Improving Care for Patients Hospitalized with Heart Failure

IMPROVING CARE FOR PATIENTS HOSPITALIZED WITH HEART FAILURE

by

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A DNP Project Submitted to the Faculty of the

COLLEGE OF NURSING

In Partial Fulfillment of the Requirements
For the Degree of

DOCTOR OF NURSING PRACTICE

In the Graduate College

THE UNIVERSITY OF ARIZONA

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THE UNIVERSITY OF ARIZONA
GRADUATE COLLEGE

As members of the DNP Project Committee, we certify that we have read the DNP project prepared by Kathryn Amy Sisterman entitled "Improving Care for Patients Hospitalized with Heart Failure" and recommend that it be accepted as fulfilling the DNP project requirement for the Degree of Doctor of Nursing Practice.

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Final approval and acceptance of this DNP project is contingent upon the candidate's submission of the final copies of the DNP project to the Graduate College.

I hereby certify that I have read this DNP project prepared under my direction and recommend that it be accepted as fulfilling the DNP project requirement.

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ABSTRACT

Background: Heart failure is a clinical syndrome occurring from the heart's inability to effectively fill and or pump blood, it is the most common reason for admission in elderly patients. Guideline directed medical therapy refers to implementation of all class I agents to reduce patient morbidity and mortality, unless there is an appropriate contraindication. Appropriate beta blocker (BB), angiotensin converting enzyme inhibitor (ACEI) or angiotensin receptor blocker (ARB), and aldosterone antagonist (AA) are recommended to be prescribed together prior to discharge for a hospital admission for decompensated heart failure with reduced ejection fraction (HFrEF). Get With The Guidelines – Heart Failure (GWTG- HF) is an online quality improvement project that assists hospitals in providing guideline directed care.

Objective: The purpose of this study was to determine if implementation of the GWTG-HF program, increases provider adherence to guideline directed medical therapy (GDMT) for patients admitted with a primary diagnosis of decompensated HFrEF at Banner University Medical Center Tucson (BUMCT).

Design: This is a quality improvement project with a pre and post test descriptive design.

Setting: BUMCT from 10/04/17 – 11/08/17

Participants: Fifty-five patients discharged with the primary diagnosis of decompensated HFrEF

Measurements: Baseline guideline adherence for a 30-day period was compared to guideline adherence after the initiation of the GWTG-HF program.

Results: The 24 patients pre intervention were compared to 31 patients post intervention. The following results were found when comparing pre and post adherence rates: BB adherence 92%

versus 100%, ACEI/ARB adherence 100% versus 94%, AA adherence 67% versus 84%, and guideline directed medical therapy 58% versus 81%. There were no statistically significant differences for the pre and post adherence rates.

Conclusion: Although, there were no statistically significant differences found to support that implementation of the GWTG-HF program, increases providers adherence to GDMT for patients admitted with a primary diagnosis of decompensated HFrEF, the trends were clear. In three out of four class I agents, there was an increase in appropriate provider prescribing per the guidelines.

INTRODUCTION

Heart failure is complex, clinical syndrome occurring from the heart's inability to effectively fill and or pump blood (Yancy et al., 2013). Common symptoms of heart failure include: fatigue, shortness of breath, and fluid retention. Heart failure with reduced ejection fraction is defined as a left ventricular ejection fraction less than 40% (Yancy et al., 2013). Left ventricular ejection fraction is assessed by visualization of myocardial contraction on a transthoracic echocardiogram; a normal left ventricular ejection fraction is around 60% (Yancy et al., 2013).

Heart failure is the most common primary diagnosis for hospitalization in patients over the age of 65 years (Heidenreich et al., 2013). By 2030, approximately one in every 33 persons in the United States of America will have a diagnosis of heart failure with projected direct medical costs that could reach 53 billion dollars annually (Heidenreich et al., 2013). Despite clear guidelines and established clinical benefit, guideline directed medical therapy is not implemented for all patients placing them at undue risk for increased morbidity and mortality (Fonarow et al., 2011). Quality improvement projects, including the American Heart Association's Get With The Guidelines – Heart Failure program have proven successful in helping care teams use guideline directed medical therapy (Heidenreich et al., 2012).

Clinical Practice Guidelines

Providers depend on guidelines to assist with evaluating scientific literature which assess the benefits and harms associate with each treatment option. Trustworthy guidelines increase care quality and improve patient outcomes (IOM, 2011). Trustworthy guideline development requires a systematic review of existing evidence, multidisciplinary expert task force, transparent

process to limit bias, explicit level of evidence, explicit class of recommendation, and revision process (IOM, 2011). The Institute of Medicine reviews clinical practice guidelines and has endorsed the joint efforts of the American Heart Association and the American College of Cardiology Foundation as compliant with their standards (IOM, 2011).

Since 1980, the American Heart Association and the American College of Cardiology Foundation have jointly translated scientific evidence into published clinical practice guidelines to promote best cardiovascular practices (Yancy et al., 2013). The heart failure clinical practice guidelines undergo a full review and revision approximately every six years. New evidence, medications, and devices that can change practices prompt a committee review with possible guideline updates as needed. The most recent heart failure guideline was released in 2013, prior to this the most recent release was in 2005 (Yancy et al, 2013; Hunt et al., 2005). Focus guideline updates on newly released therapies were released in 2016 and 2017 (Yancy et al., 2016; Yancy et al., 2017).

The focus of this paper is on the most recent full guideline release in 2013, it contains 60 pages of text and graphs to summarize over a hundred recommendations regarding the care of heart failure based on 924 references that were reviewed by its task force (Yancy et al., 2013). Due to the extensive nature of the selected clinical practice guideline, the chosen clinical syndrome will be further defined as inpatient care for decompensated heart failure with reduced ejection fraction. The chosen treatment will be further defined as adherence to the three class I recommended pharmacologic agents that have been shown to reduce morbidity and mortality in heart failure with reduced ejection fraction: appropriate beta blocker, angiotensin converting enzyme inhibitor or angiotensin receptor blocker, and aldosterone antagonist.

Quality Improvement Program

In 2005, the American Heart Association created one of the nation's largest, inpatient quality improvement programs, Get With The Guidelines – Heart Failure, which includes a registry. Retrospective, observational registries, offer the opportunity to determine the relevance of randomized, controlled trail data to real world practice (Faxon & Burgess 2016). Registries are the cornerstone for quality improvement initiatives, they provide data for the care that is actually delivered each day. They can be used to report and promote evidence based care via guideline adherence. They measure individual and institutional performance via quality and outcome measures (Faxon & Burgess 2016). The Get With The Guidelines – Heart Failure registry analyzes all major aspects of inpatient care for one of the most common causes of hospitalization, heart failure. However, if used to its full potential, this registry may offer more than just improving evidence based practice; based on patient outcomes, it can create practice based evidence (Faxon & Burgess 2016).

A learning health care system, as defined by the Institute of Medicine, uses a never ending cycle to translate evidence based practice into practice based evidence based on real world and patient outcomes (Kovacs, 2015). The patients typically treated do not resemble those carefully selected in randomized controlled trials. Common features that are underrepresented include: the very old, the very young, ethnic minorities, medical co-morbidities, and imperfect adherence. Practice level data can confirm results of randomized controlled trials with real world patients and conditions as well as generate new hypothesis for more effective care (Kovacs, 2015).

Not only does Get With The Guidelines – Heart Failure allow hospitals to track guideline adherence and outcome indicators for heart failure patients, but it also allows hospitals to share easily this information with care teams via emailed reports. Hospital systems that have implemented the Get With The Guidelines - Heart Failure program demonstrate improved provider adherence to guideline directed medical therapy (Heidenreich et al., 2012). This quality improvement project seeks to increase provider adherence to guideline directed medical therapy for patients hospitalized with the primary diagnosis of decompensated heart failure with reduced ejection fraction by implementing the Get With The Guidelines – Heart Failure program.

