All identified HF patients will have a designated HF nurse caring for them while inpatient at the CAH.	***Program Outcome:*** HF patients will have a designated HF nurse caring for them while inpatient 90% of the time.	***Outcome Score = 100%*** While all pilot patients had a HF nurse caring for them during their inpatient stay (100%), mishaps occurred on the medical/surgical unit (2MS) on various day, evening, and night shifts with no designated HF nurse caring for the patient. The med-surgical floor required frequent oversight due to repeat patterns of missed opportunities with protocol follow-through. Several of these missed opportunities pointed to no HF nurse working on a particular shift (scheduling issue) as well as HF nurses working yet not assigned to a HF pilot patient (see project limitations).
Program Objective: An enhanced admission assessment will include identification of	***Program Outcome:*** HF patients will have an enhanced admission assessment identifying	***Outcome Score = 100%*** All HF pilot patients had the caregiver identified

caregivers for D/C planning and predicting post-hospital needs.	caregivers for D/C planning and predicting post-hospital needs 90% of the time.	during their inpatient stay.
Population Objective: HF patients and their designated caregivers will be provided with specific HF management instructions utilizing "teach back" techniques and "Ask me 3" techniques specifically for provider teaching (National Patient Safety Foundation, n.d.)	***Population Outcome:*** The patient and/or caregiver will verbalize understanding of HF disease management as demonstrated by "teaching back" the instructions to the HF nurse 90% of the time.	***Outcome Score = 88%*** Two HF patients and/or their caregivers were unable to verbalize understanding of HF disease management based upon the topic being taught. While the "teach back" method was utilized with all HF patients and/or their caregivers during their inpatient stay, opportunities in documentation were noted by the program facilitator (addressed within the evaluation section of this manuscript).
Program Objective: Identified "new" HF patients will have a cardiology consult while inpatient. This goal will allow "new" patients to be seen by the Cardiology NP and program facilitator on an outpatient basis. ("New" HF patients are defined as patients who have not been seen by the cardiology department at the CAH in the past).	***Program Outcome:*** A cardiology consult will be ordered by the hospitalist for "new" HF patients who will be discharged home 90% of the time.	***Outcome Score = 100%*** All HF pilot patients had a cardiology consult while inpatient. Out of the 17 patients who participated in the inpatient program, five patients were established patients within the cardiology department. The remaining patients were new patients or patients who were not seen for several years and considered new patients.
Program and Population Dual Objective: The DASI questionnaire will be provided to HF patients during inpatient status by the designated HF Nurse. Inclusion criteria for the DASI are those patients who will be discharged home.	***Program and Population Dual Outcome:*** HF patients who meet the inclusion criteria will receive and complete the DASI questionnaire 90% of the time during their inpatient stay.	***Outcome Score = 100%*** All identified HF pilot patients who meet the inclusion criteria completed the DASI questionnaire during their inpatient stay.
Program and Population Dual Objective: HF patients will have	***Program and Population Dual Outcome:*** The "HF Discharge Time Out"	***Outcome Score = 82%*** While the Discharge Time Out document was utilized

"Discharge Time Out" to be completed by the discharging HF nurse.	medical record form will be completed on HF patients 90% of the time.	on all HF pilot patients, there were three patients in which the form was not fully completed.

Table III – Transitions in Care
Goal: HF patients who are discharged home will have individualized discharge follow-up in the outpatient cardiology department at the Critical Access Hospital

Objectives	Outcome Measures	Results
Program and Population Dual Objective: Prior to inpatient discharge, an appointment and referral will be made to the outpatient cardiology department located at the CAH for HF patients to be seen 7-10 days post discharge.	***Program and Population Dual Outcome:*** HF patients will have an outpatient cardiology appointment within 7-10 days post discharge and be seen by the Cardiology NP, 90% of the time.	***Outcome Score = 65%*** Six patients were lost to follow-up and not seen in the outpatient cardiology department. Patients lost to follow-up are addressed further within the evaluation section of this manuscript.
Program and Population Dual Objective: HF patients will have a follow-up phone call within 24-48 hours post discharge.	***Program and Population Dual Outcome:*** HF patients will accept a follow-up phone call within 24-48 hours post discharge conducted by the program facilitator or the program assistant 90% of the time.	***Outcome Score = 88%*** Follow-up phone calls were made to 15 patients post discharged: One patient died while inpatient with the second patient being discharged on a Friday returning for readmission on the following Monday requiring end of life care and hospice involvement. Minus the above two patients, this outcome score may be viewed as 100% with two outliers.

Table IV – Outpatient HF Pilot Program: To assess program effectiveness and impact on target population.
Goal: HF patients who are seen in the outpatient cardiology department will have individualized care.

Objectives	Outcome Measures	Results
Population Objective**:** HF patients will be seen within 7-10 days post discharge by the Cardiology NP and program facilitator. If NP is unavailable; pt's will be	***Population Outcome:*** HF patients will appear for their post-discharge out-patient appointment at CAH 90% of the time.	***Outcome Score = 91%*** Only one patient has rescheduled and will be seen the end of April.

seen by the covering Cardiologist if needed.		
***Population Objective*:** HF patients who were discharged from in-patient hospitalization and who do not show for their post-discharge appointment will be contacted by phone with specific follow-up questions and opportunities to reschedule their appointment. To be conducted by the Cardiology NP and/or Program Facilitator	***Population Outcome:*** HF patient who are not seen for their scheduled post-discharge appointment will respond to the call and set another appointment 90% of the time.	***Outcome Score = 100%*** No show rate was 0% Only one patient has rescheduled their outpatient appointment.
Program Objective: The DASI questionnaire will be provided to HF patients who were discharged from inpatient status at the CAH during their outpatient appointment.	***Program Outcome:*** DASI questionnaire will be completed by HF patients (who were recently discharged form inpatient status) during their outpatient appointment 90% of the time.	***Outcome Score = 76%*** We were unable to obtain post-discharge DASI on four patients: three deaths and one patient did not return our phone follow-up call. Out of 17 patients who completed the inpatient program, we were able to obtain 13 post discharge DASI's via combination of follow-up appointment and follow-up phone call.
***Population Objective*:** Based upon the inpatient and outpatient interventions, HF patients METs score as calculated from answers on the DASI will demonstrate improvements.	***Population Outcome:*** Improvements of the METs score as calculated from answers on the DASI will be reported by HF patients 90% of the time.	***Outcome Score =*** See "Interpretation of DASI scores" under Evaluation section of this manuscript. Wilcoxson Signed Rank Test demonstrated no statistical difference between inpatient and outpatient oxygen (O_2) uptake; $z = -.839^a$
Program Objective: HF patients will receive an individualized treatment plan provided by the cardiology NP.	***Program Outcome:*** Documentation regarding the individualized plan is completed for all HF patients 90% of the time.	***Outcome Score = 100%*** The cardiology NP documented all individualized plans within each HF patients EMR
Program Objective: HF patients will receive additional teaching	***Program Outcome:*** Documentation regarding	***Outcome Score =100%*** All HF pilot patients

provided by the Cardiology NP and program facilitator	education will be completed for all outpatient HF patients 90% of the time.	received continued education by the NP and program facilitator.
***Population Objective*:** HF patients and their designated caregivers will be provided with specific HF management instructions utilizing "teach back" techniques and "Ask me 3" techniques specifically for provider teaching (National Patient Safety Foundation, n.d.)	***Population Outcome:*** The patient and/or caregiver will verbalize understanding of HF disease management as demonstrated by "teaching back" the instructions the NP and the program facilitator.	***Outcome Score = 100%*** All HF pilot patients were able to teach back key components specific to HF management while home: weight monitoring, decreased sodium intake, and when to call NP with worsening symptoms.

Table V –Evaluation of HF Pilot Program (Overall)
Goal: The overall pilot program and population effectiveness will be continually monitored.

Objectives	Outcome Measures	Results
Program and Population Dual Objective: Patient who meet the inclusion criteria for the HF Pilot Program (identified while inpatient and discharged home) will be included in the pilot both inpatient and outpatient.	***Program and Population Dual Outcome:*** Patient who meet the inclusion criteria for the HF Pilot Program (identified while inpatient and discharged home) will participate in the program to completion, 90% of the time.	***Outcome Score = 65%*** Eleven patients completed the entire program. Six patients were lost to follow-up in the outpatient cardiology department.
Program and Population Dual Objective: Patients who have participated in the pilot program will be offered a satisfaction survey during their outpatient visit.	***Program and Population Dual Outcome:*** Patients who have participated in the pilot program will complete a satisfaction survey 90% of the time.	***Outcome Score = 86%*** Twelve surveys were completed and returned out of 14 patients (3 expired). Patients were provided satisfaction survey's during their outpatient appointments. Patient who were lost to follow-up were mailed a satisfaction survey with a stamped self addressed envelope to return back to the NP at the CAH (Tables XI-XIII).
Program Objective: Dissemination of HF Pilot Program findings will be presented to all stakeholders in this proposal	***Program Outcome:*** Ninety percent of Stakeholders will verbalize satisfaction of the pilot program results	***Outcome Score = Unable to determine.*** Dissemination of Findings scheduled at the CAH on Apr 28. "Verbalizing"

		satisfaction is not an appropriate measure; rather data regarding stakeholder satisfaction should be obtained by an anonymous survey similar to what was used with HF pilot patient satisfaction surveys.
Program Objective: The program facilitator will evaluate the program throughout Phase I.	***Program Outcome:*** The program facilitator will be successful in evaluating this program via data collection during the entire Phase I process 90% of the time.	***Outcome Score = 100%*** The program facilitator was successful in evaluating this program as noted within the manuscript.

Specific Resource Program Outcome Indicators.

While the type and amount of resources required for a health program vary with the interventions to be used, the expertise of the personnel, characteristics of the target audience, and degree of attention paid to acquiring and managing resources all affect the success of a program (Issel, 2004). Organizational inputs proposed for this HF Pilot Program include: Human resources, informational resources, monetary resources, physical resources, managerial resources, and time resources (Appendix B). The organizational plan objectives serve as a guide as to which activities are the most critical for implementing a health program.

Service utilization inputs proposed for this HFPP include: Recipients, participants, queuing, social marketing, and interventions (Appendix C). Before the HFPP can be delivered, people need to know about it; this is the purpose of social marketing (Issel, 2004). Determining through the process of screening based on criteria, who will participate in the program is another aspect of the service utilization plan. The intervention delivery takes the most effort, yet can be easily achieved if the planning has been well-developed. Prior to full program implementation, it is best to pretest the program or "pilot" the program in order to analyze process components.

Cost / Benefit Analysis of the HF Pilot Program

As noted in Figures 1, 2, and 3, opportunities for improvement at this CAH regarding HF care were clear; yet building a clinical case for HF programs requires cost monitoring and revenue analysis. These are important in demonstrating the business case for HFDM programs and/or specific interventions (Hines, Yu & Randall, 2010; Inglis et al., 2010). Estimated costs prior to implementation of this HF pilot program at this CAH are listed within the Proposed Inputs and Outputs to the Organizational HF Pilot Proposal (Appendix A) and the Proposed Inputs and Outputs to the Service Utilization Plan (Appendix B).

Chan and fellow researchers (2008) determined various cost estimates for HF disease management programs which were standardized to 2005 US dollars by the consumer price index for health care (Figure 10). In reviewing available data at this CAH for readmissions of HF patients within 30 days during fiscal year 2009 - 2010, it can be estimated that the total charges equaled $561,107.68 for 58 total readmissions with charges per case estimated to be $9,674.27 (personal communication, T. Rinaldi, November 21, 2010). However, understanding CAH designation is another aspect to consider when calculating a cost-benefit analysis. Legislation enacted as part of the Balanced Budget Act (BBA) of 1997 authorized states to establish State Medicare Rural Hospital Flexibility Programs (Flex Program), under which certain facilities participating in Medicare can become CAH (Centers for Medicare & Medicaid Services [CMS], 2008). Medicare pays CAHs based on reported costs; each CAH receives 101 percent of its costs for outpatient, inpatient, laboratory and therapy services, as well as post-acute care in the hospital's swing beds (Medpac, 2007). CAHs are not subject to the Inpatient Prospective Payment Systems (IPPS) and Hospital Outpatient Prospective Payment System (OPPS);

Medicare pays CAHs for most inpatient and outpatient services to Medicare beneficiaries on the basis of reasonable cost (CMS, 2008).

Additionally, benefits to the hospital in preventing readmissions are hard to calculate for many reasons. For example, Centers for Medicare and Medicaid (CMS), Joint Commission (JC), and Blue Cross and Blue Shield (BCBS) provide incentive payments to CAH's for all HF patients meeting specific HF core measure outcomes which are estimated to be approximately 3.75% per admission (G. Ritter, personal communication, November 18, 2010). However, the amount of these payments is not public information. Therefore, a cost / benefit analysis for this CAH is an estimate due to the inability to clear figures on these monetary benefits.

Finally, an important aspect to consider regarding cost-benefit involves doing what is right for patients. For example, improvements in care may translate into avoidance of readmissions which ultimately impacts quality of life (QOL) for these patients. Avoiding re-hospitalization allows HF patients to live independently with their families and loved ones. Thus, monetary benefits regarding QOL are also difficult to calculate. According to the United States National Library of Medicine and National Institutes of Health (n.d.) it is rarely possible or necessary to identify and quantify all costs and all benefits (or outcomes), and the units used to quantify these may differ. It may be more appropriate to conduct a cost-effective analysis (CEA) which is a comparison of costs in monetary units with outcomes in quantitative non-monetary units, e.g., reduced mortality or morbidity. However, crossing the imaginary line into rejection due to increased cost may not be the right approach (Figure 11). The tradeoffs of costs and effectiveness require careful weighing with consideration to standards of care.

Inpatient Heart Failure Pilot Program. Attempts were made at the CAH in estimating cost / benefit of the inpatient heart failure pilot program and listed in Tables VI – VIII

Table VI. – Estimated Costs for Inpatient HF Pilot Program

Implemented for Pilot	**Cost per Patient**	**Cost for Pilot N = 17 pts**	**Annualized cost N = 56 pts**
Average hourly nursing rate of $31.25 1. DASI: 5-8 min. 2. Education based on HF book: total 2 hrs. 3. DC time out: 20 min.	1. $5.21 2. $62.5 3. $10.42 2.5 hrs per patient Total: $ 78.13	Total cost for inpatient pilot based on 17 patients Total: $ 1,328	Annualized cost for inpatient program based on 56 patients Total: $ 61,264 (this is the cost of nurses which is built into their wages)

Table VI estimates what nurses are doing for the HF pilot patient at the CAH. They are supporting the patient through the DASI, HF education book, and DC time out so that all components are completed. For the nurse to accomplish and support this HF inpatient program during hospitalization equals 2.5 hrs per patient = $78.13 x 17 pt's = $1,328; to annualize = $61,264.

Table VII demonstrates a breakdown on the readmissions during the pilot period. However, a detailed discussion regarding readmissions is described within the results section of this paper. Readmissions were reviewed to determine if the readmit was related to a HF diagnosis. While hospitals report HF readmission as 30-day all cause, readmissions for this pilot program revealed only one being related to a HF diagnosis with certainty; thus, 5.88% readmission rate was determined for the first quarter of this HFPP.

Table VII – Breakdown on Reasons for Readmission within 30 days

Patient Number N = 5	**Reason**	**LOS for readmission**	**Related to HF diagnosis?**
105	Dyspnea / overlying pleural effusion	3 days	Questionable
108	Coreg 25 mg b.i.d. not tolerated	1 day	yes
110	End of Life	3 days	Questionable

	requiring hospice		
112	Panic attack leading to SOB	1 day	Not directly
115	Dyspnea / pneumonia	9 days	Not directly
One patient out of 17 was readmitted due to heart failure diagnosis = 5.88% readmit rate For 1st Q 2011 ANNUALIZED: 4 pt. in 2010 / 56 pts = 7.14% readmit rate			

To annualize, refers to expressing a variable in yearly terms even though the variable does not directly apply to a year (Farlex Financial Dictionary, 2009). That is, an annualized variable has been mathematically converted to yearly terms (Farlex Financial Dictionary, 2009). An annualized variable is often theoretical; there is no guarantee that the rate in the example above will be 7.14 % if it is calculated after a month or two.

According to Ross and colleagues (2010) there has been no recent national or regional improvement in hospital readmission care among Medicare beneficiaries discharged after HF hospitalization. Recent national hospital-specific risk-standardized readmission rates approached 25% for the most common discharge diagnosis among Medicare beneficiaries and the distribution in hospital performance has not shown beneficial changes.