Definition of Concepts

Decompensated heart failure refers to patients with either a new or established diagnosis, but with worsening symptoms (Yancy et al., 2013). The New York Heart Association class is used to assess symptom severity, class II symptoms are defined as inability to perform ordinary physical activity such as walking more than two blocks without symptoms (NYHA, 1994).

This project recognizes that interdisciplinary efforts are required to consistently achieve high quality care in an academic teaching center. The term care team refers to all health care workers who directly or indirectly provide care for heart failure patients. Multidisciplinary heart failure teams have been shown to improve care processes and survival (Cooper & Hernandez, 2015). At Banner University Medical Center Tucson, heart failure team members include: attendings, fellows, residents, pharmacists, advanced practice providers, registered nurses, managers, and directors. The primary team is defined as the main admission team, they may seek out the consultation of another specialty, but they control what medications are prescribed. For

the purposes of this project the primary admitting team is either internal medicine, general cardiology, or heart failure.

Nationwide, the majority of admitted heart failure patients are cared for by an internal medicine primary team. Ultimately, it is up to the discharging provider to prescribe the guideline directed medical therapy, however all the members of the care team assist in achieving high quality care via active collaboration.

According to the American Heart Association, guideline directed medical therapy (GDMT) refers to implementation of all class I agents, unless there is a contraindication (Yancy et al., 2013). The American Heart Association provides a strength of evidence 'A' rating based on multiple populations evaluated via randomized clinic controlled trials and a 'C' rating based on limited data defining the standard of care (Yancy et al., 2013).

Beta blockers (BB) should be used in all patients with heart failure with reduced ejection fraction, unless there is a contraindication. The strength of this recommendation is '1C' (Yancy et al., 2013). Approved beta blockers include: Bisoprolol, Carvedilol, and Metoprolol Succinate (Yancy et al., 2013). Initiation of a beta blocker is not recommended while a patient is hypervolemic; however, it can be safely started prior to discharge in a patient who is euvolemic. Common contraindications that limit this medication include: symptomatic hypotension, symptomatic bradycardia, and significant heart block.

Angiotensin converting enzyme inhibitors (ACEI) should be used in all patients with heart failure with reduced ejection fraction, unless there is a contraindication. The strength of this recommendation is '1A' (Yancy et al., 2013). Approved angiotensin converting enzyme inhibitors include: Captopril, Enalapril, Fosinopril, Lisinopril, Perindopril, Quinapril, Ramipril,

Trandolapril. Common contraindications that limit this medication include: angioedema, cough, symptomatic hypotension (systolic blood pressure <80mmHg), elevated creatinine (>3.0mg/dL), and hyperkalemia (potassium >5.0 mEq/L).

In patients with an angiotensin converting enzyme inhibitor intolerance, an angiotensin receptor blocker (ARB) is an appropriate substitution. The strength of this recommendation is '1A' (Yancy et al., 2013). Approved angiotensin receptor blockers include: Candesartan, Losartan, Valsartan. Common contraindications that limit this medication include: symptomatic hypotension (systolic blood pressure <80mmHg), elevated creatinine (>3.0mg/dL), and hyperkalemia (potassium >5.0 mEq/L).

Aldosterone receptor antagonists (AA) should be used in patients with a reduced left ventricular ejection fraction and New York Heart Association symptoms class II or greater, unless there is a contraindication. The strength of this recommendation is '1A' (Yancy et al., 2013). Approved aldosterone antagonists include: Spironolactone and Eplerenone. Common contraindications that limit this medication include: symptomatic hypotension (systolic blood pressure <80mmHg), elevated creatinine (>2.50mg/dL in men or >2.0mg/dL in women), and hyperkalemia (potassium >5.0 mEq/L).

These three classes of medications beta-blocker, angiotensin converting enzyme inhibitor or angiotensin receptor blocker (not both), and aldosterone antagonist are recommended to be prescribed together prior to discharge from a hospital admission for decompensated heart failure with reduced ejection fraction (Yancy et al., 2013). In addition, if a patient is already on these medications during the hospitalization, inappropriate cessation is discouraged due to its risk of increased morbidity and mortality. During the hospitalization monitoring of the blood pressure,

heart rate, heart rhythm, renal function, and potassium level is key is assessing the safety of these medications. As an outpatient, it is recommended that renal function and potassium level be checked within one to two weeks after initiation of an angiotensin converting enzyme inhibitors, angiotensin receptor blockers, and or aldosterone antagonist.

Local Problem

The investigator works as a nurse practitioner performing general cardiology consultations at Banner University Medical Center Tucson (BUMCT). Repeated clinical observations noted that patients admitted to internal medicine teams with decompensated heart failure with reduced ejection fraction were being sent home without guideline directed medical therapy. Sisterman and colleagues (Sisterman, Natarajan, Rocha, & Cook et al., 2017) performed a baseline needs assessment to document actual practice. This retrospective chart review encompassed a period of six months, from July 2015 to December 2015. A total of 114 patients discharged with a primary diagnosis of decompensated heart failure with reduced ejection fraction were assessed. Data regarding medical therapy was extracted from the discharge summary in the electronic medical record. The following quality indicators were measured: utilization of appropriate beta blocker, angiotensin converting enzyme inhibitor or angiotensin receptor blocker, and aldosterone antagonist. Adherence to guideline directed medical therapy was defined as prescription of all three classes of medications, unless there was a contraindication.

Patients hospitalized with a primary diagnosis of heart failure with reduced ejection fraction were more likely to receive guideline directed medical therapy if they were admitted to a heart failure team compared to an internal medicine team, 81% compared to 24% ($p=<0.001$).

The difference in prescribing was most striking for aldosterone antagonists, 90% compared to 36% (p=<0.001). While patients admitted to a heart failure team compared to an internal medicine team had higher rates of appropriate beta blocker use (97% compared to 88%) and angiotensin converting enzyme inhibitor or angiotensin receptor blocker use (93% compared to 59%), it was not statistically significant (p=>0.1). This baseline needs assessment demonstrates an opportunity to increase adherence to guideline directed medical therapy for patients admitted to non-cardiology teams with the primary diagnosis of decompensated heart failure with reduced ejection fraction at Banner University Medical Center Tucson by implementing the Get With The Guidelines - Heart Failure program.

Intended Improvement

The purpose of this project is to implement and evaluate the effectiveness of the Get With The Guidelines - Heart Failure program at Banner University Medical Center Tucson. The target population is patients admitted with the primary diagnosis of decompensated heart failure with reduced ejection fraction. Although the Get With The Guidelines - Heart Failure program tracks multiple quality and outcome indicators (Appendix A), this project will focus on provider adherence to three quality measures that were first identified in the needs assessment and that are shown to be effective in treating heart failure with reduced ejection fraction patients (AHA, 2016; Yancy et al., 2016). The three chosen quality criteria are all class 1 recommendations for decompensated Heart failure with reduced ejection fraction: 1) appropriate beta blocker, 2) angiotensin converting enzyme inhibitor or angiotensin receptor blocker, and 3) aldosterone antagonist. Patients that have a contraindication to any of these therapies, will be counted as adherent to therapy because they are not able to safely tolerate these therapies. The needs

assessment notes that guideline directed medical therapy adherence can be as low as 24%, our goal is to increase this adherence rate to greater than 70%.

Study Question

This project will answer the following question:

1) Following implementation of the Get With The Guidelines - Heart Failure program, will providers increase their adherence to guideline directed medical therapy, specifically appropriate beta blocker, angiotensin converting enzyme inhibitor or angiotensin receptor blocker, and aldosterone antagonist for patients admitted with a primary diagnosis of decompensated heart failure with reduced ejection fraction at Banner University Medical Center Tucson?

FRAMEWORK

During this section a synthesis of the evidence, a practice model, and an implementation theory will be reviewed.

Synthesis of the Evidence

Each ground breaking multi center, double blind, randomized placebo controlled trial for the introduction of each discussed medication class is included (Appendix B). These studies were well run and included large numbers of patients. The potential criticism for each of these studies is that they were sponsored and controlled by pharmaceutical companies with potential for conflicts of interest. However, these studies were conducted with ‘gold standard designs’. As well, these drug classes have stood the test of time and their benefits to heart failure with reduced ejection fraction patients has been shown with practice based evidence registry data (Yancy et al., 2013).

Packer and colleagues explored if a beta blocker would benefit euvolemic patients with heart failure with reduced ejection fraction (Packer at al., 2002). This randomized, double blind, placebo controlled trial randomly assigned 2,289 patients to conventional treatment plus placebo (n=1133) or conventional therapy plus carvedilol (n=1156). Patients treated with a beta blocker were found to have decreased morbidity, mortality, and hospitalizations (p=<0.001).

The CONSENSUS trial study group examined if an angiotensin converting enzyme would benefit heart failure patients (CONSENSUS, 1987). This randomized, double blind, placebo controlled trial randomly assigned a total of 253 patients to conventional therapy with placebo (n=126) or conventional therapy with enalapril (n=127). After 12 months, the angiotensin converting enzyme inhibitor group had a 50% reduction in mortality (p=<0.001). The ethical review committee recommended that this trial end ahead of schedule as it was deemed unethical to withhold this treatment from the placebo controlled group after the efficacy of this medication was documented.

McMurray and colleagues tested if patients who were intolerant of an angiotensin converting enzyme inhibitor would benefit from an angiotensin receptor blocker (McMurray, et al. 2002). The most common reasons for angiotensin converting enzyme inhibitor intolerance include dry cough and allergy. A total of 7,599 patients across 25 countries were enrolled and randomized to treatment with conventional therapy with placebo or conventional therapy with candasartan. Patients with heart failure with reduced ejection fraction who were treated with an angiotensin receptor blockers were found to have decreased morbidity and mortality (p=<0.001).

Girerd and colleagues examined the benefits of starting an aldosterone antagonist in patients with heart failure with reduced ejection fraction and New York Heart Association class

II symptoms (Girerd, et al. 2015). This randomized, double blind, placebo controlled trial randomly assigned a total of 2,727 patients to conventional therapy with placebo or conventional therapy with eplerenone and followed them for six months. Patients treated with an aldosterone antagonist had decreased morbidity, mortality, and hospitalizations (p=<0.001).

Gilstrap and colleagues assessed the impact of inappropriate cessation or failure to start an angiotensin converting enzyme inhibitor or angiotensin receptor blocker in patients hospitalized with heart failure with reduced ejection fraction (Gilstrap et al., 2017). This retrospective chart review was conducted using national registry data from the Get With The Guidelines - Heart Failure program. This multicenter cohort study assessed 16,052 patients from 339 hospitals. Patients without an angiotensin converting enzyme inhibitors or angiotensin receptor blockers contraindication were stratified into four groups: continued, started, discontinued, and not started. Patients in the discontinued and not started on angiotensin converting enzyme inhibitor or angiotensin receptor blocker groups had a higher 30 day mortality; 1.92 (95% CI 1.32, 2.81; P<0.001) for those discontinued and 1.50 (95% CI 1.12, 2.06; P=0.006) for those not started compared to the continued and started groups. At one year, the mortality rate for those discontinued was 1.35 (95% CI 1.13, 1.61; P=0.001) and for those not started it was 1.28 (95% CI 1.14, 1.43; P<0.001). This study confirms prior research regarding decreased morbidity and mortality benefits of angiotensin converting enzyme inhibitor or angiotensin receptor blocker use in patients with heart failure with reduced ejection fraction. The poor prognostic indicator of discontinuing or never starting angiotensin converting enzyme inhibitors or angiotensin receptor blocker during a heart failure with reduced ejection fraction hospitalization should be emphasized for all inpatient care teams.

Dev and colleagues assessed prescribers' barriers to recommending aldosterone antagonists for heart failure with reduced ejection fraction patients as this class is the least prescribed guideline directed medication (Dev et al., 2016). This qualitative study design included a survey and interviews at the Veteran's Health Association of Phoenix, Arizona. Care team members included attending physicians, fellows, residents, pharmacists, and advanced practice providers from the cardiology, internal medicine, and family medicine departments. Of the 294 recruited providers, 50 responded to the survey for a 17% response rate. Of the 50 survey takers, 42 participated in the interviews for an 84% recruitment rate. The common barriers to aldosterone antagonist prescribing included: potential for side effects (56%), concern for polypharmacy (54%), and lack of familiarity (32%). Some providers believed that it was the responsibility of cardiology to start an aldosterone antagonist (26%). Confounding and overlapping barriers were more likely to deter prescription compared to any one single barrier. This study highlights the concerns that keep providers from initiating guideline directed medical therapy by withholding an aldosterone antagonist.

Burnett and colleagues performed a network meta-analysis to compare the efficacy of the combination of class I guideline directed heart failure agents (beta-blocker, angiotensin converting enzyme inhibitors or angiotensin receptor blockers (not both), and aldosterone antagonist) compared to placebo (Burnett et al., 2017). They reviewed 57 multi center, double blind, randomized placebo controlled trials published between 1987 and 2015. Despite the many differences between the studies: duration, patient characteristics, heart failure severity; the analysis was considered feasible and all studies were analyzed simultaneously. The three class drug class combination was associated with a 56% decrease in all-cause mortality when

compared with placebo (hazard ratio 0.44, 95% credible interval 0.26–0.66)). This study confirms the morbidity and mortality benefits of these drugs as a combination therapy making it easier to appreciate their cumulative benefit.

Heidenreich and colleagues (Heidenreich et al., 2012), used a retrospective cohort study to evaluate if participation in the Get With The Guidelines – Heart Failure program improved quality and outcome measures. A total of 215 hospitals that used the Get With The Guidelines - Heart Failure program was compared with 4,245 hospitals that did not use the program. Hospitals that used the Get With The Guidelines - Heart Failure program were more likely to prescribe an angiotensin converting enzyme inhibitor or an angiotensin receptor blocker (88% versus 86%) (p=<0.05).

Similarly, Fonarow and colleagues (Fonarow et al., 2007), conducted a retrospective cohort study to evaluate if the heart failure quality improvement program, Organized Program to Initiate Lifesaving Treatment in Hospitalized Patients with Heart Failure (OPTIMIZE-HF), increased quality of care. The OPTIMIZE-HF program was eventually integrated into the current Get With The Guidelines - Heart Failure program. A total of 259 hospitals in the United States agreed to enroll in the OPTIMIZE-HF program with 48,612 heart failure patients. Increased provider adherence was seen for appropriate beta blocker use from 76% to 86% (p=<0.001) following program implementation. Increased provider adherence to the guidelines for angiotensin converting enzyme inhibitor or angiotensin receptor blocker and aldosterone antagonist was not found.

DeVore and colleagues (DeVore et al., 2015), used a cluster, randomized controlled trial to assess if an enhanced version of the Get With The Guidelines - Heart Failure program with

increased personal feedback and promoted interventions was more effective than the usual Get With The Guidelines - Heart Failure approach in improving quality of care. The study collected data on 71,829 patients treated at 147 different hospitals across the United States. The control group received the usual Get With The Guidelines - Heart Failure intervention which includes on demand computer generated reporting that can be shared and the intervention group. At baseline, adherence to quality measures were similar in the control and intervention groups. At the end of the study, the difference between groups for improvement in quality indicators was not statistically significant (p=0.21). The enhanced intervention did not improve performance more than the usual Get With The Guidelines - Heart Failure program. Efforts to intensify the Get With The Guidelines - Heart Failure intervention over what is currently recommended by the program has not been shown to improve quality or outcomes more than the usual intervention.