Table VIII – Benefit for Inpatient HF Pilot Program

	Charges/case	**2010**	**2011 Annualized**
Readmission per pt	$9,766.16 loss	$68,596.96	$39,064.64
Assume Contract Reductions	= 40% of charges received	23,438.78	15,625.86
			7, 812.92 Loss / cost avoidance by decreasing readmissions

A main benefit for this CAH and other hospitals resides in cost / loss avoidance. Table VII reflects the DRG charge per patient which is not reflective of cost. For every readmission,

the CAH will not be paid yet care will still be delivered. Cost / loss avoidance is a benefit for all hospitals when they can successfully decrease hospital readmission rates.

As previously stated, pay-for-performance models demonstrate financial incentives and public recognition for top-performing hospitals as well as financial penalties for hospitals that do not improve above a pre-defined quality measure thresholds (Premier, Inc., 2006). These figures were not available from the CAH.

Outpatient HF Pilot Program. Attempts were made at the CAH to estimate the cost/benefit of the outpatient heart failure pilot program and listed in Table IX.

Table IX. – Cost versus Benefit for Outpatient HF Pilot Program

Variables	Cost / Benefit
$72.63 per Medicare payment x 15 pt's	$1,089.45 revenue for reimbursement
$ 0. per two patients due to health insurance	$ 0 for reimbursement
With 17 patients x 30 min appt's = 510 min = 8.5 hr of NP time	8.5 hrs x 41.2 (average leadership salary range) = $350.2 cost

Increased revenue with Medicare was noted within the outpatient HFPP as noted in Table IX. Reimbursement received based upon 15 Medicare patients versus the cost of an NP (with average leadership salary range) demonstrates revenue of $739.25. However, annualizing cost or reimbursement was not possible for the outpatient components of the program due to inability in obtaining clear figures surrounding monetary benefits.

Finally, as a consequence of limited data regarding the cost-benefit of HF DMP's in general, several aspects of HF cost of care remain poorly understood especially in the area of HF resource use in the outpatient setting (Liao et al., 2007). Accountable Care Organizations (ACOs) are projected to become a new trend in health care with potential to create opportunities for rural health care providers to improve health care quality and control health care costs within their communities (MacKinney, Mueller, & McBride, 2010). MacKinney and colleagues describe

these ACOs as payment and delivery system reforms to improve health care quality and control costs through care coordination and provider collaboration, with accountability for its performance.

The ACO model has received significant attention among policymakers and leaders in the healthcare community in the context of the ongoing debate over health reform, not only because of the unsustainable path on which the country now finds itself but also because it directly focuses on what must be the key goal within our healthcare system: higher value (Lowell & Bertko, 2010). This particular HF Pilot Model would fit into an ACO model of care in terms of care coordination and provider collaboration.

Timeline of HF Pilot Program

- Nov – Dec. 13, 2010; HF Pilot Proposal submitted with acceptance by doctoral committee members and the designated mentor for the project at the CAH. Met with key stakeholders throughout this period. Worked on developing necessary tools for data collection.
- Dec. 13, 2010 – December 31, 2010; all necessary aspects were in place: Documentation tools, clinician roles, staff education, and IRB approval. Contacted biostatistics department at UMASS, Amherst for statistical consulting.
- IRB approval granted December 22, 2010.
- Phase I: HF Pilot Program (HFPP) Implementation: Jan 1, 2011-March 31, 2011; Inpatient & Outpatient HF program in place.
- April – April 30, 2011; Analysis of results:
    - Approx. 15 - 20 patients were initially estimated. Actual patients equaled seventeen.

- April – May 01, 2011; written evaluation of program and dissemination of findings to UMASS, Amherst and the CAH.
    - Data analysis: Includes statistical analysis with assistance by a biostatistician at UMASS, Amherst and comparative qualitative analysis of findings by comparative review: case by case.
- Phase II: Post Doctoral ~ Continuation of Program; CAH Senior Management determined feasibility for continuation of HF program for an additional three months, scheduled to end on June 30, 2011. Adoption of program will be determined upon analysis of outcome measures.

HF Pilot Program Development and Implementation

In order to design an effective program for HF patients at the CAH, the program facilitator conducted an assessment of the "current state" of HF treatment in the setting. Based on this assessment, the program facilitator developed the HFPP based on the recommendations from the Clinical Practice Guideline and best evidence.

Medication Reconciliation. According to various officials at the CAH, the new electronic medication reconciliation process instituted during November 2010 was designed to alleviate medication fall-outs. Medication reconciliation process at the CAH was projected to reach 100% compliance due to their recent electronic advancements within the electronic medical record and pharmacy division. This recent advancement was expected to be beneficial during all patient admissions and during the discharge process. Mechanisms were in progress outside of this pilot to track and monitor this process.

Despite these efforts, two medication issues occurred during the HFPP with discharge medications, both regarding combivent (ipratropium bromide and albuterol sulfate) a known

bronchodilator. These two problems impacted HF Core Measures. The Quality management staff addressed these issues with various staff and council members at the CAH. Opportunities for improvement in medication reconciliation exist including double checking/safety net mechanisms with another staff member to ensure all key items are in place prior to discharging a patient in order to avoid any additional medication discrepancies.

Multidisciplinary care team with specialized HF nurses. The evidence supports the use of a multidisciplinary care team as an effective structure in managing HF patients on an inpatient and outpatient basis (Lindenfeld et al., 2010; Hunt et al., 2009; Gohler et al., 2006). In addition, an effective intervention to reduce hospitalizations encourages consistency of specially trained nurses in providing acute care for patients with chronic conditions such as HF (Boutwell, Griffin, Hwu, & Shannon, 2009). While the CAH incorporates a multidisciplinary approach to patient care, they did not have designated specially trained HF nurses.

Evidence supports the effectiveness of a designated trained HF nurse who works with the patient and family or caregiver during the hospitalization to conduct patient education, arrange post-acute follow-up, confirm medication reconciliation, and prepare them for discharge (Boutwell & Hwu, 2009). The program facilitator provided pilot education to all the HF designated nurses to ensure they understood the pilot purpose along with various outcome measures for evaluation.

Effective Teaching and Enhanced Learning. According to Joint Commission (JC) (2010) HF patients or caregivers discharged home must be given written instructions or educational material. These materials must address all of the following: activity level, diet, discharge medications, follow-up appointment, weight monitoring, and what to do if symptoms worsen. Prior to this pilot, the CAH provided HF patients and their families with an evidence-

based HF education packet which describes simple pathophysiology of HF, along with dietary, activity, weight monitoring, and symptom monitoring within the booklet entitled: “A Stronger Pump: A guide for people with all types of Heart Failure” (Purcell & Fletcher, 2009). In addition, the packet contains a stop light laminated sheet (8.5 x 11) describing signs and symptoms and what to do if they are in a green, yellow, or red zone. This stop light is designed to guide patients and families in monitoring their status and providing guidance instructions for recommended follow-up. However, there was no system in place to track patient or caregiver understanding of this packet.

Lindenfield and fellow researchers (2010) have described the importance of adequate patient and family or caregiver teaching. They report that inadequate education and counseling can lead to the following (p. e101):

- Poor communication and coordination of care among health care providers.
- Inadequate discharge planning.
- Failure to organize adequate follow-up care.
- Clinician failure to emphasize non-pharmacologic aspects of HF care, such as dietary, activity, and symptom monitoring recommendations.
- Failure to address the multiple and complex medical, behavioral, psychosocial, environmental, and financial issues that complicate care, such as older age, presence of multiple co-morbidities, lack of social support or social isolation, failure of existing social support systems, functional or cognitive impairments, poverty, presence of anxiety or depression.
- Failure of clinicians to use evidence-based practice and follow published guidelines in the prescription of pharmacologic and non-pharmacologic therapy.

While the Critical Access Hospital provided an education packet to all HF patients, little was known about the participation and engagement of patients and families or caregivers. This evidence based educational packet includes comprehensive education strategies and counseling for patients and families prior to discharge from an acute care setting (Yu et al., 2006; Boutwell, Jencks et al., 2009). Effective teaching to enhance learning should include "teach back" daily in the hospital to assess patients' and family understanding of discharge care and ability to perform them (Weiss, 2007; CAH, 2010 February). Since teach back was not utilized in this setting, the program assistant designed a teach-back plan for the program. The teaching document entitled: "Heart Failure Pilot Program – Patient Teaching "A Stronger Pump" was developed by the program assistant to capture key aspects of HF understanding demonstrated by the patients and their caregivers (Figure 7).

According to Weiss (2007) only about 13% of the American adult population have fully developed health literacy skills and can read and understand virtually all text and numerical information they might encounter in health care settings. Based on the increase in HF readmission rates at this CAH, it is important to evaluate if patients understand their role in managing HF (Yu et al., 2006). As part of this HFPP, the HF nurse's assessed and documented the patient and family understanding of their role in management of HF prior to discharging them home.

Consistency with HF Teaching. In order to maintain consistency in terms of HF teaching during hospitalization, key nurses were identified on the medical-surgical unit (2MS) and in the critical care unit (CCU) for the day, evening, and night shifts and became known as the "HF pilot nurses". These nurses were trained by the program facilitator along with the program assistant in discussing key aspects of HF care based on the HF Education Packet which

is currently in use at this CAH (Purcell & Fletcher, 2009). In addition the selected HF pilot nurses were instructed to watch a DVD entitled: "Teaching Moments: Educational In-Service" by Reske and Rucki (Fairview Hospital [FVH], 2010). On February 3, 2010 this particular in-service was presented at the CAH which described various teaching methods in order to enhance educational opportunities while caring for patients. The program facilitator viewed this DVD prior to program development to determine if the contents were suitable for pilot implementation. Various components were described in this DVD including but not limited to: Ask Me 3 (National Patient Safety Foundation. n.d.).

A systematic approach was developed and created by the program assistant to aid these HF nurses in teaching key factors for HF management (Figure 7). It is particularly important to establish consistency between individuals when teaching patients about HF management or when abstracting data from medical or other records (Issel, 2004). The teaching document allowed all HF nurses to follow the educational aspect of this program closely with clear documentation on what items were achieved, which in turn allowed the program facilitator to revisit these items with HF patients during their scheduled outpatient cardiology appointment.

All HF patients received education by a designated HF pilot nurse to determine gaps in knowledge. After delivery of patient education, the impact was assessed prior to discharge utilizing the "teach-back" and "Ask me 3" methods (Fairview Hosptial, 2010, February; National Patient Safety Foundation, n.d.). The patient and/or caregiver understanding were documented by the HF nurse within the patients' medical record. Opportunities in documentation were noted by the program facilitator and addressed within the evaluation section of this manuscript.

Post-discharge during the follow-up phone call and outpatient appointment with a cardiology trained Nurse Practitioner (NP); patient knowledge was reassessed utilizing the teach-

back method. In order to maintain consistency, the same educational HF Packet was referred to during follow-up phone calls, and during the outpatient appointment.

While all HFPP patients received designated HF pilot nurses during their inpatient stay, there were several shifts on the medical-surgical unit (2MS) resulting in no HF nurse caring for a HF pilot patient. On several occasions it was due to no HF nurse working the shift pointing to a scheduling concern; while on other occasions it was discovered that a HF pilot nurse was working the shift, but not assigned to the HFPP patient. Anecdotal conversations revealed that additional education was warranted to the charge nurses on 2MS. Key managers were informed in order to actualize process improvements with HF pilot identification and for proper protocol adherence.

One charge nurse on 2MS recommended that all nurses be "HF nurses" in order to minimize additional fall-outs. Given IRB requirements, any nurse who becomes a designated HF nurse for this pilot must complete NIH certification and follow all IRB requirements.

Discharge Instructions. Previous outcome data on HF core measures at the CAH demonstrated opportunities for improvement specifically with discharge instructions. The analysis of HF discharge errors identified issues with discharge medications, weight monitoring, and smoking cessation counseling (Figure 4).

The HF core measures reports presentation of the patient discharge instructions, yet there were no current measures of the patient understanding of their discharge plan. Therefore, the HF nurse was instructed to assess and document the patient and/or caregiver understanding of HF disease management within their discharge note in the computerized electronic medical record (EMR).

Discharge "Time-Out". Based on the problem identification, a discharge time-out document was developed which was completed prior to discharge by the designated HF nurse (Figure 5). This Discharge Time-Out document allowed all HF designated nurses to ensure all key items have been addressed prior to discharging HF patients. The completed form was collected post discharge by the program facilitator or program assistant and filed under double locks.

Results of these forms demonstrated that various items were not consistently completed by the discharging HF nurse. During the pilot, efforts were made to convey the importance of each item being addressed. Additionally, it was communicated to the HF nurses that the Discharge Time-Out document can be started upon admission in order to ensure all items are addressed.

Follow-up appointment at time of discharge. Numerous studies and national guidelines support the importance of follow-up appointments to a primary care practitioner or specialty office at time of discharge; yet no formal process existed at this CAH (Delgado-Passler & McCaffrey, 2006; Inglis et al., 2010; Lindenfeld et al., 2010). A recent study by Jencks, Williams, and Coleman (2009) reviewed Medicare claims data from 2003-2004 to describe the patterns of re-hospitalizations and characteristics of hospitals. In the case of 50.2% of the patients who were re-hospitalized within 30 days after a medical discharge to the community, there was no bill for a visit to a primary care or specialty physician's office between the time of discharge and re-hospitalization (Jencks et al., 2009). The current evidence on the post discharge management of HF recommends that patients recently hospitalized for HF obtain a post-discharge appointment with their PCP or clinic visit scheduled within 7-10 days post discharge (Lindenfeld et al., 2010; Phillips et al., 2005). This program included nursing follow up on the

scheduling of this appointment and patient reminder prior to discharge for every HFPP patient. They were documented on the Discharge Time-Out document (Figure 5).

Structured telephone follow-up. National guidelines and research support telephone follow-up post discharge to HF patients (Delgado-Passler & McCaffrey, 2006; Inglis et al., 2010; Lindenfeld et al., 2010). In addition, the evidence supports telephone interventions for medication counseling and review by an APN with prescriptive authority (Delgado-Passler & McCaffrey, 2006). While there has been much discussion and efforts made at the CAH to conduct these telephone follow-up calls, it remains unclear how this intervention would be systematic or how data would be utilized, tracked, or disseminated.

For the HF Pilot Program (HFPP), follow-up telephone contact was made by the program facilitator (DNP student) or the program assistant within 24-48 hours post discharge utilizing the "HF Routine Telephone Call" document (Figure 9). The completed form was collected after telephone contact was established by the program facilitator or program assistant and filed under double locks. This HFPP included availability of the cardiology NP for notification by the program facilitator or program assistant if reported patient symptoms required specific advanced nursing action.

Implementation Continued: Monitoring and Modification

Fidelity

Fidelity may be defined as the quality or state of being faithful: factual accuracy of details and exactness (Merriam-Webster, 2011). Intervention fidelity refers to the consistency of the program implementation, including all elements of the intervention. There were several tools to ensure fidelity which include: DASI Questionnaire, HF Pilot Program (HFPP) Patient Teaching "A Stronger Pump", Discharge Time Out, Post Discharge Follow-Up Phone Call, and

HF Pilot Program (HFPP) Patient Satisfaction. Patients were screened by the program assistant beginning January 1, 2011 thru March 31, 2011 focusing on admission diagnosis related to dyspnea/shortness of breath (SOB), pneumonia, chest pain, atrial fibrillation, and renal failure. In addition, brain natriuretic peptide (BNP) test were also analyzed for potential rule-in/rule-out diagnosis of HF. A screening log was maintained by the program assistant per recommendation of the health system IRB. A total of 64 patients were screened for this pilot, from Jan 1- March 31, revealing seventeen total candidates.

Ensuring Educational Fidelity (consistency). Shortly after initiation of the HFPP, it was discovered by the pilot program assistant that a teaching document was needed for all designated HF nurses to use in order to gauge education efforts based on the CAH existing HF packet. Thus, the data collection document was developed by the program assistant and submitted to the IRB for approval with acceptance received on January 3, 2011 (Figure 7). All HF nurses were informed of the need to document their strategies with educational efforts in alignment with the education booklet entitled: "A Stronger Pump: A guide for people with all types of Heart Failure" (Purcell & Fletcher, 2009). This document proved to be helpful for all the HF nurses with determining how they should focus their educational strategies. This in turn proved to be beneficial for all shifts in gauging where the gaps reside in terms of teaching the patient and their caregiver on key aspects surrounding HF disease management. Items which were not covered or required additional attention were addressed during their outpatient cardiology appointment by the program facilitator. The program facilitator utilized the same teaching document during their outpatient appointment to ensure concepts were understood by the patient and/or caregiver.

Functional status was measured by the DASI. This instrument was used for the pre-program measure (inpatient) and post program measure (outpatient). The post program DASI

was measured at the post discharge NP visit. For those patients who would be lost to follow-up, the program facilitator or the assistant completed the post program DASI by telephone with the same instrument. The completed DASI questionnaires for this pilot were entered by the program assistant or program facilitator into a BHS owned laptop utilizing an excel spreadsheet; secured with double locks. Completed questionnaires were filed and maintained by the program assistant within a secured double lock system. Upon pilot completion, data analysis was accomplished on aggregate group results by a biostatistician at the University of Massachusetts Amherst for interpretation utilizing appropriate statistical tests. Individual analysis of results was not completed for this HF pilot project to protect anonymity of the data and patients' confidentiality at this time.

Follow- up visit with Cardiology NP. The CAH has a full time cardiology NP who agreed to see all HF pilot patients post discharge. An early pilot program change incorporated the addition of another NP at the CAH affiliate in order to capture potential HF patients which would ultimately allow the CAH to see the affiliate's patient in the outpatient setting. Addition of this NP to the project staff was submitted via an amendment to the IRB with approval received on February 10, 2011. This new NP was educated by the program facilitator regarding various inpatient pilot measures which were currently being captured at the CAH such as administration of the DASI, patient education with the CAH booklet with documentation form, and discharge time out. The NP agreed to notify the program facilitator with potential patients which would then be followed by the CAH on an outpatient basis. Despite the addition of this NP from the CAH affiliate, no new patients were captured for this particular pilot program. Should this HFPP lead to adoption, collaborative agreements between both facilities deserve attention.

Research Training. The IRB notified the program facilitator in mid February, 2011, regarding project staff for this pilot. It was noted that several of the designated HF nurses did not achieve National Institute of Health (NIH) Certification regarding protection of human subjects which is a requirement by the Critical Access Hospital IRB when incorporating these HF nurses as project staff. It was determined that the remaining nurses who did not have their NIH certification (13 nurses), must complete that process in order for the HF project to continue along with submission of their signatures on the project staff IRB form. Thus, the program facilitator worked with these 13 nurses and coached them on how to obtain NIH certification. Within a three to four week period, all designated HF nurses were NIH certified along with submission of their project staff forms to the Critical Access Hospital IRB. There were a total of 22 designated HF nurses for this pilot project. A sixth amendment form was filed with the IRB regarding the project staff update listing all 22 HF nurses; amendment approval was received on March 15, 2011.

Adaptability

This may be described as the ability to change or be changed in order to fit or work better in some situation or for some purpose**:** or be adapted to change to fit changed circumstances (Merriam-Webster, 2011). According to Melnyk and Fineout-Overholt (2005) it is essential to have a written strategic plan with clearly described goals for a change in evidence-based practice (EBP) to occur. Additionally, lack of a detailed plan is a major barrier to implementing a change.

It was anticipated and observed with this HFPP that the identified HF nurses would vary in their individual personality styles while implementing the HFPP which ranged from “drivers”, “inspired”, “supportive and steady”, to “contemplators” (Melnyk & Fineout-Overholt, 2005).

The program facilitator was responsible for this change effort by facilitating strategies to work successfully with each of them. It was soon discovered that varying degrees of skepticism would occur if the change is not clearly understood, if they are fearful about it, or if they have misperceptions about why change is needed.

In order to ensure adaptability, the program facilitator and program assistant frequently visited the inpatient units throughout this HFPP. Educating the HF nurses about this EBP change was an ongoing endeavor from the beginning of this HFPP to the end. Prior to the start of this HFPP, the program facilitator met with all HF nurses on the medical surgical floor and during a staff meeting on the critical care unit (CCU) to discuss how this pilot would be rolled-out. A "Heart Failure Pilot Program"(HFPP) note book was made by the program facilitator and program assistant for use on each unit with detailed instructions regarding all necessarily documents on how to capture the necessary HFPP data as well as the program facilitator and program assistant contact information. All HF nurses were encouraged to contact them during the pilot for any assistance or clarification. Electronic messages from the program facilitator were also used in order to maintain communication efforts during this pilot. All HF nurses were asked to provide any feedback, comments, or suggestions regarding pilot measures or potential for improvements.

Anecdotal verbal responses from the HF nurses were obtained by the program facilitator while visiting the inpatient units at the CAH. Comments derived from the medical-surgical unit (2MS) pointed to the overabundance of paper work during the discharge process which may be displaced and not necessarily due to this particular pilot. Other anecdotal verbal responses by some of the HF nurses pointed to positive aspects of this pilot including how much they learned along with their patients and caregivers with the enhanced teaching portion.

Previously discussed in this paper, the Awareness-to-Adherence Model applied the Heart Failure Society of America (HFSA) guideline as a key reference source for this HFPP (Lindenfeld et al., 2010). This model was chosen in order to increase practitioner use of the guideline recommendations with HF patients during the acute care hospitalization, and discharge process. For ease of access, the Heart Failure Society of America (HFSA) guideline was printed, placed in a binder, and made available on the 2MS unit for all project staff and clinicians as a reference guide surrounding heart failure care.

The entire hospitalist group and cardiology group demonstrated positive support for this HFPP. They informed the program facilitator when potential candidates were identified and shared results of diagnostic studies.

Results, Data Analysis, and Interpretation

As more funding agencies require health programs to document their success, the evaluation becomes more integral to the actual intervention and overall program delivery (Issel, 2004). The program facilitator monitored and recorded the baseline outcomes. These were major components of the process evaluation.

Patient screening and tracking endeavors were conducted by the program assistant and program facilitator which were entered into an excel spreadsheet as recommended by the Critical Access Hospital IRB. The CAH Quality Management Department assisted the project with developing an excel spreadsheet to track and monitor patient education outcomes and DASI results.

Population Results

Out of 67 patients who were screened, there were a total of 17 participants who received the inpatient HFPP (Table X).

Table X. Number of HF pilot participants n = 17

Number of patients receiving inpatient pilot program to its entirety	17
Number of patients receiving outpatient pilot program to its entirety	11
Number of patients who were lost to follow-up	6
Number of patients who completed the inpatient & outpatient DASI	13
Number of patients receiving portions of the inpatient pilot program, but were excluded prior to discharge	8
Number of HF pilot patients readmitted within 30 days (due to HF)	1
Number of patients seen for an emergency room visit post discharge from HF Pilot program (treated and released)	2
Number of patients who expired requiring reporting to CAH IRB (one inpatient; two outpatient)	3
Number of returned patient satisfaction survey's	12

There were a total of 17 patients who received the inpatient portion of the HFPP during their hospital stay. Six of those patients were lost to follow-up; three of the six expired (one inpatient and two outpatient deaths); one patient resided in another state and had two readmissions during the pilot program (patient number 105 and 112) with the first admission and subsequent two readmissions lost to outpatient cardiology follow-up. Further analyses of these patients will occur within the readmission and mortality discussion.

Eleven patients (65%) completed the entire HFPP (inpatient & outpatient) with continued care in the outpatient cardiology department. During their outpatient appointment with the cardiology NP and program facilitator, a physical assessment was obtained including weight, blood pressure, and observing for any physical assessment signs of heart failure. In addition, medications were reviewed and discussed along with adjustments being made by the NP if warranted. Heart failure education was reviewed by the program facilitator utilizing the same

approach as noted during their inpatient hospitalization at the CAH. Of the eleven patients seen in the outpatient HFPP, one patient was sent to the emergency room for evaluation of tachycardia with a HR of 140, and one patient required an outpatient chest x-ray due to notable dyspnea with lung auscultation revealing course crackles; this patient refused emergency room evaluation. This patient was ultimately readmitted several days later with worsening symptoms. Further analyses of this particular patient will occur within the readmission discussion. Both of these cases represent proactive symptom management that could have avoided emergency situations.

A total of eight patients received portions of the inpatient HFPP during the ruling-in / ruling-out process primarily due to a questionable diagnosis of HF. As described in the heart failure guideline, HF is a syndrome with notable co-morbidities such as pneumonia, renal failure, and pulmonary congestion. It became apparent during the inpatient aspects that HF may not be readily identified due to underlying co-existing conditions. Chest X-Ray was not always definitive nor having an elevated BNP level. Thus, during the ruling-in/ruling-out process several patients who were thought to have HF did not, and vice versa.

Follow-up Phone Calls. Fifteen patients received a telephone follow-up call 24-72 hours post discharge. During this pilot, the cardiology NP was notified once regarding a patients discharge medication. It was determined by this NP that no additional intervention was warranted since the patient had enough medication and was scheduled to be seen in the outpatient setting whereby all medications would be reviewed.

Patient Satisfaction. Patient Satisfaction was measured with a tool developed for this program. The same survey was used for all patients in the program. A total of 12 satisfaction surveys were obtained. Mean scores were calculated for each question utilizing an excel

spreadsheet (Tables XI-XIII). Each item was based on a likert scale ranging from very poor = 1, to very good = 5, which can be reviewed in figure 7 of this manuscript.

Table XI.

A. In-patient Education (Your hospital stay)	**Average Score**
1. The education portion was effective in teaching me new information and reinforced information I already knew.	4.9
2. The nurses presented the education material with enthusiasm.	5
3. The nurses were knowledgeable and well prepared to present education material.	4.9
4. The education sessions covered all necessary information and answered my questions.	5
Comments: Pt. #1: Per patients' spouse: "Care at this hospital was excellent, however, they didn't send his records down to FL and it was urgent at the time." Pt. #6: "Beds lumpy & uncomfortable. Night & day nurses are great. Night assistants too noisy". Pt. #12 - "The nurses were very empathetic to my condition & very helpful in teaching thoroughly my new conditions and needs"	

Table XII.

B. Out-patient Education (In the Cardiology Dept.)	**Average Score**
5. The education portion was effective in teaching me new information and reinforced information I already knew.	4.7
6. The nurse practitioner(s) presented the education material with enthusiasm.	4.8
7. The nurse practitioner(s) were knowledgeable and well prepared to present education material.	4.9
8. The education sessions covered all necessary information and answered my questions.	4.8
Comments: Pt. #7: "I was very pleased" Pt. #11: "Unfortunately you do not offer preventative care program which makes some of this info null & void" Pt. #12 - "I'm very satisfied with the services provided to me"	

Table XIII.

C. Facility and Nursing (Overall)	**Average Score**
9. All staff provided an appropriate level customer service.	4.9
10. The heart failure program provided all the information I needed.	4.8
11. The facilities are clean and safe.	4.9
12. Please rate the overall care you received during the program.	4.9
Comments: Pt. #4: "Very happy with all" Pt. #12: "The doctors, nurses, and all help acted and provided my needs above the appropriate standard of service"	

Six surveys revealed brief comments. Handwritten comments have been shared with the HF nurses and department managers. Anecdotal verbal responses obtained from patients during their outpatient appointment included: “How much they learned about HF” and “I’ve never been taught this much before”.

Readmission

The breakdown on reasons for readmission demonstrated five 30-day all-cause readmissions (30%) during the pilot program period from Jan 1 – March 31, 2011 (Table VII). However, according to Table VII, only one patient was readmitted specifically due to previous HF care (5.88%). One particular patient deserves close attention given that this patient received the inpatient program initially in January, but was readmitted in February (patient number 105), and again in March (patient number 112). In addition, this patient was lost to cardiology outpatient follow-up since the established cardiologist who was involved with the care of this patient, resided out of state. Thus, this patient did not participate in the outpatient HF aspect of this program. The HFPP facilitator identified a local primary care practitioner (PCP) for this patient, after the patient was discharged in March.

Attempts could have been made during previous admissions for this patient in establishing a follow-up appointment with the local PCP in order to avoid any additional readmissions. While this patient was told to follow-up with his PCP per documentation in the medical record, no follow-up appointment was made on behalf of the HF nurse or the case management team. Lost opportunities were realized after the second readmission by the program facilitator in terms of ensuring this patient had a follow-up appointment with the designated PCP.

Care across State Lines. One patient was unable to complete the entire program because they lived in a different state from the CAH. Efforts were made by the program facilitator to determine how to best manage care with patients who reside out-of-state with both the hospitalist group and the case management department. The quality management department in conjunction with the case management department has developed a focus study regarding 30-day readmissions. Key questions are being obtained from readmitted patients to aid the CAH in recognizing opportunities for improvement. While the PCP listed for this particular patient resides locally, there were no documented efforts made to contact this PCP in order to discuss or establish timely follow-up care in order to avoid unnecessary readmissions.

Readmission for patient number 108 suggests it was due to inpatient heart failure management with carvedilol (Coreg) 25mg bid being prescribed one day prior to discharge. The patient had an adverse reaction once discharged home due a syncopal event with loss of consciousness prompting emergency service notification. The patient was subsequently readmitted with the carvedilol dose being decreased to 12.5 mg daily which was tolerated well.

Patient number 115 deserves attention as well given that the first initial presentation in March resulted in a lengthy hospital admission of 11 days and 9 days for the subsequent readmission period. Although the NYHA classification system is not utilized at the CAH, this

patient would have likely been staged as class IV due to a reported ejection fraction of 20% with symptoms of cardiac insufficiency present at rest (Lindenfeld et al., 2010). In addition to being a bilateral amputee, multiple co-morbidities have been established with this patient pointing to the rationale for the lengthy admissions. A follow-up phone call was attempted with this patient after the initial admission yet the patient was not available nor was the phone call returned to the program facilitator or assistant by this patient. Fortunately, the patient appeared for the cardiology outpatient appointment with the NP and program facilitator less than 10 days post discharge after the initial admission revealing significant sedation due to narcotic use, SOB, diaphoresis, right basilar crackles with scattered wheezes and diminished left base. This patient refused emergency room evaluation, but agreed to an outpatient chest x-ray and labs; results were reviewed by the NP and cardiologist. Two days later, the patient appeared in the emergency room with worsening SOB and admitted with a questionable diagnosis of HF versus pneumonia. After another lengthy admission of 9 days, the patient was notified via follow-up phone call by the program facilitator reportedly doing the same, denying any worsening symptoms. The outpatient appointment in the cardiology department was made prior to discharge, but this patient reportedly rescheduled for factors unknown. Histories of non-adherence to therapeutic interventions were noted with this particular patient.

Of particular interest with this patient (#115) points to the verbalization of dissatisfaction in not being accepted for the cardiac-rehab program at this CAH. Criteria for acceptance into cardiac-rehab do not include a diagnosis of HF. According to Stevens (2009) the Centers for Medicare and Medicaid Services (CMS) recognizes myocardial infarction (MI), coronary artery bypass grafting (CABG) surgery, stable angina pectoris, percutaneous coronary intervention (PCI), heart valve repair or replacement, and heart transplantation as additional indications for

formal cardiac rehabilitation. CMS declined to add HF as an indication. However, CMS signaled that it is waiting for the results of a current U.S.-wide trial on HF and would reconsider this indication in light of its results (McDermott Will & Emery, 2011). Despite these explanations, patient #115 asked: "Do I need to get worse before I get better to qualify?" Clearly, a question which prompts much thought on behalf of all clinicians especially in light of the importance surrounding physical exercise.

Mortality

Three patients (17%) expired during the three month HFPP period. One patient expired during inpatient hospitalization, and two expired post-discharge. Hospital mortality rates include those patients who expire during their hospitalization; outpatient mortality is not accounted for. Despite this, two patients who expired and listed in a local newspaper was noted by the program facilitator and reported to the IRB. Thus, a mortality rate for inpatient deaths during this pilot resulted in one patient (5.8%). It was determined that the inpatient death was not due to HF, rather it was presumed to be a pulmonary embolism as the identified cause.

Functional Status: Interpretation of DASI scores

The DASI pre program and post program scores were entered into SPSS and the distribution of scores demonstrated a normal distribution for both the inpatient and outpatient oxygen (O_2) uptake scores (Figures XI-XII). Thus, it can be assumed that the populations from which the samples are taken are normally distributed (Pallant, 2007).