This review of the literature examined evidence that beta blocker, angiotensin converting enzyme inhibitors or angiotensin receptor blocker, and aldosterone antagonist reduce morbidity and mortality for patients with heart failure with reduced ejection fraction (Packer at al., 2002; CONSENSUS, 1987; McMurray, et al. 2002; Girerd, et al. 2015; Gilstrap et al., 2017; Burnett et al., 2017). It explored providers' discomfort in prescribing an aldosterone antagonist which is the medication most likely to be left out of guideline directed medical therapy (Dev et al., 2016). Studies that have shown increased provider adherence to guideline directed medical therapy via implementation of the Get With The Guidelines - Heart Failure program were assessed (Heidenreich et al., 2012; Fonarow et al., 2007). An enhanced version of the Get With The Guidelines - Heart Failure program was also \studied, but was not found to be more effective than the simple intervention of adherence reports (DeVore et al., 2015). Based on this evidence,

this project will start the Get With The Guidelines - Heart Failure program to increase provider adherence to a beta blocker, angiotensin converting enzyme inhibitor or angiotensin receptor blocker, and aldosterone antagonist for patients admitted to the hospital with decompensated heart failure with reduced ejection fraction.

The Theory of Planned Behavior

Use of a theory while studying the implementation of evidence based practice will help to understand and explain provider behavior which will determine whether or not this project is successful. Psychologist Icek Ajzen developed the Theory of Planned Behavior as an extension of the Theory of Reasoned Action to predict how beliefs translate into behaviors (Figure 1.) (Ajzen, 1985). The Theory of Planned Behavior has been successfully applied towards provider behaviors during the implementation of evidence based practice guidelines for chronic disease management (Ceccato, Ferris, Manuel, & Grimshaw, 2007).

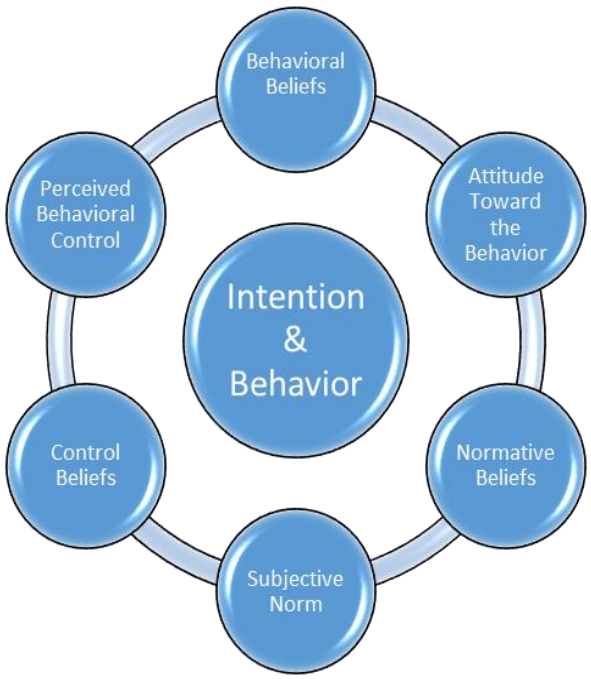

FIGURE 1. Theory of Planned Behavior

Brothers and colleagues used the Theory of Planned Behavior to assess if a training program increased provider intention to implement an evidence based psychological treatment to reduce cancer stress (Brothers et al., 2015). Intervention specific attitudes and self-efficacy were able to predict provider intention to implement this treatment. The Theory of planned behavior was helpful in examining this process as perceived behavioral control, which can be positively influenced by training, which precedes attitudes towards an intervention.

For the purpose of applying this model, the example of a provider prescribing an aldosterone antagonist for a patient with heart failure with reduced ejection fraction and New York Heart Association class II symptoms without a contraindication to this agent will be used. Behavioral beliefs link the behavior to what is an expected outcome (Ajzen, 2006); a provider may be more likely to prescribe an aldosterone antagonist if they link this medication to a potential benefit. Attitude toward the behavior is how the behavior is valued; a provider may be more willing to prescribe this medication if they value it as an effective agent. Normative beliefs are the behavior expectations of others; such as having the care team anticipate use of this medication.

Subjective norm is the amount of social pressure to comply with a behavior, such as provider awareness that adherence to guideline directed medical therapy is being measured. Control beliefs are the factors that may facilitate the behavior; such as the provider having accessible information about the indications for use of this medication. Perceived behavioral control is the perception of a provider's ability to perform a behavior, such as confidence that they are able to safely recognize when an aldosterone antagonist should be used. These six

factors together produce intention which defines a provider's readiness to perform a behavior. Finally, behavior is the manifestation of the prior mentioned factors.

Plan-Do-Study-Act (PDSA) Cycle

The model for improvement which uses small scale PDSA cycles has been repeatedly demonstrated to be effective in real world health care settings (Figure 2) (IHI, 2017). The quality improvement cycle begins with the *Plan*, by creating a theory to achieve defined improvement goals. The *Do* portion is the implementation of activities to improve practice. The *Study* portion requires monitoring to test for success and failure and requires the collection of data to determine if the implementation step was successful. Finally, the *Act* step integrates everything learned by the prior steps by adjusting the plan and redefining the goals to determine what will be tested in the next cycle. These four steps complete the continuous plan-do-study-act cycle that is needed for continuous quality improvement (W. Edwards Deming Institute, 2016).