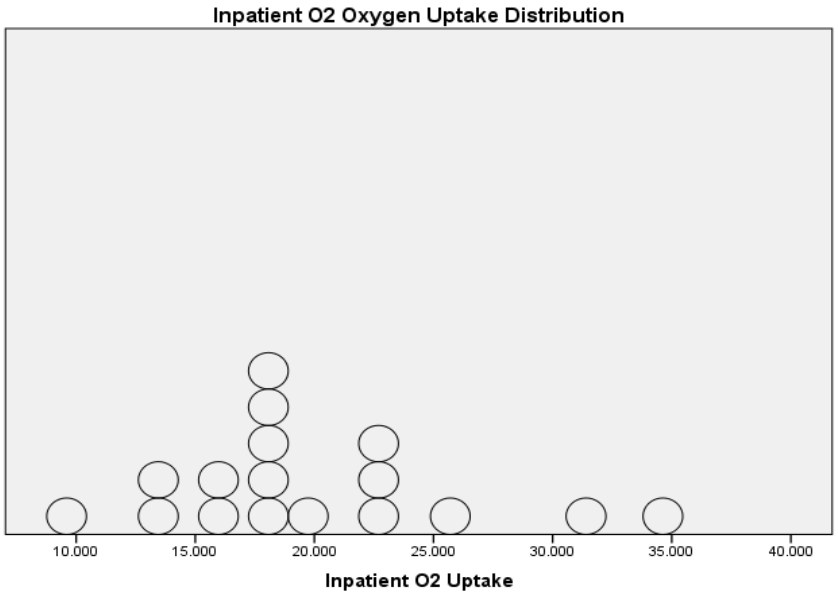


Figure 12. Inpatient O2 Oxygen Uptake Distribution

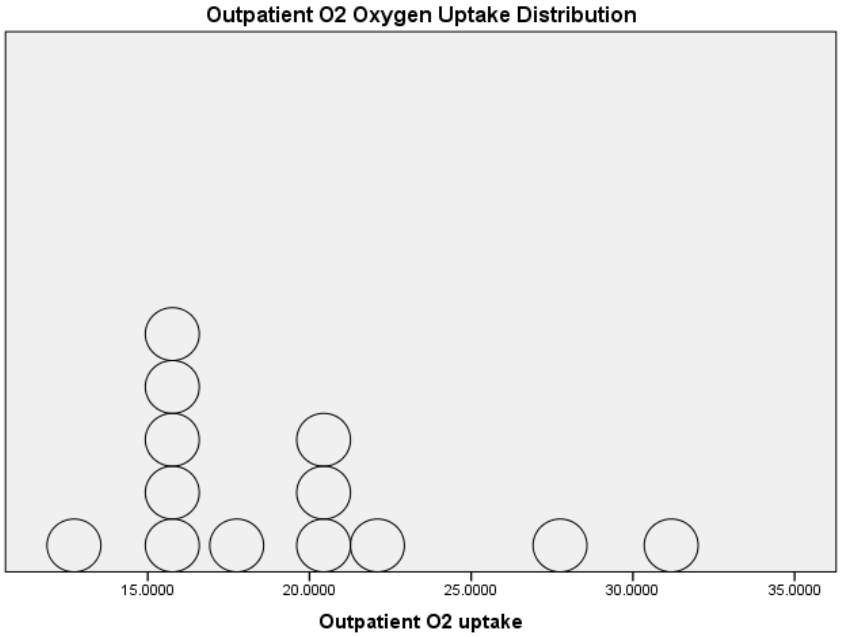


Figure 13. Outpatient O2 Oxygen Uptake Distribution

Paired T-Test was conducted to compare inpatient vs. outpatient of O2 uptake. Average difference between inpatient and outpatient values (inpatient O2 uptake is higher) equaled 1.73. There was no significant difference in scores for inpatient (M = 20.99, SD = 6.42) and outpatient

(M = 19.26, SD 5.28), *t* value = .94, *df* = 12, *p* = .36 (two-tailed). Wilcoxson Signed Rank Test, non-parametric test of differences, demonstrated no statistical difference between inpatient and outpatient oxygen (O2) uptake; z = -.839[a], *p* = .40, the median score on the inpatient O2 uptake(Md = 5.58) to post discharge outpatient O2 uptake (Md = 8.21). Despite no statistical difference between inpatient and outpatient oxygen (O2) uptake scores, the DASI can serve as a useful role in the follow-up evaluation of patients. Individual results from inpatient to outpatient DASI scores should be reviewed during the outpatient appointment in order to gauge level of functional capacity which may aid in establishing various treatment plans along with targeted risk management to improve prognosis.

Gender. An independent-samples t-test was conducted to compare O2 uptake changes based on gender. On average, inverse relationship from outpatient vs. inpatient O2 uptake decreased by 2.3 for females (F = 2.32, SD = 6.69) and males 0.8 (M = .79, SD = 7.24); *t* value = .38, *df = 11, p* = .705 However, this difference between males and females' change in O2 uptake is not statistically significant. Additionally, t-test of age by gender demonstrated average age of 5 males in study is 75, 9 females' average age is 69. Difference between males' and females' ages is not statistically significant (*p* = .403; two-tailed).

Age. Pearson correlation or Spearman correlation was used to give the direction and strength of the relationship between variables (Pallant, 2007). A moderate correlation was detected with age and O2 uptake change from outpatient vs inpatient, ($p < 0.05$). Additionally, the distribution of data points suggests a correlation is present when drawing a straight line through the main cluster of points (Figure XIII). (Pallant, 2007).

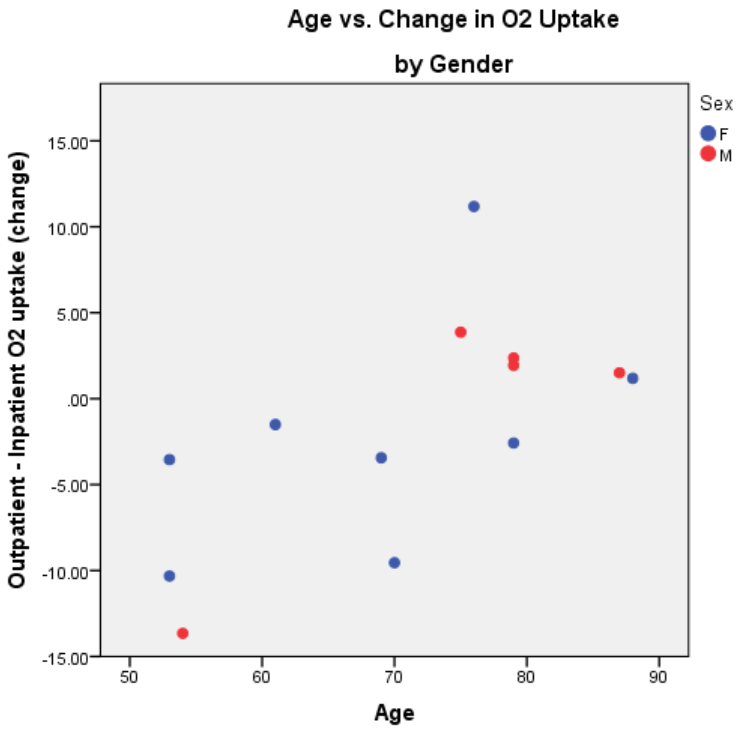


Figure 14. Age vs. Change in O2 Uptake by Gender

An independent-samples t-test was conducted to compare O2 uptake changes based on age. Average O2 uptake decreased by 7 for patients 70 or under (M = 7.00, SD = 4.82), and increases by 3 for those over 70 (M = 2.77, SD = 4.19); $t = 3.91$, $df = 11$, $p = < 0.01$. Explanations for this inverse detection are intriguing suggesting that functional capacity may improve with increasing age post discharge. These results suggest that older people are potentially benefitting from the inpatient interventions. The usefulness for clinical decision making regarding lower O2 uptake scores for those under 70 compared those over 70 cannot be explained or understood given the surprising nature of this result. The fact that other clinical factors are also independent predictors of functional capacity indicates that an uncomplicated course of inpatient heart failure designated care is not, in of itself, sufficient to guarantee an optimal functional outcome (Jaeger et al., 1994). It is, however, an interesting factor to consider in conducting research on HF.

Five variables and O2 uptake change. Five additional variables were analyzed to determine if any relationship occurred with O2 uptake change as noted in changes in DASI. There were a total of 13 patients who completed the inpatient DASI and the 7-10 days post discharge DASI. The five variables included key items for the pilot program. Independent-samples t-test was conducted for all five variables as listed to compare O2 uptake changes based on each variable.

a. **HF Education:** 0 = not fully completed; 1 = fully completed

   Three patients were not fully completed (M = .43, SD = 2.64); 10 patients were fully completed (M = -2.38, SD 7.44); (t (11) = .626, p = .544 [two tailed]). This was not statistically significant.

b. **Teach Back Method:** 0 = was not able; 1 = was able

   Two patients were unable (M = 7.5, SD = 5.16); 11 patients were able (M = -3.41, SD = 5.49); (t (11) = 2.60, p = .024 [two tailed]). This is statistically higher at $p < 0.05$. Especially surprising about this result is that average O2 uptake change of 7.5 for 2 patients who were "unable to teach back" is significantly higher, than average O2 uptake change of -3.4 for 11 patients who were "able to teach back". The scores of the 2 patients that "were unable" went up, while those that "were able", went down on average.

c. **Inpatient Nutrition Consult:** 0 = no; 1 = yes

   Two patients did not have a nutrition consult completed (M = -.107, SD = 3.49); 11 patients had a consult (M = -2.03, SD = 7.16); (t (11) = .362, p = .724 [two tailed]). This was not statistically significant.

d. **DC Time Out:** 0 = not fully completed; 1 = fully completed

Two patients were incomplete (M =1.34, SD =.22); 11 patients were fully completed (M = -2.29, SD =7.13); (t (11) = .696, p = .501 [two tailed]). This was not statistically significant.

e. **Follow-up with NP:** 0 = no; 1 = yes

Two patients did not see NP (M = 2.15, SD = .304); 11 patients saw NP (M = -2.44, SD = 7.03); (t (11) = .890, p = .393 [two tailed]). This was not statistically significant.

Project Limitations

This project had several limitations. A review of the literature conducted by the author of this paper found that HF programs often resulted in decreased hospitalizations (Willey, in press). While most disease management programs for HF seem to work by reducing hospital length of stay or readmission rates, the impact is not always statistically significant, as noted within this three month HFPP, and the success of these programs may be a function of the types of patients enrolled based on the severity of their illnesses (vanVonno, Ozminkowski, Smith, Thomas, Kelley et al., 2005). In our HFPP, we did not stratify program participants by risk status and control for differences in co-morbidities; thus, severity of illness varied widely among all pilot participants. Despite the intricacies involved in adjusting for differences, a comparison group may be used which remains an option for this CAH to develop and implement with IRB guidance. Otherwise, it may not be possible to infer whether observed changes are really due to program participation (vanVonno et al., 2005).

Second, the responses to the questions on the DASI are subjective and may be affected by patient factors and by method of administration. Given the number of HF nurses, method of administration will vary. However, in the outpatient setting, the DASI was administrated by the same individuals: the program facilitator or the program assistant. In addition, the DASI has

been validated in younger patients, but has not been separately validated in older patients (Jaeger et al., 1994). One study by Arena, Humphrey, and Peberdy (2002) attempted to assess the reliability or validity of the DASI in HF population with a small sample size of 33 participants. Future research is needed to determine if this questionnaire holds value in the HF population group (Arena, Humphrey, & Peberdy, 2002).

Third, there were scheduling challenges to ensure that a HF nurse care for a HFPP patients during the inpatient stay. While all HFPP patients had a HF nurse caring from them while inpatient, there were several shifts when HFPP patients did not have a designated HF nurse either due to one not working or inability to change assignments to allow a HF designated nurse to care for a HFPP patient. Clearer scheduling protocols need to occur to allow HF nurses to care for HFPP patients. While these strategies may require change in assignments, discussions regarding protocol adherence with the department managers, charge nurses, and HFPP champions must continue in order to evaluate missed opportunities.

Fourth, given the scope of this HFPP, inclusion criteria applied to patients who were being discharged home since outpatient cardiology follow-up seemed most likely to occur. Patients who were transferred to another acute care hospital or extended care facility were excluded based on potential for loss to follow-up in the outpatient cardiology setting; however, waivers were granted for the two patients who were transferred to another acute care facility since they were inadvertently included in the pilot. Both of these patients returned for outpatient cardiology follow-up and thus deemed to be good candidates for the outpatient pilot program. It was determined that patients who are transferred to another acute care facility require careful consideration in terms of follow-up care. Nevertheless, this finding supports the contention that transferred patients may benefit by being included in the CAH HF pilot program.

Fifth, seven patients received portions of the inpatient HFPP, but were excluded due to discharge disposition to a skilled nursing facility (SNF), consideration of this population group is warranted. Gaps remained in those discharged to SNFs which deserve further attention regarding inclusion in the HFPP providing follow-up in the outpatient cardiology setting can be achieved. Furthermore, opportunities exists for nurse case management to develop a follow-up phone call process within 48 hours of discharge to the registered nurse/licensed practical nurse in the SNFs to verify or clarify discharge instructions which may improve continuity of care (Jacobs, 2011). Tracking of the SNF population group requires further tightening should the program continue. Additionally, it may be beneficial for various SNF patients to receive the inpatient HFPP despite the likelihood of loss to follow-up. If program adoption occurs, incorporating this population group warrants additional discussion among all key stakeholders.

Conclusion

The purpose of an evaluation is to learn about the facilitators and barriers to program implementation. Thus, negative or unexpected results should be viewed as opportunities for discussions about how to better organize programs, how to run them more effectively, and how to best work with patients and their providers (vanVonno et al., 2005). An appealing benefit of conducting an evaluation pilot program is that these discussions can occur prior to full-scale rollout. Additionally, a pilot study is critical in determining the feasibility of subject enrollment, the intervention, the protocol or data collection plan for the study, and the likelihood that subjects will complete follow-up measures (Melnyk & Fineout-Overholt, 2005, p. 266).

What we learned about this pilot program is that it takes a considerable time to implement and monitor all aspects in order to ensure the protocol is being followed appropriately by all HF nurses. Discussions with the CAH senior managers will need to be maintained during

this pilot in order to keep the momentum going with all pilot features including, but not limited to, communication with unit managers in order to maintain their commitment and full engagement to this project.

Dissemination of Findings

Results have been shared with key stakeholders at the CAH including all aspects of the pilot features. Formal presentations occurred at the CAH on April 28, 2011 and on campus at the University of Massachusetts, Amherst on May 12, 2011. If suitable for publication, the IRB will be notified to determine status of this pilot.

Program Continuation

Several of these HF interventions have been proven in the literature to lower readmission rates after HF hospitalization, including improved hospital and post-discharge care, pre-discharge planning, home-based follow-up, and patient education (Ross et al., 2010). Findings from this CAH pilot support program continuation. Additional data with a larger sample size may result in actualization into a formal HF program. Plans for post-project continuation and implications for future practice and translational research initiatives have been determined by senior management at the CAH. On April 1, 2011 the CAH Chief Nursing Officer determined program continuation for an additional three months projecting to end on June 30, 2011.

Heart Failure nurse champions on the 2MS unit and CCU have been selected to assist in overseeing project protocols along with the aid of the program assistant. The project facilitator will be available for consultation as needed. The goal of these champions will be to ensure potential patients are identified and included in the HFPP, and that the three pilot forms are instituted and fully completed. Results of specific outcome indicators noted in Tables II-V of

less than 100% have been shared with all project staff and their managers in order to identify opportunities for improvement.

Additional concerns point to the following:

Considerations to data tracking and entry will be carried-out by the program assistant with oversight by the program facilitator; follow-up phone calls will be carried-out amongst the designated HF nurses on 2MS and CCU with oversight by the program facilitator and assistant in ensuring calls are made within the protocol timeframe.

On two occasions during this HFPP, patients who were transferred to another acute care facility were inadvertently placed on this pilot despite meeting the exclusion criteria. However, both patients were deemed appropriate for this HFPP since both patients would eventually be seen by the NP in the outpatient cardiology department. Therefore, the program facilitator modified the inclusion criteria for two patients. This particular exclusion as listed in the protocol may warrant modification with an IRB amendment in order to capture patients who would be seen for follow-up in the outpatient cardiology office.

In the outpatient setting, the NP has agreed to administer the outpatient DASI and provide satisfaction questionnaires to program participants. The NP will provide these documents to the program assistant for data entry. Since the protocol requires a second DASI 7-10 days post discharge, it will be important for the program assistant to be aware of any patient who is not scheduled to be seen in the outpatient setting. Communication patterns regarding protocol adherence requires additional attention for all project staff to ensure discrepancies are minimized and opportunities for improvements are addressed.

As previously stated, comments derived from 2MS pointed to the overabundance of paper work during the discharge process which may be displaced and not necessarily due to this

particular pilot. Should this HF program be adopted this explicit concern should be addressed with all HF designated nurses and the CAH in order to streamline inpatient HF documentation. A key aspect of what we learned during this pilot program points to constant vigilance and frequent reminders with all HF nurses in ensuring HF pilot protocols utilizing evidence-based care is carried out during the entire admission period. Communication patterns with the project staff must continue in order to ensure potential HF patients are not missed or that protocol adherence is not followed properly. Furthermore, extra assistance and guidance in developing expertise for all nurses in HF care may be warranted should this pilot prove to be effective in hospital-based outcome measures.

Lastly, should program adoption occur, components for information systems should also be reviewed for electronic medical record (EMR) purposes specifically in terms of meaningful use.

References

Ainsworth, B. E., Haskell, W. L., Leon, A. S., Jacobs, D. R., Montoye, H. J., Sallis, J. F., & Paffenbarger, R. S. (1992). Compendium of Physical Activities: classification of energy costs of human physical activities. *Journal of the American College of Sports Medicine*, 71-80.

Arena, R., Humphrey, R., & Peberdy, M. (2002, Mar-Apr). Using the Duke Activity Status Index in Heart Failure. *Journal of Cardiopulmonary Rehabilitation*, *93*, 93-95.

Armstrong, L., Balady, G., Berry, M., Davis, S., Davy, B., Davy, K., ... Wallace, J. (2009). *American College of Sports Medicine: Guidelines for Exercise Testing and Prescription* (7th ed.). Philadelphia: Lippincott Williams & Wilkins.

Blumenthal, D., & Tavenner, M. (2010, August 5). The "Meaningful Use" Regulation for Electronic Health Records. *The New England Journal of Medicine*, 501-504.

Bourge, R. C., Abraham, W. T., Adamson, P. B., Aaron, M. F., Aranda, J. M., Magalski, A., ... Stevenson, L. W. (2008). Randomized Controlled Trial of an Implantable Hemodynamic Monitor in Patients With Advanced Heart Failure: The COMPASS-HF Study. *Journal of the American College of Cardiology*, *51*, 1073-1079.

Boutwell, A., & Hwu, S. (2009). *Effective Interventions to Reduce Rehospitalizations: A Survey of the Published Evidence*. Cambridge, MA: Institute for Healthcare Improvement. Retrieved November 20, 2010, from http://www.ihi.org/NR/rdonlyres/0F548851-A118-4284-B127-70FC0384CD3A/0/STAARSurveyofPublishedEvidence.pdf

Boutwell, A., Griffin, A., Hwu, F., & Shannon, S. (2009). *Effective Interventions to Reduce Rehospitalizations: A Compendium of 15 Promising Interventions*. Cambridge, MA: Institute for Healthcare Improvement. Retrieved November 20, 2010, from

http://www.ihi.org/NR/rdonlyres/758FCB3E-96AA-45FE-944D-CCD5FA63FF81/0/STAARCompendiumofPromisingInterventions.pdf

Boutwell, A., Jencks, S., Nielsen, G., & Rutherford, P. (2009). *STate Action on Avoidable Rehospitalizations Initiative*. Cambridge, MA: Institute for Healthcare Improvement. Retrieved November 20, 2010, from http://www.ihi.org/NR/rdonlyres/C0CAA410-D43E-4075-88ED-4601FDAF5579/0/STAARStateBasedStrategy.pdf

Centers for Disease Control and Prevention [CDC] (2010). Fact Sheets and At-a-Glance Reports. Retrieved on July 17, 2010 from http://www.cdc.gov/print.do?url=http://www.cdc.gov/dhdsp/library/fs_heart_failure.htm

Centers for Medicare & Medicaid Services. (2008). *Critical Access Hospital Fact Sheet*. Retrieved from http://www.cms.gov/MLNProducts/downloads/CritAccessHospfctsht.pdf

Chan, D., Heidenreich, P., Weinstein, M., & Fonarow, G. (2008). Heart failure disease management programs: A cost-effectiveness analysis. *American Heart Journal*, *155*, 332-338.

Copeland, L. A., Berg, G. D., Johnson, D. M., & Bauer, R. L. (2010). An Intervention for VA Patients With Congestive Heart Failure. *American Journal of Managed Care*, *16*, 158-165.

Critical Access Hosptial (2011, March). *Heart Failure Measures: A Performance Update*. Paper presented at Fairview Hospital, Great Barrington MA.

Del Sindaco, D., Pulignano, G., Minardi, G., Apostoli, A., Guerrieri, L., Rotoloni, M., ... Leggio, F. (2007). Two-year outcome of a prospective, controlled study of a disease management programme for elderly patients with heart failure. *Journal of Cardiovascular Medicine*, *8*, 324-329.

Delgado-Passler, P., & McCaffrey, R. (2006). The influences of postdischarge management by nurse practitioners on hospital readmission for heart failure. *Journal of the American Academy of Nurse Practitioners*, *18*, 154-160.

Esposito, D., Brown, R., Chen, A., Schore, J., & Shapiro, R. (2008). Impacts of a Disease Management Program for Dually Eligible Beneficiaries. *Health Care Financing Review*, *30(1)*, 27-45.

Fairview Hospital [FVH]. (Producer). (2010, February). *Teaching Moments: Educational In-Service by Teresa Kuta Reske, MSN & Shiela Q. Rucki, PhD* [DVD]. Available from RQ Nurse Consulting: Muse-Med, Inc.

Farlex Financial Dictionary. (2009). *Annualized*. Retrieved from http://financial-dictionary.thefreedictionary.com/annualized

Gaikwad, R., & Warren, J. (2009). The role of home-based information and communications technology interventions in chronic disease management: a systematic literature review. *Health Infomatics Journal*, *15(2*), 122-145.

Gohler, A., Januzzi, J., Worrell, S., Osterziel, K., Gazelle, S., Dietz, R., & Siebert, U. (2006). A Systematic Meta-Analysis of the Efficacy and Heterogeneity of Disease Management Programs in Congestive Heart Failure. *Journal of Cardiac Failure*, *12(7*), 554-567.

Grady, K. (2008,). Self-care and Quality of Life Outcomes in Heart Failure Patients. *Journal of Cardiovascular Nursing*, *23*(3), 285-292.

Haskell, W. L., Lee, I. M., Powell, K. E., Pate, R. P., Powell, K. E., Blair, S. N., ... Bauman, A. (2007). *Physical activity and public health: updated recommendation for adults from the American College of Sports Medicine and the American Heart Association*. Retrieved December 11, 2010, from http://circ.ahajournals.org/cgi/reprint/116/9/1081.pdf

Hebert, P. L., Sisk, J. E., Wang, J. J., Tuzzio, L., Casabianca, J. M., Chassin, M. R., McLaughlin, M. A. (2008). Cost-Effectiveness of Nurse-Led Disease Management for Heart Failure in an Ethnically Diverse Urban Community. *Annals of Internal Medicine*, *149*, 540-548.

Hines, P., Yu, K., & Randall, M. (2010,). Preventing Heart Failure Readmissions: Is Your Organization Prepared?. *Nursing Economic*$, *28*(2), 74-85.

Hines, P., Yu, K., & Randall, M. (2010, March-April). Preventing Heart Failure Readmissions: Is Your Organization Prepared?. *Nursing Economic*$, *28(2*), 74-85.

Hlatky, M. A., Boineau, R. E., Higginbotham, M. B., Lee, K. L., Mark, D. B., Califf, R. M., ... Pryor, D. B. (1989, September 15). A Brief Self-Administered Questionnaire to Determine Functional Capacity (The Duke Activity Status Index). *The American Journal of Cardiology*, *64*, 651-654.

Horowitz, C. R., Rein, S. B., & Leventhal, H. (2004). A story of maladies, misconceptions and mishaps: effective management of heart failure. *Soc Sci Med*, *58*, 631-643.

Hunt, S. A., Abraham, W. T., Chin, M. H., Feldman, A. M., Francis, G. S., Ganiats, T. G., Oates, J. A., et al. (2009). *2009 Focused Update Incorporated Into the ACC/AHA 2005 Guidelines for the Diagnosis and Management of Heart Failure in Adults: A Report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines: Developed in Collarboration With the International Society for Heart and Lung Transplantaion.* (DOI: 10.1161/CIRCULATIONAHA.109.192065). Retrieved from American Heart Association: http://www.circ.ahajournals.org

Inglis, S. C., Clark, R. A., McAlister, F. A., Ball, J., Lewinter, C., Cullington, D., ... Cleland, J. C. (2010). Structured telephone support or telemonitoring programmes for patients with chronic heart failure. *Cochrane Database of Systematic Reviews*, *9*(8), 1-138.

Institute for Healthcare Improvement (IHI) (n.d.). STate Action on Avoidable Rehospitalizations. Retrieved on June 12, 2010 from

Institute for Healthcare Improvement. (March 2009). *Effective Interventions to Reduce Rehospitalizations: A Survey of the Published Evidence*. Retrieved from http://www.ihi.org/NR/rdonlyres/0F548851-A118-4284-B127-70FC0384CD3A/0/STAARSurveyofPublishedEvidence.pdf

Issel, L. M. (2004). *Health Program Planning and Evaluation: A Practical, Systematic Approach for Community Health*. Sudbury, MA: Jones and Bartlett Publishers.

Jaarsma, T., Van der Wal, M. H., Lesman-Leegte, I., Luttik, M., Hogenhuis, J., Veeger, N., ... Van Gilst, W. H. (2008). Effect of Moderate or Intensive Disease Management Program on Outcome in Patients With Heart Failure. *Archives of Internal Medicine*, *168(3*), 316-324.

Jacobs, B. (2011, January/February). Reducing Heart Failure Hospital Radmissions from Skilled Nursing Facilities. *Professional Case Management*, *16*(1), 18-24.

Jaeger, A. A., Hlatky, M. A., Paul, S. M., & Gortner, S. R. (1994, July). Functional Capacity After Cardiac Surgery in Elderly Patients. *American College of Cardiology*, *24*, 104-108.

Jarousse, L. A. (2010). *What You Need to Know About Meaningful Use*. Retrieved from http://www.hhnmag.com/hhnmag_app/jsp/articledisplay.jsp?dcrpath=HHNMAG

Jencks, S., Williams, M., & Coleman, E. (2009, April 2). Rehospitalizations among Patients in the Medicare Fee-for-Service Program. *The New England Journal of Medicine*, *360(14*), 1418-1428.

Joint Commission. (2010). *Heart Failure National Hospital Inpatient Quality Measures*. Retrieved from

http://www.jointcommission.org/PerformanceMeasurement/PerformanceMeasurement/Current+NHQM+Manual.htm

Krantz, M. J., Havranek, E. P., Hayes, D. K., Smith, I., Bucher-Bartelson, B., & Long, C. (2008). Inpatient Initiation of B-blockade Plus Nurse Management in Vulnerable Heart Failure Patients: A Randomized Study. *Journal of Cardiac Failure*, *14(4)*, 303-309.

LaFramboise, L. M., Woster, J., Yager, A., & Yates, B. C. (2009). A Technological Life Buoy: Patient Perceptions of the Health Buddy. *Journal of Cardiovascular Nursing*, *24*, 216-224.

Liao, L., Anstrom, K. J., Gottdiener, J. S., Pappas, P. A., Whellan, D. J., Kitzman, D. W., ... Jollis, J. G. (2007, November 7). Long-term costs and resource use in elderly participants with congestive heart failure in the Cardiovascular Health Study. *American Heart Journal*, *153, Number 2*, 245-252.

Lindenfeld, J., Albert, N., Boehmer, J., Collins, S., Ezekowtiz, J., Givertz, M., Starling, R., et al., (2010). *Executive Summary: HFSA 2010 Comprehensive Heart Failure Practice Guideline*. Retrieved from Journal of Cardiac Failure: http://www.journals.elsevierhealth.com/periodicals/yjcaf/home

Living With Heart Failure (2007 ed.). South Deerfield, MA: Channing Bete Company.

Lowell, K. H., & Bertko, J. (2010). The Accountable Care Organization (ACO) Model. *Journal of Ambulatory Care Management*, *33*, 81-88.

MacKinney, A. C., Mueller, K. J., & McBride, T. D. (2010). The March to Accountavle Care Organizations - How Will Rural Fare?. *The Journal of Rural Health*, *27*, 131-137.

Massachusetts Health Care Quality and Cost Information. (2006). *Cogestive Heart Failure (CHF), by Hospital*. Retrieved from http://www.mass.gov/Eeohhs2/docs/dhcfp/qc/qc3/chn_chf.pdf

Massachusetts Hospital Association. (2009). *Healthcare Quality/Re-Admissions Issues Brief.* Retrieved October 14, 2010, from http://www.mhalink.org/AM/Template.cfm?Section=Reducing_Rehospitalizations&template=/CM/ContentDisplay.cfm&ContentID=10489

McDermott Will & Emery. (2011). *New CMS Coverage Policy for Cardiac Rehabilitation*. Retrieved April 12, 2011, from http://www.mwe.com/index.cfm/fuseaction/publications.nldetail/object_id/f5f134a3-67e9-451d-a796-87cf943526df.cfm

Medpac. (2007). *Critical Access Hospitals Payment System*. Retrieved from http://www.medpac.gov/documents/MedPAC_Payment_Basics_07_CAH.pdf

Melnyk, B., & Fineout-Overholt, E. (2005). Critically Appraising Quantitative Evidence. In L. Johnston (Ed.), *Evidenced-Based Practice in Nursing & Healthcare: A Guide to Best Practice* (pp. 79-125).

Melnyk, B., & Fineout-Overholt, E. (2005). Making the Case for Evidence-Based Practice. In *Evidence-Based Practice in Nursing & Healthcare: A Guide to Best Practice* (pp. 3-24). Philadelphia: Lippincott Williams & Wilkins.

Merriam-Webster. (2011). http://www.learnersdictionary.com/search/adaptable

Merriam-Webster. (2011). http://www.merriam-webster.com/dictionary/fidelity?show=0&t=1301257030

Munro, B. H. (2005). *Statistical Methods for Health Care Research* (5th ed.). Philadelphia: Lippincott Williams & Wilkins.

National Patient Safety Foundation. (n.d.). Retrieved from http://www.npsf.org/askme3/PCHC/what_can_provid.php

Nguyen, V., Ducharme, A., White, M., Racine, N., O'Meara, E., Zhang, V., ... Brophy, J. (2007). Lack of Long-Term Benefits of a 6-Month Heart Failure Disease Management Program. *Journal of Cardiac Failure*, *13(4*), 287-293.

Nucifora, G., Albanese, M., DeBiaggio, P., Caliandro, D., Gregori, D., Goss, P., ... Fioretti, P. (2006). Lack of improvement of clinical outcomes by low-cost, hospital-based heart failure management programme. *Journal of Cardiovascular Medicine*, *7*, 614-622.

Ojeda, S., Anguita, M., Delgado, M., Atienza, F., Rus, C., Granados, A., ... Velasco, J. (2005). Short- and long-term results of a programme for the prevention of readmissions and mortality in patients with heart failure: Are effects maintained after stopping the programme?. *The European Journal of Heart Failure*, 921-926.

Pallant, J. (2007). *SPSS: Survival Manual, A Step by Step Guide to Data Analysis using SPSS for Windows* (3rd ed.). New York, NY: McGraw-Hill.

Pathman, D. E., Konrad, T. R., Freed, G. L., Freeman, V. A., & Koch, G. G. (1996). The Awreness-to-Adherence Model of the Steps to Clinical Guideline Compliance: The Case of Pediatric Vaccine Recommendations. *Medical Care*, *34*, 873-889.

Pennsylvania Health Care Quality Alliance. (2010). *Quality Measures: Appropriate Care*. Retrieved November 21, 2010, from http://www.phcqa.org/measures/category.php?category_id=5

Phillips, C., Singa, R., Rubin, H., & Jaarsma, T. (2005). Complexity of program and clinical outcomes of heart failure disease management incorporating specialist nurse-led heart failure clinics: A meta-regression analysis. *The European Journal of Heart Failure*, 333-341.

Premier, Inc.. (2006). *Centers for Medicare and Medicaid Services (CMS)/Premier Hopsital Quality Incentive Demonstration Project: Findings from Year One*. Retrieved from Premier, Inc.: http://www.premierinc.com/quality/tools-services/p4p/hqi/hqi-whitepaper041306.pdf

Purcell, J. A., & Fletcher, B. J. (2009). *A Stronger Pump: A guide for people with all types of Heart Failure* (2010 ed.). Atlanta, GA: Pritchett & Hull Associates.

Ramachandran, K., Husain, N., Maikhuri, R., Seth, S., Vij, A., Kumar, M., ... Srinath Reddy, K. (2007). Impact of a comprehensive telephone-based disease management programme on quality-of-life in patients with heart failure. *The National Medical Journal of India*, *20(2)*, 67-73.

Riegel, B., Carlson, B., Glaser, D., & Romero, T. (2006). Randomized Controlled Trial of Telephone Case Management in Hispanics of Mexican Orgin with Heart Failure. *Journal of Cardiac Failure*, *12(3)*, 211-219.

Roccaforte, R., Demers, C., Baldassarre, F., Teo, K., & Yusuf, S. (2005). Effectiveness of comprehensive disease management programmes in improving clinical outcomes in heart failure patients: A meta-anlaysis. *The European Journal of Heart Failure*, *7*, 113-1144.

Ross, J., Chen, J., Lin, Z., Bueno, H., Curtis, J., Keenan, P., ... Krumholz, H. (2010). *Recent National Trends in Readmission Rates After Heart Failure Hospitalization*. Retrieved from http://circheartfailure.ahajournals.org/content/3/1/97.full.pdf+html

Shaw, L., Olson, M., Kip, K., Kelsey, C., Johnson, B. D., Mark, D., & Merz, C. N. (2006). The Value of Estimated Functional Capacity in Estimating Outcome: Results From the NHBLI-Sponsored Women's Ischemia Syndrome Evaluation (WISE) Study. *Journal of the American College of Cardiology*, *47*, S36-S43.

Smith, B., Forkner, E., Zaslow, B., Krasuski, R., Stajduhar, K., Kwan, M., ... Freeman, G. (2005). Disease Management Produces Limited Quality-of-life Improvements in Patients with Congestive Heart Failure: Evidence From a Randomized Trial in Community-dwelling Patients. *The American Journal of Managed Care*, *11*, 701-713.