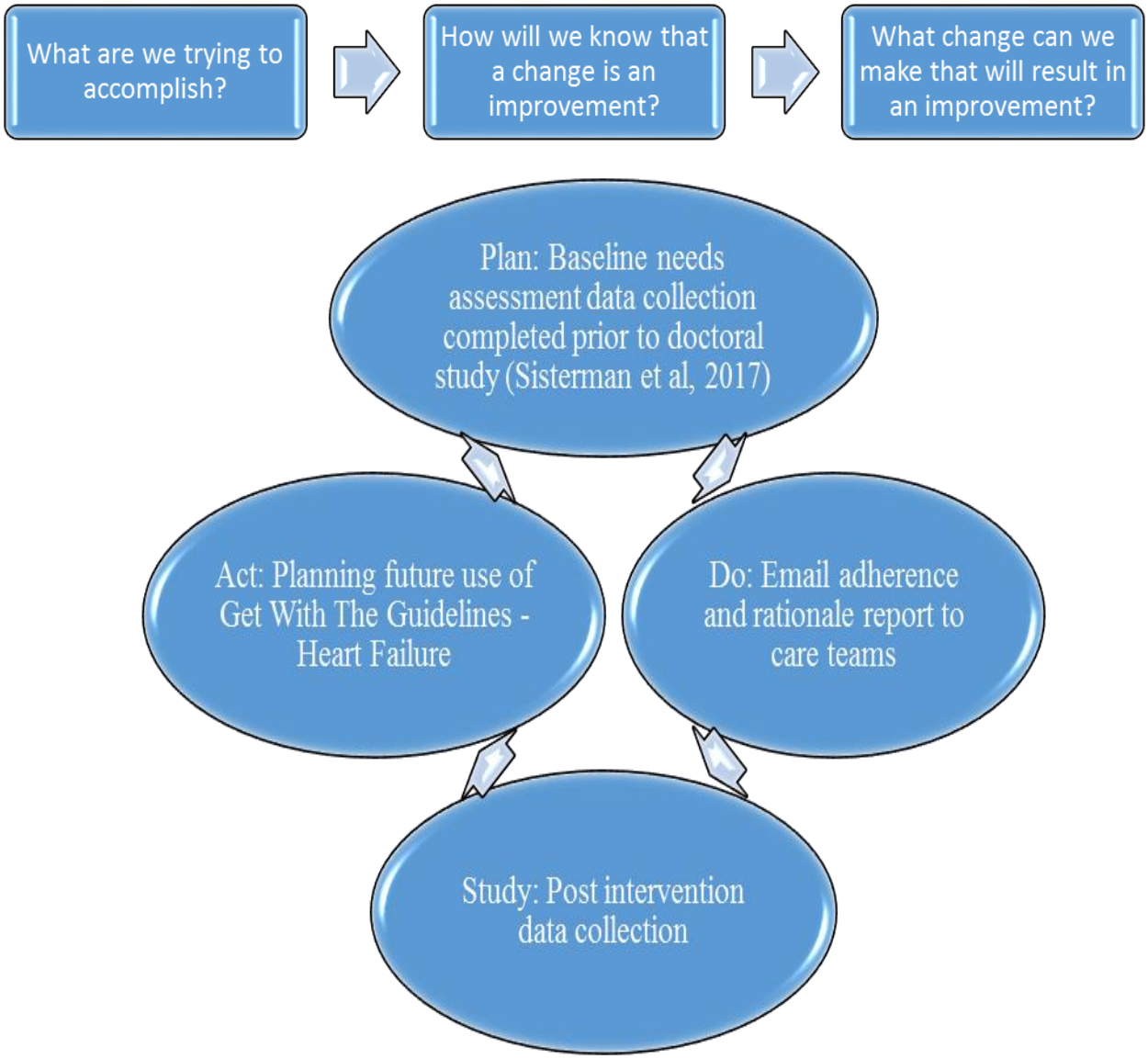

FIGURE 2. Model for Improvement – Plan-Do-Study-Act (PDSA) Cycle

For the purpose of this quality improvement project, one cycle of the PDSA will be conducted. It is usual practice to begin a PDSA cycle by conducting a needs assessment to determine the extent of the practice problem. For this project, a previously conducted needs assessment by this author will be used to serve as the planning phase. From this needs assessment, the baseline adherence rates for guideline directed medical therapies was described

(*Plan)*. Based on this data, it was clear that the Get With The Guidelines - Heart Failure program should be implemented and is the *Do* phase of this quality improvement project. The *Study* phase will be the pre and post intervention data collection to determine if implementation of the Get With The Guidelines - Heart Failure program with emailed adherence reports affected practice change. The *Act* phase will be the decision of how to continue with the Get With The Guidelines - Heart Failure program into the future. Findings from this quality improvement project cycle will then determine the content of the next PDSA cycle by the current stakeholders.

METHODS

Design

This is a quality improvement project with a pre and posttest descriptive design. This project will evaluate provider adherence to heart failure guidelines using a medical record audit for patients admitted to Banner University Medical Center Tucson with the primary diagnosis of decompensated heart failure with reduced ejection fraction. For the purpose of this project, three quality indicators will be assessed: appropriate beta blocker, angiotensin converting enzyme inhibitor or angiotensin receptor blocker, and aldosterone antagonist using the Get With The Guidelines – Heart Failure program. Appendix A details all the quality and outcome indicators that are tracked by this program.

Patient Population

Banner University Medical Center Tucson has approximately 500 primary and 2,000 secondary heart failure admissions annually. The largest exclusion criteria will be heart failure with preserved ejection fraction, defined as left ventricular ejection fraction >40%. Additional exclusion criteria include: age less than 18 years, mechanical circulatory device support, death

during admission, and discharge to hospice. It is estimated that there will be approximately 20 patients per month who fit criteria. Patients will be selected via a search for their primary admission and discharge International Classification of Diseases 10th revision codes. The following ICD-10 codes define decompensated heart failure with reduced ejection fraction and will be used to identify this singular diagnosis: 150.20 (unspecified systolic congestive heart failure), 150.21 (acute systolic heart failure), 150.22 (chronic systolic heart failure), 150.23 (acute on chronic systolic heart failure), 150.40 (unspecified combined systolic and diastolic heart failure), 150.41 (acute combined systolic and diastolic heart failure), 150.42 (chronic combined systolic and diastolic heart failure), 150.43 (acute on chronic combined systolic and diastolic heart failure), 150.9 (unspecified heart failure).

Stakeholders

Developing insurance incentives has ensured that Banner University Medical Center Tucson and the department of cardiology are motivated to promote the highest quality of care for heart failure patients. In 2012, the largest insurance payer, the Centers for Medicare & Medicaid Services, started performance initiatives (CMS, 2016). Quality measures for heart failure are tracked and publically reported on their website to assist patients in becoming informed consumers. In addition, hospitals with increased hospital readmission rates for heart failure receive reduced reimbursement.

The investigator works as a nurse practitioner with the department of cardiology, providing inpatient consultations to patients admitted to internal medicine primary teams. The investigator regularly meets with the Banner University Medical Center Tucson's quality improvement and heart failure team to discuss current strengths and opportunities for future

growth in heart failure care. There was concern for increased provider variability and decreased guideline adherence for heart failure patients discharged home from primary internal medicine teams. The investigator and the director of the department of cardiology and the director of the heart failure program shared a vision to implement the Get With The Guidelines – Heart Failure program to increase guideline adherence.

Procedures

The Get With The Guidelines - Heart Failure program costs approximately $2,000 per year; the department of cardiology allocated funds for this purchase to assist this quality improvement project. Deidentified information from the patients' electronic medical record will be entered into the secure, online Get With The Guidelines - Heart Failure database. Appendix C shows the secure online database that is used to enter de-identified patient data (AHA, 2016).

Baseline data will be gathered from the medical records of all patients admitted for heart failure with reduced ejection fraction. The investigator who is also a cardiology nurse practitioner with Banner University Medical Center Tucson will enter all patient data for this project. An email comparing this one month of adherence benchmarked against national averages will be sent to care teams. Appendix E is a sample of this document, which also includes rationale for these three guideline measures. This email will be sent to internal medicine attendings, internal medicine residents, cardiology attendings, cardiology fellows, inpatient pharmacists, advanced practice providers, registered nurses who work on cardiac units. A seven day period will be provided prior to post intervention sampling to allow health care providers time to read the intervention email.

Post report data on provider adherence to medical therapy guidelines will then be obtained for all patients with heart failure with reduced ejection fraction who were admitted for a 30-day period, approximately seven days after the care teams received the initial Get With The Guidelines - Heart Failure report. Figure 3 shows the workflow process for this quality improvement project.