Smith, B., Hughes-Cromwick, P. F., Forkner, E., & Galbreath, A. D. (2008). Cost-effectiveness of Telephonic Disease Management in Heart Failure. *The American Journal of Managed Care*, *14(2*), 106-114.

Stephens, M. (2009). *Cardiac Rehabilitation*. Retrieved April 12. 2011, from http://www.aafp.org/afp/2009/1101/p955.html

Taylor, S., Bestall, J., Cotter, S., Falshaw, M., Hood, S., Parsons, S., ... Underwood, M. (2009). Clinical service organisation for heart failure. *Cochrane Database of Systematic Reviews*, 1-91.

Thompson, W. R., Gordon, N. F., & Pescatello, L. S. (Eds.). (2010). *American College of Sports Medicine (ACSM's) Guidelines for Exercise Testing and Prescription* (8th ed.).

U.S. Department of Health & Human Services. (n.d.). *The Health Insurance Portability and Accountability Act of 1996 (HIPPA) Privacy and Security Rules*. Retrieved December 11, 2010, from http://www.hhs.gov/ocr/privacy/

United States National Library of Medicine: National Institutes of Health. (n.d.). *National Information Center on Health Services Research and Health Care Technology*

(NICHSR). Retrieved November 17, 2010, from http://www.nlm.nih.gov/nichsr/hta101/ta10106.html

VanVonno, C. J., Ozminkowski, R. J., Smith, M. W., Thomas, E. G., Kelley, D., Goetzel, R., ... Walker, D. R. (2005). What Can a Pilot Congestive Heart Failure *Disease Management* Program Tell Us about Likely Return on Investment? A Case Study from a Program Offered to Federal Employees. Disease Management, *8*, 346-360.

Weiss, B. D. (2007). *Health literacy and patient safety: Help patients understand - Manual for clinicians*. Retrieved November 20, 2010, from http://www.ama-assn.org/ama1/pub/upload/mm/367/healthlitclinicians.pdf

White, M., Howie-Esquivel, J., & Caldwell, M. (2010). Improving Heart Failure Symptom Recognition: A Diary Analysis. *Journal of Cardiovascular Nursing*, *25*(1), 7-12.

Willey, R. M. (in press). Managing Heart Failure: A Critical Appraisal of the Literature. *Journal of Cardiovascular Nursing.*

Woodward, B. (1995, July 30). Disease management: opportunity for pharmaceutical care?. *Hospital Pharmacy*, *7*, 596, 599-603, 606-8. doi: http://www.ncbi.nlm.nih.gov.silk.library.umass.edu:2048/mesh

Yu, D., Thompson, D., & Lee, D. (2006). Disease management programmes for older people with heart failure: crucial characteristics which improve post-discharge outcomes. *European Heart Journal*, *27*, 596-612.

Zile, M. R., Bourge, R. C., Bennett, T. D., Stevenson, L. W., Cho, Y. K., Adamson, P. B., ... Kueffer, F. J. (2008). Application of Implantable Hemodynamic Monitoring in the Management of Patients with Diastolic Heart Failure: A Subgroup Analysis of the COMPASS-HF Trial. *Journal of Cardiac Failure*, *14(10*), 816-82

Figure Captions

Figure 12. Inpatient O2 Oxygen Uptake Distribution

Figure 13. Outpatient O2 Oxygen Uptake Distribution

Figure 14. Age vs. Change in O2 Uptake by Gender

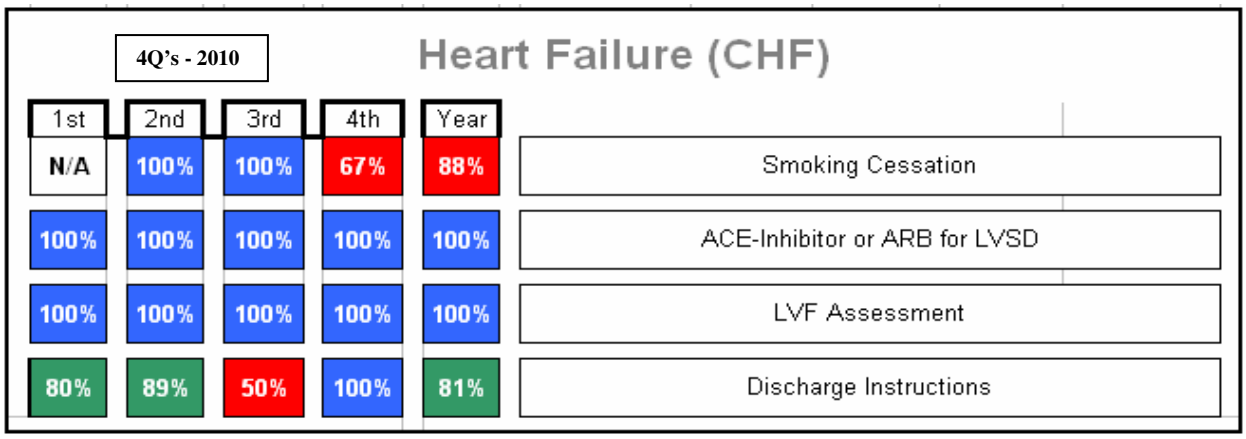
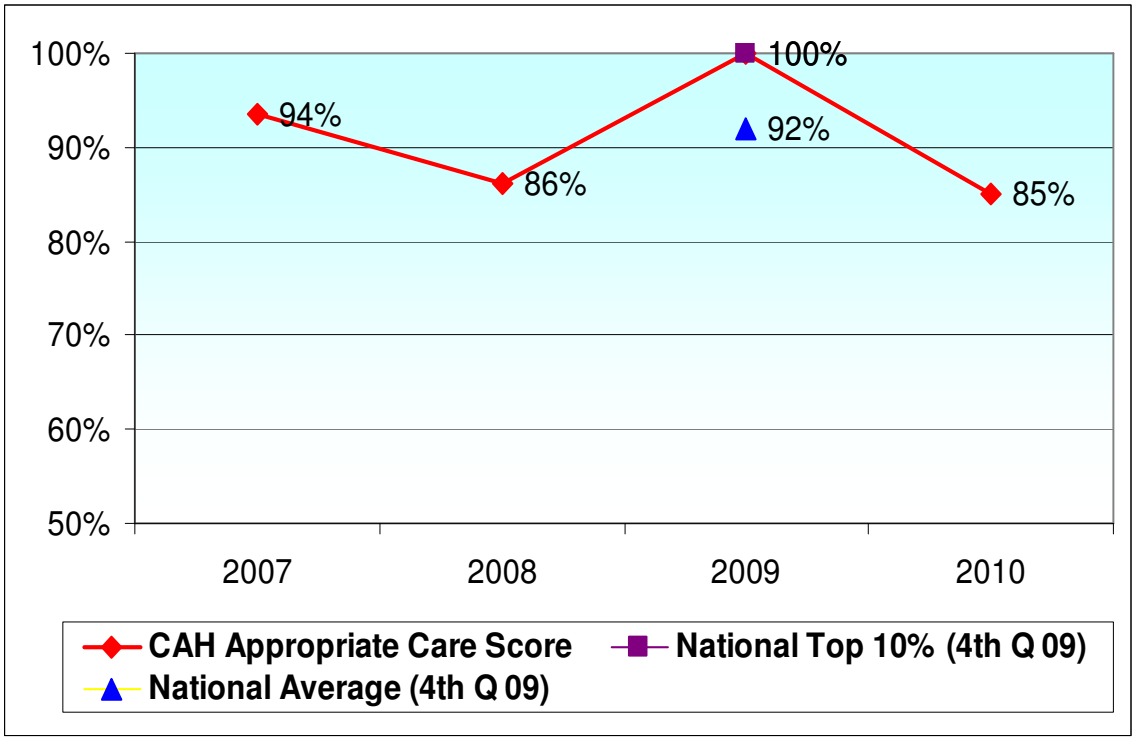


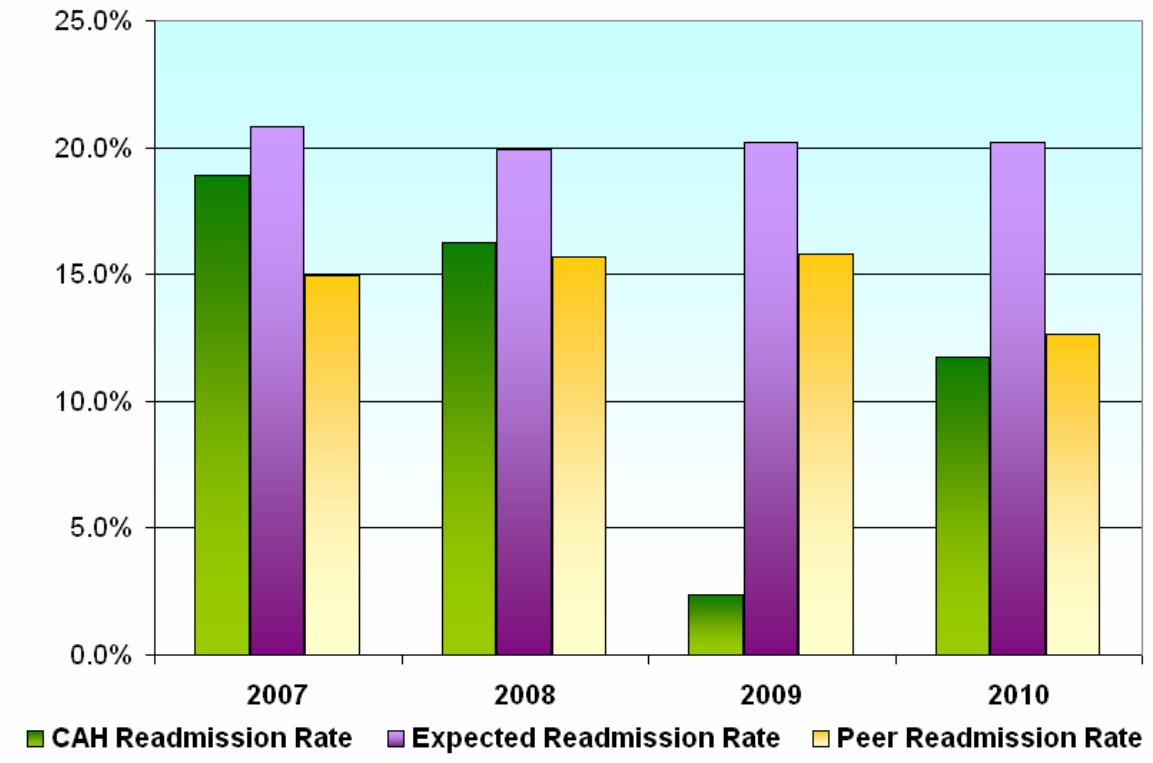
Figure 1. Critical Access Hospital HF Process Measures Year 2010
Critical Access Hospital (2011, March).



	2007	2008	2009	2010
Num	29	31	38	40
Den	31	36	38	47

Figure 2. Critical Access Hospital HF Appropriate Care Score

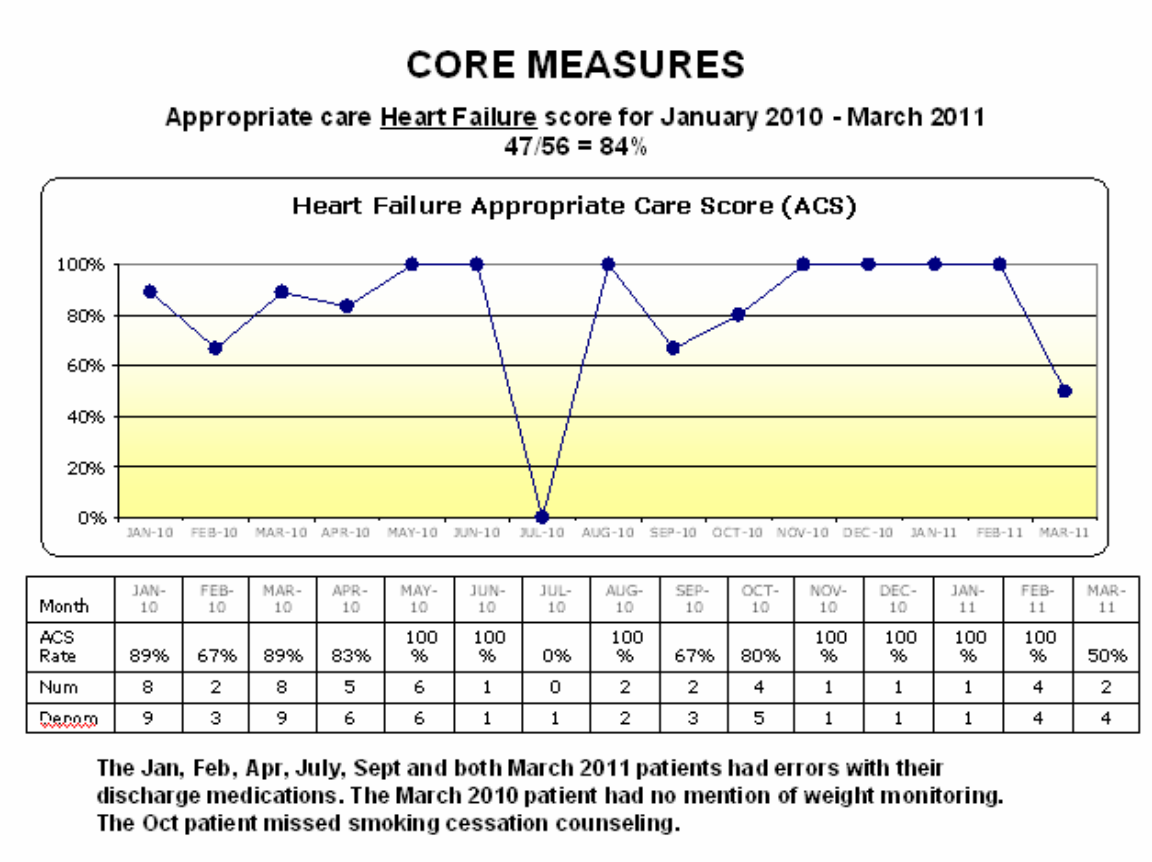
Critical Access Hospital (2011, March).



Year	Readmissions for Facility	Cases for Facility	Readmission Rate for Facility	Expected Readmission Rate for Facility	Readmission Rate for Peer
2007	7	37	18.92%	20.80%	14.93%
2008	7	43	16.28%	19.94%	15.71%
2009	1	42	2.38%	20.23%	15.79%
2010	6	51	11.76%	20.20%	12.63%

Figure 3. Critical Access Hospital (CAH) HF 30 Day All-Cause Readmission Rate

Critical Access Hospital (2011, March).



Month	JAN-10	FEB-10	MAR-10	APR-10	MAY-10	JUN-10	JUL-10	AUG-10	SEP-10	OCT-10	NOV-10	DEC-10	JAN-11	FEB-11	MAR-11
ACS Rate	89%	67%	89%	83%	100 %	100 %	0%	100 %	67%	80%	100 %	100 %	100 %	100 %	50%
Num	8	2	8	5	6	1	0	2	2	4	1	1	1	4	2
Denom	9	3	9	6	6	1	1	2	3	5	1	1	1	4	4

The Jan, Feb, Apr, July, Sept and both March 2011 patients had errors with their discharge medications. The March 2010 patient had no mention of weight monitoring. The Oct patient missed smoking cessation counseling.

Figure 4. Appropriate Care Score (ACS) Breakdown

Critical Access Hospital (2011, March).

DISCHARGE TIME OUT - Heart Failure (HF) Pilot Program

Heart Failure (HF) Specific Considerations / Management Issues

- LVF assessment: Has the patient ever had an ECHO? Y/N
- ACE or ARB for EF less than 40% - Contraindication documented? Y / N
- Beta Blocker for EF less than 40% - Contraindication documented? Y / N
- Submit diet consult through Meditech
- Call Nutrition Center: xxx-xxxx for outpt nutrition appointment

NURSING

- Enhanced admission assessment includes: identification of caregivers for D/C planning & predicting post hospital needs.
- Duke Activity Status Index (DASI) given to patient and completed shortly after admission
- Determine need for smoking cessation / counseling
- Did the pt. smoke <u>anytime</u> during the 12 mths prior to hospital arrival? Y / N If yes, document if pt. declined or received smoking cessation counseling.
- Patient/caregiver education completed and documented nurses note utilizing "teach back" & "Ask me 3" techniques
- Document pt. understanding (or caregiver) of HF disease management in discharge nurses note in Meditech
- Discharge Instructions must address: physical activity, diet, follow-up, medications, worsening symptoms, and weight monitoring
- FVH heart failure education packet given to patient / caregiver
- Medication reconciled
- Medication profile reviewed with patient and/or caregiver
- Prescription given to patient/caregiver
- Nursing Home/Home Care referral completed, patient/caregiver given copy for Home Care
- Pnuemovax/flu vaccine given if applicable
- HF out-patient appointment **scheduled** with Cardiology FNP _____
  Call Cardiology: ext 9777
- Patient instructed regarding out-patient cardiology appointment
- Patient instructed regarding follow-up blood work, if needed.
- Scale provided to patient and/or caregiver if needed

<u>NOTE</u>: Staple Med Rec and DC Instructions to this form after discharge

"HF" Nurse Name: _____Date of Patient Discharge:_____

Figure 5. DISCHARGE TIME OUT - Heart Failure (HF) Pilot Program

Trial form for HF Pilot Program 2011

Duke Activity Status Index

Overview:

The Duke Activity Status Index is a self-administered questionnaire that measures a patient's functional capacity. It can be used to get a rough estimate of a patient's peak oxygen uptake.

Item	Activity	Yes	No
1	Can you take care of yourself (eating dressing bathing or using the toilet)?	2.75	0
2	Can you walk indoors such as around your house?	1.75	0
3	Can you walk a block or two on level ground?	2.75	0
4	Can you climb a flight of stairs or walk up a hill?	5.50	0
5	Can you run a short distance?	8.00	0
6	Can you do light work around the house like dusting or washing dishes?	2.70	0
7	Can you do moderate work around the house like vacuuming sweeping floors or carrying in groceries?	3.50	0
8	Can you do heavy work around the house like scrubbing floors or lifting and moving heavy furniture?	8.00	0
9	Can you do yardwork like raking leaves weeding or pushing a power mower?	4.50	0
10	Can you have sexual relations?	5.25	0
11	Can you participate in moderate recreational activities like golf bowling dancing doubles tennis or throwing a baseball or football?	6.00	0
12	Can you participate in strenuous sports like swimming singles tennis football basketball or skiing?	7.50	0

Duke activity status index =

= SUM(values for all 12 questions)

Interpretation:

- maximum value 58.2

- minimum value 0

estimated peak oxygen uptake in mL/min =

= (0.43 * (duke activity status index)) + 9.6

References:

Hlatky MA Boineau RE et al. A brief self-administered questionnaire to determine functional capacity (The Duke Activity Status Index). Am J Cardio. 1989; 64: 651-654

Figure 6. Duke Activity Status Index (DASI) A Self-Administered Questionnaire

HEART FAILURE PILOT PROGRAM - Patient Teaching

"A Stronger Pump"

Category	Pages	Nurse providing education	Patient able to teach back? Yes or No	Patient unable to teach back (please comment)
Heart failure	2			
How you may feel	3-6			
Heart failure testing	7-9			
Medical treatment	10-17			
Surgery for heart failure	18-20			
Your role in heart failure control	21-30			
In summary	31			
Causes of heart failure	32-37			
Congenital heart disease	38-39			
Managing heart failure at home	40			

"Stop Light Education"

Category	Nurse providing education	Patient able to teach back? Yes or No	Patient unable to teach back (please comment)
Green Zone			
Yellow Zone			
Red Zone			

Nurse	Initials	Nurse	Initials

Figure 7. HEART FAILURE PILOT PROGRAM - Patient Teaching - "A Stronger Pump"

HEART FAILURE PILOT PROGRAM - Patient Satisfaction

Your comments and concerns are very important to us. We are continually trying to improve our heart failure pilot program. Please take a moment to complete this survey and return it in the provided self addressed, stamped envelope.

Directions: Please circle the number that corresponds to your rating for each program part – with 5 being the highest rating and 1 being the lowest rating. Please provide detailed comments for each area.

A. In-patient Education (Your hospital stay)	Very good	good	fair	poor	Very poor	
13. The education portion was effective in teaching me new information and reinforced information I already knew.	5	4	3	2	1	n/a
14. The nurses presented the education material with enthusiasm.	5	4	3	2	1	n/a
15. The nurses were knowledgeable and well prepared to present education material.	5	4	3	2	1	n/a
16. The education sessions covered all necessary information and answered my questions.	5	4	3	2	1	n/a
Comments:						

B. Out-patient Education (In the Cardiology Dept.)	Very good	good	fair	poor	Very poor	
17. The education portion was effective in teaching me new information and reinforced information I already	5	4	3	2	1	n/a

knew.						

18. The nurse practitioner(s) presented the education material with enthusiasm.	5	4	3	2	1	n/a
19. The nurse practitioner(s) were knowledgeable and well prepared to present education material.	5	4	3	2	1	n/a
20. The education sessions covered all necessary information and answered my questions.	5	4	3	2	1	n/a
Comments:						

C. Facility and Nursing (Overall)	Very good	good	fair	poor	Very poor	
1. All staff provided an appropriate level customer service.	5	4	3	2	1	n/a
2. The heart failure program provided all the information I needed.	5	4	3	2	1	n/a
3. The facilities are clean and safe.	5	4	3	2	1	n/a
3. Please rate the overall care you received during the program.	5	4	3	2	1	n/a
Comments:						

Thank you very much for taking the time to complete this survey.

Figure 8. HEART FAILURE PILOT PROGRAM - Patient Satisfaction

CAH - HEART FAILURE ROUTINE TELEPHONE CALL

Patient's Name: _____Date of call: _____
ID No.: _____Date of D/C: _____
Cardiologist: _____ Primary MD: _____

Telephone Assessment

1. Current symptoms
   - ☐ Chest pain/discomfort
   - ☐ Shortness of breath
   - ☐ Palpitations
   - ☐ Night time SOB
   - ☐ Dizziness
   - ☐ Fatigue
   - ☐ Edema of legs, ankle, & / or abdomen
     - Is this a change_____
       - If any of the above are checked, please page Cardiology NP @ #9739
   - ☐ Weight today: _____lb
     - Change _____lb
     - Hospital discharge weight:_____lb
     - Initial Home weight:_____lb
       - If patient gains >2lbs/24 hours or 5 lbs in 1 week, please page Cardiology NP @ #9739
     - 2000 mg sodium (salt) restriction compliance? _____
     - Other (specify) _____
2. Change in symptoms: Overall, how are your symptoms compared to 2 days ago?
   - ☐ Better ☐ About the Same ☐ Worse (describe) _____
     - If patient describes symptoms as "worse" please page Cardiology NP @ #9739
3. Current treatments
   - ☐ Medication changes (for CHF)
     - Were you able to get all your medications from the pharmacy?
     - Any issues with current medications?
     - Any questions understanding your medication list?
     - Discharge medication profile attached
4. "Can you tell me the name of your water pill?"_____
5. "Are you using the stop light visual"? _____
   - ☐ "Can you tell me what amount of weight gain you should report to your doctor?"_____
   - ☐ "Which doctor would you report those symptoms to?"_____
6. "Have you had an Echocardiogram of your heart recently"?_____
7. "Have you recently had counseling about stopping smoking"?_____

MANAGEMENT RECOMMENDATIONS / Follow-Up (check all that apply)

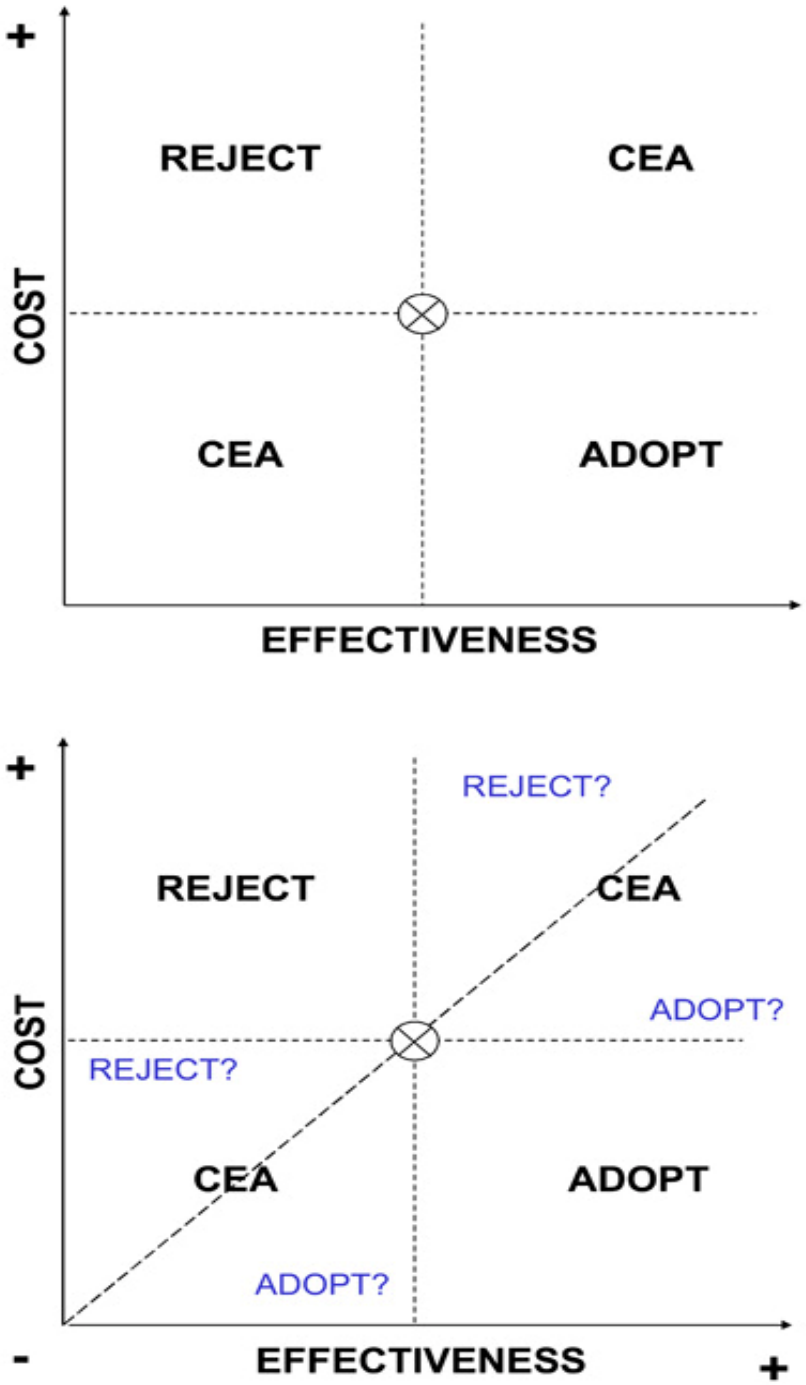
- ☐ Contacted Cardiology, FNP BC re: CHF issues phone extension 9739 or pager #9739
- ☐ Cardiologist Follow Up Appointment:_____
- ☐ Primary Care Physician Follow Up Appointment:_____

Figure 9. Critical Access HF Routine Telephone Call

	Base Case	Conservative	Quoted in Literature
DM Program	$750	$1400	$93 - 1400
HF Hospitalization	$5000	$2500	$2500-14000
Annual Outpatient HF Care	$1700	$2700	$680-2700
Annual Non-HF Health Care	$10000	$13000	$7300-13000

Figure 10. Chan and colleagues (2008): Cost Estimates for HFDM Program

A cost-effectiveness analysis (CEA) was performed by Chan and colleagues for disease management programs enrolling high-risk to baseline-risk patients; standardized to 2005 US dollars by the consumer price index for health care. Costs for hospitalization were incurred whenever a patient was hospitalized; also accounted for were yearly outpatient HF costs and non-HF health care costs (Chan et al., 2008).



Reference:
United States National Library of Medicine: National Institutes of Health (n.d.). National Information Center on health Services Research and Health Care Technology (NICHSR). HTA 101: IV. Cost Analysis Methods. Retrieved on 11/17/2010 from http://www.nlm.nih.gov/nichsr/hta101/ta10106.html

Figure 11. Cost-Effective Analysis (CEA)

Appendix A

Existing research on Heart Failure (HF) and Disease Management (DM)

Citation	Sample and location research/study was performed	Design	Outcomes/Results of the intervention and/or objectives of the study	Strength(s) and weakness(es)	Evidence Level	Evidence Class
Inglis et al., (2010)	25 full peer-reviewed studies meta-analysed. International	Systematic Review and meta-analysis	Assess the effects of telemonitoring and/or structured telephone support programs on: 1. All-cause mortality, HF-related admissions, all cause readmissions and; 2. Length of stay, QOL, healthcare cost savings in patients with HF and acceptability of the intervention to patients with HF.	Strength of this review and meta-analysis is that these researchers considered and synthesized evidence on almost all aspects from which an effect of these interventions is important (mortality, hospitalizations, length of stay, acceptability, functional capacity and cost). Weakness: Unable to stratify results according to age, functional class or sex as outcomes were not reported in a manner that allowed extraction of sub-group specific data.	I	I
Copeland, Berg, & Johnson (2010)	458 pts South West, USA	Prospective randomized controlled design with a 1-year pre-intervention data collection	No differences in clinical outcomes were noted between the intervention group (telemedicine intervention) and the control group.	Strength: RCT with a 1-year pre-intervention data collection period and a 1-yr intervention and follow-up	II	IIa

		period and a 1-year intervention and follow-up period.	The HF related costs were higher for the intervention group, as were overall costs that included the cost of the intervention. Intervention group patients reported better compliance with weight monitoring and exercise recommendations.	period. Weakness: Intervention process measures and patient-level details on numbers of calls and alerts were unavailable for this study. All, but 5 patients, were male. Results of this study may not be generalizable to non-VA populations.		
Taylor et al., (2009)	Sixteen trials involving 1,627 patients were included.	Systematic Review	Effectiveness of disease management interventions for patients with HF. Interventions were classified into three models. Data abstracted does not allow for firm recommendations for practice.	Strength: Objectives and criteria for inclusion were clearly defined. Weakness: There was some overlap between models with some interventions being difficult to classify.	I	IIb
Hebert et al., (Oct. 2008)	Randomly assigned 406 patients to usual care (203 patients) or a nurse-led program (203 patients) in which patients had 1 in-person visit with a trained nurse and periodic follow-up telephone calls over 12	Randomized Control Trial (RCT)	A nurse-led disease management program for patients with HF improved QOL at an expected cost to society of less than $2177 per patient were more than offset by reduced hospital costs of $2378 per patient, but higher costs for outpatient procedures,	Strength: This is the first cost-effectiveness analysis for nurse management of HF to include all recommended categories of cost. Weakness: Since the trial was conducted	II	IIb

	months. Harlem, NY		medications, and home health care prevented the intervention from being cost-saving over the 12-month study.	in an ethnically diverse, inner-city neighborhood, these results may not be generalized to other settings.		
Esposito et al. (2008)	37,000 beneficiaries in the Medicare fee-for service (FFS) program. Southern Florida	Randomized, intent to treat design; over 18 month period of program operations.	The LifeMasters Supported SelfCare demonstration program provides primarily telephonic patient education and monitoring services. Over the first 18 program months, average Medicare costs of the treatment group were nearly 10 percent lower ($p = 0.008$) than those of the control group among patients with HF residing in the LifeMasters redesign catchment area at enrollment. For Medicare fee-for service (FFS) program, beneficiaries with HF who resided in high-cost South Florida counties, the program reduced Medicare expenditures by 9.6%.	Strength: Large sample size, clear display of statistical results. Weakness: Portions of their analysis included other conditions, although HF was extracted separately for examination. Only 35% had HF even though it was a primary target condition for the demonstration.	II	I
Zile et al., (2008)	70 patients, a subgroup analysis of the COMPASS-HF Trial (Bourge et al., (2008).	Randomized Trial, Diastolic heart failure patients (DHF)	DHF patients were randomized to implantable hemodynamic monitor (IHM) guided care (treatment) vs.	Strength: Statistical results discussed and clearly displayed.	II	IIb