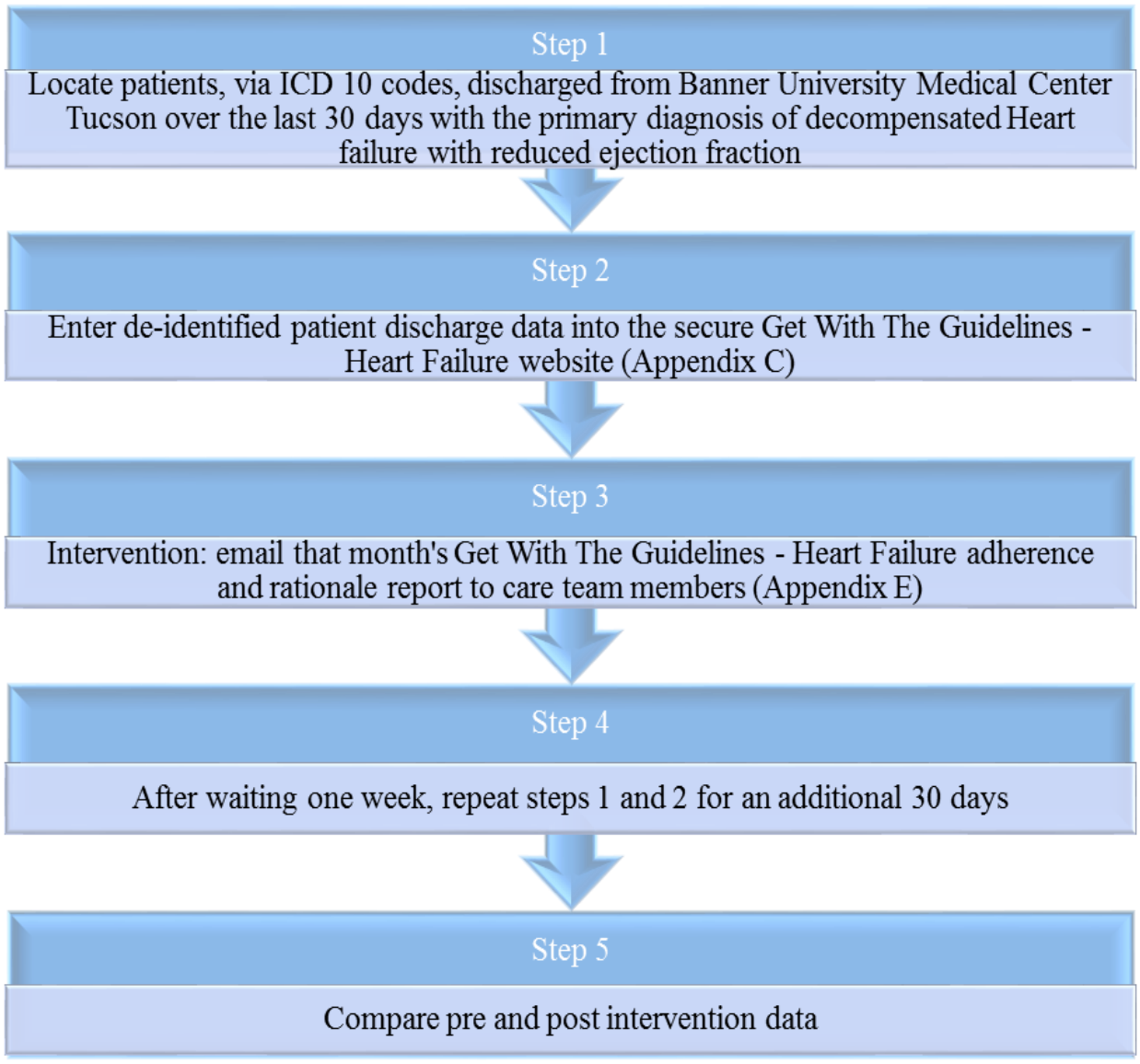

FIGURE 3. Process Flow

Ethical Considerations

Institutional Review Board approval was received by the University of Arizona and Banner University Medical Center Tucson (Appendix D). Banner University Medical Center Tucson's legal and informational technology team reviewed this project; it complies with the all health care industry regulations. For the purpose of this project, these heart failure patients' charts will undergo increased scrutiny by the investigator who already regularly accesses their charts for usual care via secure login to the electronic medical record. Health Insurance Portability and Accountability Act will be observed. The data acquired outside of the electronic medical record, via the secure online website and care team reports, will be de-identified and will not contain protected patient information. This project will not place patients at increased risk of harm. Before the intervention patients will be receiving usual care and after the intervention patients will be receiving usual care with the possibility of increased guideline adherence.

Data Analysis

The data analysis software used was Stata 12.1. The p value of ≤ 0.05 was considered statistically significant. Continuous variables are listed in the data table as their mean plus or minus the standard deviation. Categorical variables are listed in the data table as a proportion. Continuous variables were assessed via a simple t-test when they had a normal distribution and via a Mann Whitney U test when they had a skewed distribution. Categorical variables were assessed via a Fischer's Exact test when the sample was less than 30 and via a Chi-Square test when the sample was greater than 30.

The pre and post intervention patient samples were compared via the following variables: age, sex, left ventricular ejection fraction, and creatinine. The pre and post intervention care

teams were compared based on the primary admitting service: internal medicine, general cardiology, and heart failure. To determine provider adherence, a score of one was given if a class I recommendation was followed or if there was an appropriate contraindication. A score of zero was given if a class I recommendation was not followed and there was not an appropriate contraindication. Guideline directed medical therapy was defined as implementation of all three class I recommendations or an appropriate contraindication. Chi-square testing was used to assess if the intervention created a statistically significant difference in provider adherence for appropriate beta blocker, angiotensin converting enzyme inhibitor or angiotensin receptor blocker, aldosterone antagonist, or overall guideline directed medical therapy.

RESULTS

Sample

There were 55 patients included in the study. The information technology department retroactively ran a query for patients discharged with the primary diagnosis of heart failure from Banner University Medical Center Tucson from 08/15/17 to 09/15/17. A total of 24 patients met criteria for this study and were entered into the Get With The Guidelines – Heart Failure database. For patients discharged with the primary diagnosis of heart failure from Banner University Medical Center Tucson from 10/11/17 to 11/08/17, there were 31 patients who met criteria and were entered into the Get With The Guidelines – Heart Failure database.

Table 1 shows the pre and post patient samples who were similar for all measured characteristics (sex, left ventricular ejection fraction (LVEF), creatinine), except for age ($p = 0.002$). Heart failure disproportionately affects the elderly, however the post intervention sample included several young persons with heart failure due to congenital disease and or

substance abuse. The mean age was 69 years for the pre group and 55 years for the post group. Males comprised the majority of both the pre and post group at 71%. Mean left ventricular ejection fraction was 22% for the pre group and 23% for the post group. The mean creatinine was 1.2 for the pre group and 1.1 for the post group.

TABLE 1. *Patient Characteristics for Pre and Post Intervention Samples*

Variable	Pre (N=24)	Post (N=31)	p-value
Patient Characteristics			
Age (years)	69.5 ± 11.4	55.3 ± 18.4	0.002
Male (N, %)	17 (71%)	22 (71%)	0.99
Left ventricular ejection fraction (%)	22.8 ± 8.8	23.0 ± 8.0	0.9
Creatinine (mg/dl)	1.2 (0.9 - 1.7)	1.1 (0.8 - 1.5)	0.26
Primary Team			
Internal Medicine (N, %)	18 (75%)	16 (52%)	0.1
General Cardiology (N, %)	3 (13%)	8 (26%)	0.31
Heart Failure (N, %)	3 (13%)	7 (23%)	0.49

As expected the majority of patients had an internal medicine team as their primary admitting service, see Figure 4. There were no statistically significant differences in the pre and post interventional samples for the three primary admitting teams internal medicine (IM) was the primary service for 75% of the pre group and 52% of the post group (Table 1). General cardiology (GC) service was the primary service for 13% of the pre group and 26% of the post group. Heart failure (HF) was the primary service for 13% of the pre group and 23% of the post group.