	Minneapolis, Minnesota	New York Heart Association (NYHA) class III or IV HF pt's included.	standard care (control) for 6 months. Results demonstrated a 20% nonsignificant reduction in the overall heart failure-related events (HFRE) rate in the treatment group (p = .66). IHM-guided care did not result in a statistically significant reduction in HFRE rate or reduction in relative risk of a HFRE in DHF pt's.	Weakness: The COMPASS-HF trial (Bourge et al., 2008) was not designed or powered with a sufficient number of DHF patients to statistically test the efficacy of IHM-guided management in DHF patients as a separate group.		
Krantz et al., (2008)	64 patients Denver, CO	Randomized Control Trial	Study compared 6-month rehospitalization rates among patients assigned to predischarge B-blockade coupled with postdischarge nurse management (intervention) versus usual care (control). Among intervention patients at 6-months, B-blocker utilization was higher (p <.001), mean NYHA class improved (p=.01), and total HF rehospitalizations were reduced by 84% (p = .02). A trend toward improved LVEF	Strength: statistical results clearly displayed. Potential strengths of this intervention strategy include its simplicity and generalizability into a variety of patient populations and health systems. Weakness: Small sample size, vulnerable population , loss to follow-up, and single center experience in CO.	II	I

			was also observed (p = .17).			
Jaarsma et al., (2008)	1023 patients Coordinating Study Evaluating Outcomes of Advising and Counseling in Heart Failure (COACH) Netherlands	Randomized controlled trial NYHA functional class II to IV included.	Pt's were assigned after HF hospitalization to 1 of 3 groups: control group (f/u by cardiologist) and 2 intervention groups with additional basic or intensive support by a nurse specializing in management of pt's with HF. Primary findings do not support the concept that adding either a basic or an intensive nurse-led management program to standard care of a cardiologist reduces the combined end point of death or rehospitalization because of HF.	Strength: Baseline characteristics of the 3 groups were comparable. Large sample size. Weakness: Limitations were not clearly stated. Explanations for the absence of a difference in the event rate between the control and intervention groups are that either patients in the control group were managed well enough already, thus making it difficult to further improve outcomes, or the quality of the intervention did not improve treatment.	II	IIb
Ramachandran et al., (2007)	50 patients: 2 groups of 25 pt's each. India	Prospective, Randomized clinical trial	Two groups of 25 pt's each over six month study period. The control group was managed in the HF clinic receiving usual care, and the intervention group underwent additional interventions utilizing interactive sessions	Strength: First report of the impact of a comprehensive telephone-based HF management program in India. Weakness: Small sample over short period: 6 mths.	II	IIa

			and telephonic helpline telephone calls. There was significant improvement in the QOL and functional capacity of patients in the intervention group compared with controls over a 6-mth period.	Design and setting was specific to the needs of an Indian population. Limitations to the study were not discussed.		
Nguyen et al., (2007)	190 patients: 94 in the experimental group (HF management program) and 96 in the control group (standard care). Montreal, Canada	Randomized Trial	Assessed long-term recurrent ED visits, readmissions, and mortality among HF patients who were discharged after a 6-month intensive HF management program (HFMP). Study revealed no sustained long-term benefit compared to usual care for severely ill patients (mostly NYHA III and IV) who have just been discharged from a successful 6-mth intensive HFDM program	Strength: Despite small sample, ability to detect difference and large effect was good, because of the frequent occurrence of the outcome of interest. Weakness: Small sample size limits precision; lack of subgroup analyses. Unable to control for patient or physician variations. Subject with NYHA class II-IV only.	II	III
Del Sindaco et al., (2007)	173 patients Italy	Randomized Trial NYHA functional class III-IV included	Aim of the study was to determine the long-term efficacy of a hybrid disease management program (DMP) involving interdisciplinary DM with	Strength: Baseline evaluation upon discharge from hospital was discussed. Weakness:	II	IIa

			cardiologists, PCPs, nurses (intervention group) and usual care (control group) who received all treatments and services ordered by ther PCPs and /or cardiologists; combining pre- and post-discharge care and following patients for 2 years. At a 2-year follow-up, a 36% reduction in all-cause death and HF hospital admissions was observed in DMP vs. usual care. All-cause and HF admissions as well as length of hospital stay were also reduced. This study demonstrated a hybrid DMP for elderly HF pt's improves outcomes and is cost-effective over a long-term follow-up.	Small sample; Study was conducted at specialized HF clinics, thus generalizability of findings to less specialized clinical settings remains unknown.		
Gohler et al., (2006)	36 RCT studies published between 1993 and 2005 from 13 different countries with data from 8341 patients. Boston, MA Berlin,	Systematic Meta-analysis	A meta-analysis was performed to systematically combine the evidence on the efficacy of DMPs in the treatment of HF. Findings suggest that DMPs reduce all-cause mortality as well as first and	Strength: Analysis was based on a larger sample size and therefore yields a more precise estimate. Weakness: Because of the nature of	I	I

	Germany Hall, Austria		subsequent hospitalizations in patients with HF. This meta-analysis yielded a pooled risk difference of 3% ($p < .01$) for mortality and of 8% ($p < .0001$) for rehospitalization, both favoring DMP.	DMPs, blinding of patients and care providers to the intervention is not possible. Second, heterogeneity among included studies could only partly be explained by covariates. Also, intervention features vary from one DMP to another.		
Nucifora et al., (2006)	200 HF patients. Italy	RCT	Randomized trial of 200 HF pt's discharged from the hospital to evaluate the effect on re-hospitalization and death of a comprehensive HF management program. Analysis suggests that the intervention group (intensive education by an experienced cardiovascular research nurse) did not achieve better results than the usual care control group who received the preexisting routine of post-discharge care.	Strength: Patients were randomized during hospitalization, prior to discharge. Weakness: Small sample size. Italian HF management guidelines from 1998 were followed.	II	III
Riegel et al., (2006)	134 hospitalized Hispanics with HF	RCT	Hospitalized Hispanics with chronic HF were enrolled and randomized to	Strength: The intervention was refined to be culturally	II	III

	U-Penn Philadelphia, PA; San Diego, CA		intervention (telephone case management) or usual care (discharge instructions provided). No significant group differences were found in HF hospitalizations, HF readmission rate, HF days in the hospital, HF cost of care, all-cause acute care use or cost, mortality, health-related quality of life, or depression.	appropriate. Weakness: Small sample size; Focused solely on Hispanics with HF pointing to a selective population group.		
Yu et al., (2006)	Twenty-one RCTs published between 1995-2004 Studies originated in eight countries (Australia, Canada, Ireland, Netherlands, Spain, Sweden, UK, and USA).	Systematic Review	Twenty one trials were identified which reported disease management programs (DMPs) improving the discharge outcomes of older people with heart failure. Results indicate that an effective DMP should be multi-faceted and consist of an in-hospital phase of care, intensive patient education, exercise and psychosocial counseling, self-care supportive strategy, optimization of medical regimen, and ongoing surveillance and management of clinical	Strenth: This review only included studies that randomized the sample and recruited a control group. Weakness: Sample size varied considerably among the studies; studies evaluated dates back to 1995; considerable variations in clinical factors among the 21 reviewed studies were noted with significant regional differences in patient demographics.	I	I

			deterioration.			
Delgado-Passler & McCaffrey (2006)	Five RCT studies examined	Literature Review	The primary purpose of this literature review was to examine advanced practice nurse (APN)-directed versus registered nurse (RN)-directed telemanagement programs for heart failure. Findings from three RCT studies confirmed an APN role as effective in improving patient outcomes in HF management and reduce rates of readmissions.	Strength: Study results were clearly displayed. Weakness: Studies were not meta-analyzed. Outcome measures varied between all five studies.	IIa	V
Roccaforte et al. (2005)	Thirty-three RCTs were included. Date ranges: 1980-2004 Canada & Italy	Meta-analysis	Aim was to summarize the evidence supporting DMP effectiveness in improving HF clinical outcomes. RCTs were included if: patients were enrolled with a diagnosis of HF, were followed in an outpatient setting; a comprehensive DMP was compared to usual care; all-cause mortality and/or (re)hospitalization rates, and HF-related (re)hospitalization rates and/or HF-related mortality, were the outcomes assessed. Results	Strength: A sensitivity analysis was performed, stratifying trials for the quality components considered: if all of them were present in a study, the study was deemed of "high" quality; otherwise, it was judged as being "not high". The literature search was continuously updated while the review was in progress. Weakness: It was not possible to demonstrate whether DM	I	I

			demonstrated that DMP reduced mortality and hospitalizations in HF patients. Because various types of DMP appear to be similarly effective, the choice of a specific program depends on local health services characteristics, patient population, and resources available.	programs for HF were effective in all clinical settings, because most studies included were performed in academic, tertiary, or urban hospital centers.		
Phillips et al., (2005)	Seven reports of six randomized clinical trials selected. Date ranges: 1966-2004 Boston & Baltimore, USA The Netherlands	Meta-regression analysis	Objectives of this study were to determine whether a hierarchy of effectiveness exists with respect to complexity of published protocols of HF disease management (DM) incorporating specialist nurse-led HF clinics. The available evidence suggests that specialist nurse-led HF clinics are efficient additions to, or promising alternatives for, HF DM and a very appealing strategy for carefully selected patients.	Strength: Data synthesis and results was well described. Weakness: The results reflect data from a limited number of studies that were not powered to detect changes in the range of outcomes evaluated; therefore, the possibility of a Type II error cannot be ruled out.	I	I
Ojeda et al., (2005)	153 pt's discharged from a Cardiology ward – Spain.	RCT, Prospective study	The objective of the study was to evaluate whether improvements obtained during an HF intervention program were maintained after	Strength: Statistical results were well displayed and discussed in detail. Both groups were homogeneous in	II	IIa

			the program stopped. Patients were randomized to either usual care (control group) or the intervention group which consisted of formal education for patients and their families prior to discharge; self-monitoring of vital signs, diet and exercise counseling, effects of medications, and measures to be taken in case of worsening. After DC, regular f/u visits at the outpatient HF clinic were scheduled every 3 months, to assess the pt's knowledge of care, to optimize medical therapy and to reinforce the pt's self-care. Results demonstrated the positive effects of an intervention program are clearly reduced when it is stopped.	terms of prevalence of cardiovascular risk factors. Etiology of HF was similar in control and intervention pt's. Weakness: It is possible that these results cannot be extrapolated to all HF pt's, since the study only included pt's DC from the cardiology service; therefore, extrapolation of these results to a general population of pt's with HF requires further study. In addition, randomization of pt's to either continuation or withdrawal of the program, was not done in this study.		

Source of applying classification of recommendations:
Hunt, S. A., Abraham, W. T., Chin, M. H., Feldman, A. M., Francis, G. S., Ganiats, T. G., Oates, J. A., et al. (2009). 2009 Focused Update Incorporated Into the ACC/AHA 2005 Guidelines for the Diagnosis and Management of Heart Failure in Adults: A Report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines: Developed in Collarboration With the International Society for Heart and Lung Transplantaion. (DOI: 10.1161/CIRCULATIONAHA.109.192065). Retrieved from American Heart Association: http://www.circ.ahajournals.org

Source for applying level of evidence:

Melnyk, B., & Fineout-Overholt, E. (2005). Making the Case for Evidence-Based Practice. In *Evidence-Based Practice in Nursing & Healthcare: A Guide to Best Practice* (pp. 3-24). Philadelphia: Lippincott Williams & Wilkins.

Appendix B

Proposed Inputs and Outputs to the Organizational HF Pilot Proposal

Elements	Measure of Inputs	Measure of Outputs	Cost
Human Resources: Quantity and quality of personnel: Personnel costs (New hires, FTEs, hours of training and education, biostatistial consulting).	1. There were no new hires for this pilot program. 2. Designated HF Nurse on 2MS/CCU will notify outpt cardiology to schedule appointment for HF pt's with NP, prior to HF pt's discharge. 3. Outpt cardiology receptionist will provide appointment to 2MS/CCU HF nurse or charge nurse prior to pt. discharge. 4. U-Mass biostatistical consulting	1. No new employees 2. Number of hours worked was not increased due to scheduling appt. for HF patients. 3. Providing appt. day/time is existing responsibility of cardiology receptionist 4.Biostatitical consulting fee at a student rate.	During pilot – $60.00/hr student fee for UMass statistician After Pilot Completion: Program adoption may lead to hiring a designated cardiology NP. Estimated salary with total compensation (includes benefit package) est. $117,985.92
Informational Resources: Computer hardware and software – a physical source; Information Systems (IS) computer generated reports.	1. During "pilot program" no upgrading of hardware or software occurred. 2. Printing materials for medical records and or documents 3. New IS report capacities may occur after completion with information systems (IS) support.	1. Printing of tools/forms are anticipated for data collection purposes: Discharge Time Out & Post-discharge phone follow-up. 2. After completion of Pilot Program, adoption may lead into new report generation or electronic medical record specific for HF care.	During pilot – $5.70 for two reams of paper. After Pilot Completion: Program adoption may lead into new report generation. Cost currently undetermined.
Monetary Resources: Funding	Amount of grant monies submitted for program funding.	Awaiting determination	No funding or receipt of grant monies occurred
Physical Resources: Material resources, facilities, and equipment.	1. No new equipment or facility space was anticipated for Pilot Program. 2. Program adoption may require additional space for NP, if hired.	1. No changes to physical resources are needed for HF Pilot Program intervention delivery. 2. Program adoption may require additional exam room	During pilot – $00.00 Program adoption may require additional office/exam room space. Cost currently undetermined.
Managerial Resources: Program Manager/Facilitator	1. Education of program manager and/or facilitator	1. No additional managers are	Program facilitator estimated volunteer

	is suitable for pilot; Program facilitator is a Doctor of Nursing Practice (DNPc) candidate in the Family Nurse Practitioner Track (FNPc). 2. Additional assistance and coverage for facilitator provided by an RN; cardio-pulm dept.	anticipated. 2. Cardio-Pulm RN assisted facilitator with inpatient aspects along with f/u phone calls post discharge.	hours per week: 24-32 hours. This is "in-kind", contributed time. Calculation to be determined by program mentor and CFO. Assistance from cardio-pulm RN was less than 8 hrs per week for pilot program with no additional cost. However, if program is adopted, designated staff would need to be established.
Time Resources:	1.Timeline developed, presence of deadline for completion available	1.No delay in meeting deadlines	During pilot – $00.00
TOTAL COSTS ANTICIPATED FOR PILOT PROGRAM **TOTAL COST ANTICIPATED FOR STATISTICAL CONSULTATION**			**$5.70 + (in-kind amount)** **Student fee rate of $60.00 / hr.**
TOTAL COSTS FOR THREE MONTH PILOT PROGRAM			= $**185.00** (plus in-kind)
TOTAL COST ANTICIPATED FOR STATISTICAL CONSULTATION (with Pilot continuation, post doctoral) **CARDIO-PULM. RN; increase of 8 hrs per week with pilot continuation. (Average RN hourly wage: $31.35/hr)** **Pilot Continuation for 3 additional mths =**			**$60-$80 per hour** 3 hrs anticipated **$2,880.** (3 mths) **Estimated: $3,120.**
TOTAL COSTS ANTICIPATED FOR PROGRAM ADOPTION			**$117,985.92 for hiring of new NP**

Appendix C

Proposed Inputs and Outputs to the Service Utilization Plan

Elements	Measure of Inputs	Measure of Outputs	Cost
Recipients: Determines the extent to which the target audience has been reached.	1. All HF patients who were discharged home were included in this pilot study. 2. HF patients being discharged to extended care facilities were excluded from this pilot study. 3. HF patients who are transferred to another acute care center were excluded from this pilot study (1 pt. was waived).	A. Extent to which the target audience has been reached.	During pilot – $00.00
Participants: Extent of multidisciplinary staff engagement.	1. Hospitalists involvement was critical 2. Nurses who will volunteer in becoming "HF Nurses" and/or champions for pilot program was critical. 3. Cardiologist involvement was critical. 4. Cardiology NP, involvement during outpatient HF patient visits was critical.	A. Extent to which the target audiences has been reached.	During pilot – $00.00 Program adoption may require additional workshops for nurses focusing on acute HF care. Cost currently undetermined. Cardiology NP involvement may necessitate additional compensation. Amount undetermined.
Queuing: Ability of system to move patients through program	1. Follow-up phone calls made post discharge within 24-48 hours. 2. Out pt. appointment with cardiology is scheduled 7-10 days post discharge	1. Data collection completed for f/u phone calls. 2. Patients are seen within 7-10 days in outpatient cardiology.	During pilot - $00.00
Social Marketing: Extent of social marketing	1. Quality and extent of social marketing	1. Multi-disciplinary team	During pilot - $00.00

analysis	within the organization will be conducted and maintained by the program facilitator. 2. Meeting with local PCPs will be conducted through the CAH Medical Staff Dept.	members at the CAH are aware of pilot program. 2. Pertinent Council and/or committee awareness occurred in Dec 2010 and Jan 2011. 3. PCPs in the region were informed of this pilot program and ensured their patients will continue to follow-up with them for continuity in care.	Program adoption may require additional marketing costs – currently undetermined.
Intervention: How well the intervention was delivered to HF patients – Consistency of implementing program	1. Multi-disciplinary staff were encouraged to be supportive of program interventions 2. Extent of revisions based on previous cycle or month of intervention delivery.	1. Number of hours for program delivery will be tracked 2. Number of participants completing intervention (service completion) will be tracked.	See Table for cost benefit analysis
Organization: How well this pilot was viewed by stakeholders and staff.	1. Viewpoints and participation of administration 1. Viewpoints and participation of hospitalists and cardiologists 2. Viewpoints and participation of nursing staff	1.Administration acceptance 2. Hospitalists acceptance 3. Nursing staff acceptance	During pilot – Est. $00.00
TOTAL COSTS ANTICIPATED FOR PILOT PROGRAM			**$00.00**
TOTAL COSTS ANTICIPATED FOR PROGRAM ADOPTION			**Undetermined**