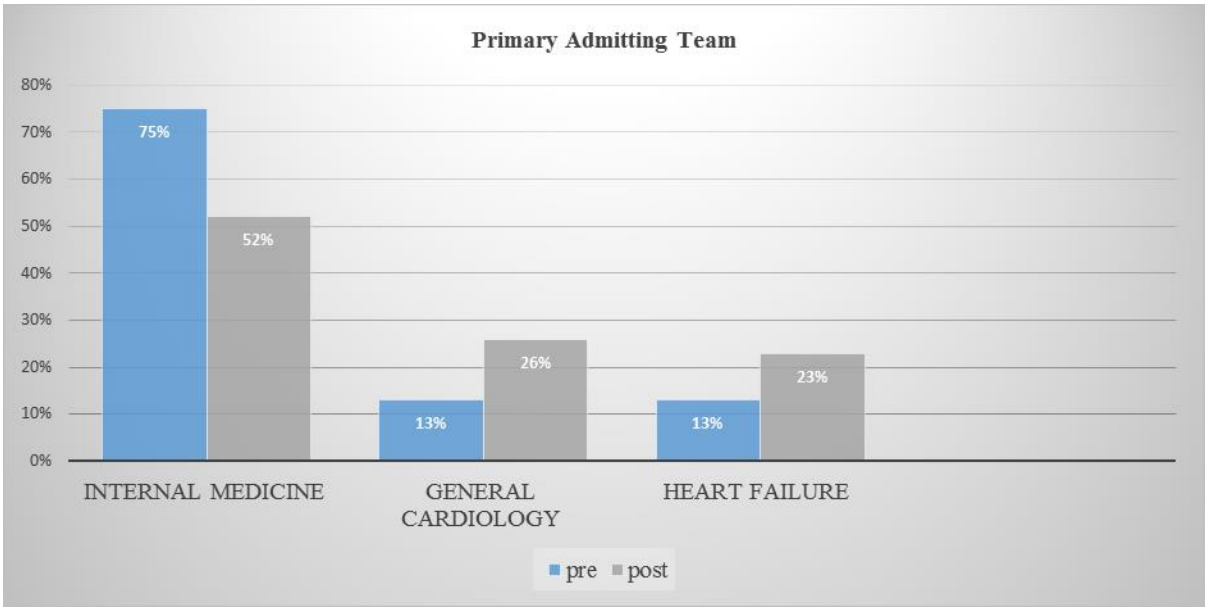

FIGURE 4. Pre- and Post-Intervention Primary Admitting Team

Pre Intervention Results

Figure 5 shows Banner University Medical Center Tucson's adherence rates compared to the national averages of hospitals participating in the Get With The Guidelines – Heart Failure program for this same time period (08/15/17 to 09/15/17). Overall, Banner University Medical Center Tucson performed the same or better than the national average for all measures.

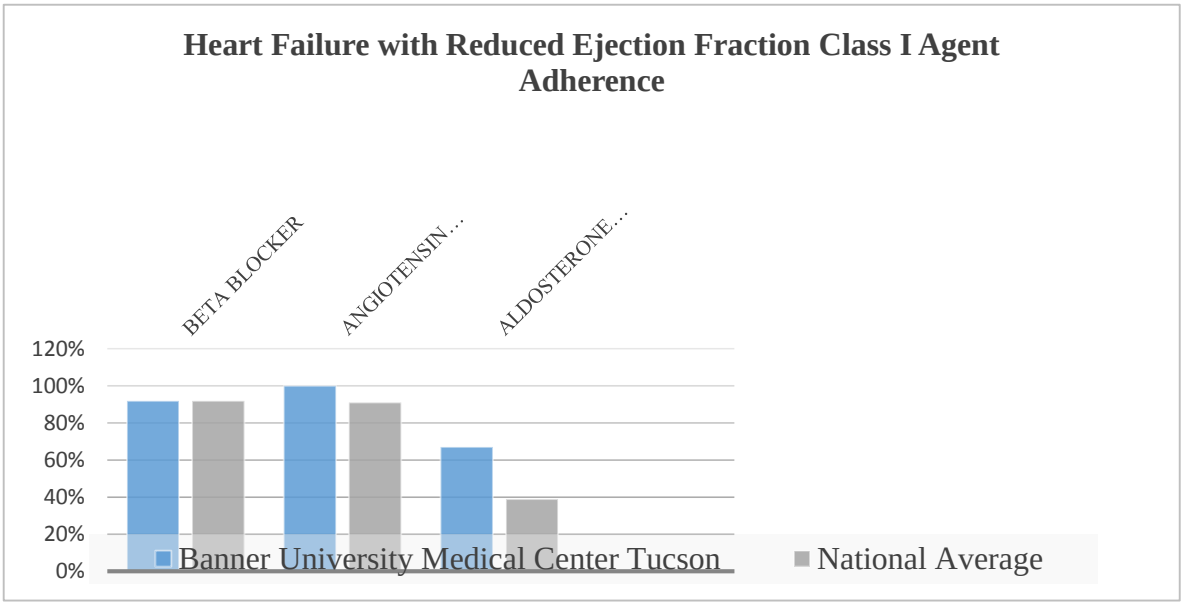

FIGURE 5. Pre-Intervention versus National Average Guideline Adherence

Post Intervention Results

Table 2 shows the adherence rates pre and post intervention. There were no statistically significant differences for any of the agents. However, three out of four agents show trends toward improved adherence. As well, the post intervention sample exceeded the project's goal of greater than 70% adherence for all measures.

TABLE 2. *Pre- and Post-Intervention Adherence Rates*

Variable	Pre (N=24)	Post (N=31)	p-value
Medication			
Beta Blocker (N, %)	22 (92%)	31 (100%)	0.1
Angiotensin Converting Enzyme Inhibitor/Angiotensin Receptor Blocker (N, %)	24 (100%)	29 (94%)	0.5
Aldosterone Antagonist (N, %)	16 (67%)	26 (84%)	0.2
Guideline Directed Medical Therapy (N, %)	14 (58%)	25 (81%)	0.08

Figure 6 shows the comparison of pre and post adherence rates: beta blocker adherence 92% versus 100%, angiotensin converting enzyme inhibitor intolerance or angiotensin receptor blocker adherence 100% versus 94%, aldosterone antagonist adherence 67% versus 84%, and guideline directed medical therapy 58% versus 81%. There was no statistically significant difference for any of them.

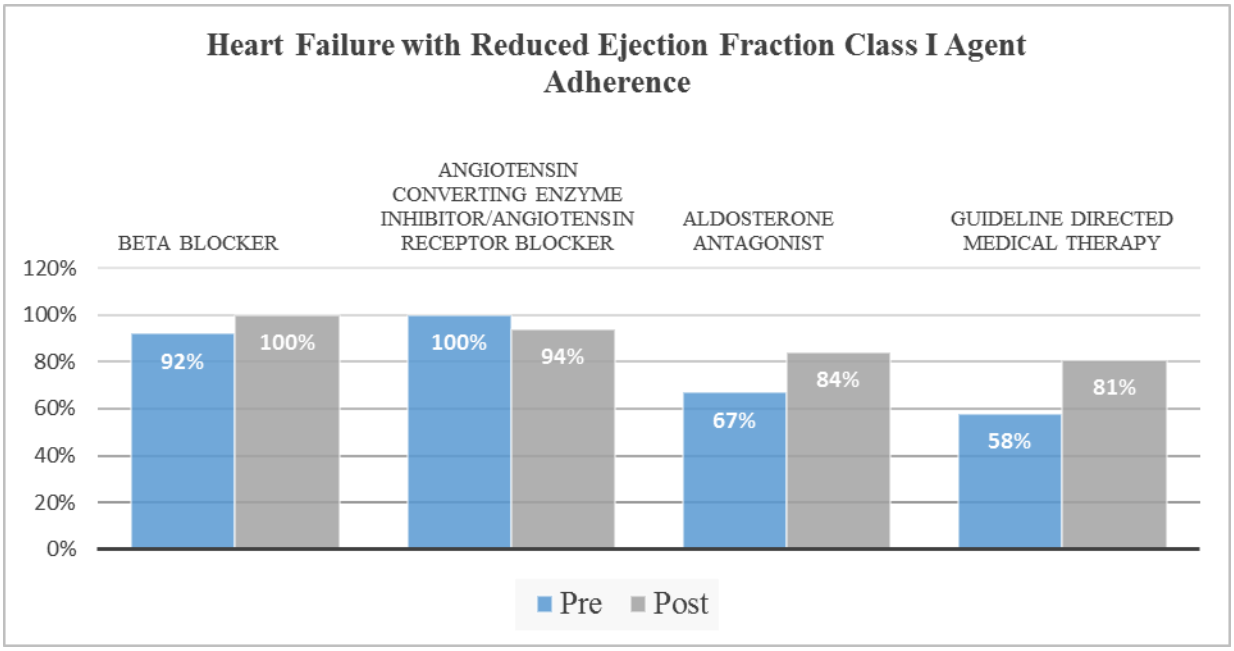

FIGURE 6. Pre-and Post-Intervention Guideline Adherence

In summary, provider guideline adherence was assessed for a total of 55 patients via a pre (N=24) and post (N=31) intervention sample. The samples were similar except for age. While the post intervention sample did not show a statistically significant improvement, there was a trend towards increased provider adherence in three out of four of these class I agents. The project's goal of improving provider adherence to greater than 70% was achieved.

DISCUSSION

Strengths

This was a nurse practitioner identified and led practice improvement. An existing and well-documented quality improvement program that has been shown to improve practice was used. A review of the literature demonstrated morbidity and mortality benefit of the three medication classes upon which this project focuses. The Theory of Planned Behavior was used to better understand provider behavior towards the least prescribed medication class, aldosterone antagonist. This study used one cycle of the PDSA quality improvement method to increase provider adherence to heart failure guidelines.

This quality improvement project provided real world data on high-risk patients, many of whom would not have met inclusion criteria for a clinical trial. It also used an existing and well-documented program shown to improve practice. By implementing this program within the hospital system, this program will monitor practice and allow for higher quality care for heart failure patients. This project was conducted with the relevant stakeholder groups. The intervention focused on interdisciplinary team members' influence on provider prescribing practices. These data were entered by one person, which reduces the risk of interpersonal variability with chart abstraction. The pre and post patient groups were statistically similar for primary admission team, sex, left ventricular ejection fraction, and creatinine; increasing the confidence in the results.

Limitations

This quality improvement project focused only on the guidelines related to prescriber adherence to three medication classes, it did not include other quality indicators for heart failure

care. This review did not assess outcome indicators such as less than 30 day hospital readmission, death, heart attack, acute renal injury, hyperkalemia, symptomatic hypotension, symptomatic bradycardia. These outcome indicators are important drivers for the rationale and emphasis of quality indicators.

The pre and post intervention samples differed significantly by age. It is possible that the younger age of the post intervention group accounted for providers being more comfortable prescribing them guideline directed medical therapy. While proportionally the post intervention group had increased provider adherence rates for all medications except angiotensin converting enzyme inhibitor or angiotensin receptor blocker, these results were not statistically significant.

Between pre and post intervention data collection, the electronic medical record platform changed. The majority of providers did not have prior experience with the new system so predictably there was a large learning curve with multiple system wide issues that complicated patient care during this time. A larger sample and longer time for review may positively influence results. However, given the that baseline adherence rates were already above the national average there may be little any quality improvement project can do to further improve these quality indicators.

Recommendations for Practice

Based on the results of this project, regular, system wide heart failure quality improvement throughout all of Banner's hospitals is recommended. Future plans include returning to the stakeholder groups to present these findings and recommendations for future PDSA cycles with expanding outcome measurements. With the implementation of the same electronic medical record platform used throughout the Banner system, this program will be

easier to implement and evaluate for change in practice. Benchmarking and identification of best practices will be more relevant among Banner hospitals. Further PDSA cycles will make month to month comparisons of guideline adherence more meaningful. In addition, expansion to all the quality and outcome measures that are assessed with the Get With The Guidelines – Heart Failure program.

Future qualitative studies using the Theory of Planned Behavior could help to better understand provider barriers towards implementing guideline directed care. Inter-provider variability may be reduced by standardized institutional practices such as heart failure order sets that integrate guideline directed medical therapy with their rationale and appropriate contraindications.

Future PDSA cycles could include patients who have a secondary diagnosis of decompensated heart failure with reduced ejection; the majority of these patients are not admitted to internal medicine and cardiology teams. These patients are at highest risk for being without guideline directed medical therapy because the emphasis of their hospitalization is on their non-heart failure primary diagnosis.

Conclusion

This quality improvement project achieved its goal of increasing provider adherence to greater than 70% for guideline directed medical therapy; specifically, appropriate beta blocker, angiotensin converting enzyme inhibitor or angiotensin receptor blocker, and aldosterone antagonist for patients admitted with a primary diagnosis of decompensated heart failure with reduced ejection fraction at Banner University Medical Center Tucson. The already high provider adherence rates in the pre intervention group may explain why statistical significance

was not found when comparing it to the post intervention group. The Get With the Guidelines – Heart Failure program should continue regularly, but with expansion to other Banner hospitals and with other quality and outcome indicators that are assessed with this program.

APPENDIX A:

MEASURES

MEASURES

Angiotensin converting enzyme inhibitors/angiotensin receptor blockers or ARNi at discharge: Percent of heart failure patients with left ventricular systolic dysfunction (LVSD) and without both angiotensin converting enzyme inhibitor (angiotensin converting enzyme inhibitors) and angiotensin receptor blocker (angiotensin receptor blocker) contraindications who are prescribed an angiotensin converting enzyme inhibitor or angiotensin receptor blockers or ARNi at hospital discharge. For purposes of this measure, LVSD is defined as chart documentation of a left ventricular ejection fraction (LVEF) less than 40% or a narrative description of left ventricular function (LVF) consistent with moderate or severe systolic dysfunction.

Evidence-based specific beta blockers: Percent of heart failure patients who were prescribed with evidence- based specific beta blockers (Bisoprolol, Carvedilol, Metoprolol Succinate CR/XL) at discharge.

Measure LV function: Percent of heart failure patients with documentation in the hospital record that left ventricular function (LVF) was assessed before arrival, during hospitalization, or is planned for after discharge.

Post-discharge appointment for heart failure patients: Percent of eligible heart failure patients for whom a follow up appointment was scheduled and documented including location, date, and time for follow up visits or location and date for home health visit.

HF QUALITY MEASURES

Aldosterone antagonist at discharge: Percent of heart failure patients with left ventricular systolic dysfunction (LVSD) with no contraindications or documented intolerance who were prescribed aldosterone antagonist at discharge.

Anticoagulation for atrial fibrillation or atrial flutter: Percent of patients with chronic or recurrent atrial fibrillation or atrial flutter at high risk for thromboembolism, according to CHA2DS2-VASc risk stratification, prescribed anticoagulation therapy at discharge.

Hydralazine/nitrate at discharge: Percent of black heart failure patients with left ventricular systolic dysfunction (LVSD) with no contraindications or documented intolerance who were prescribed a combination of hydralazine and isosorbide dinitrate at discharge. NOTE: This treatment is recommended in addition to angiotensin converting enzyme inhibitor or angiotensin receptor blockers and beta blocker therapy at discharge.

DVT prophylaxis: Percent of patients with heart failure and who are non-ambulatory who receive DVT prophylaxis by end of hospital day two.

CRT-D or CRT-P placed or prescribed at discharge: Per- cent of heart failure patients with left ventricular ejection fraction less than or equal to 35%, QRS duration of 120 ms or above and Left Bundle Branch Block or QRS 150ms or above regardless of QRS morphology, with no contraindications, documented intolerance, or any other reason against who have CRT-D or CRT-P, had CRT-D or CRT-P placed, or were prescribed CRT-D or CRT-P at discharge.

ICD counseling, or ICD placed or prescribed at dis- charge: Percent of heart failure patients with left ventricular ejection fraction less than or equal to 35% with no contraindications, documented intolerance, or any other reason against who had ICD counseling provided, who have ICD prior to hospitalization, had an ICD placed, or were prescribed an ICD at discharge.

Influenza vaccination during flu season: Percent of patients that received an influenza vaccination prior to dis- charge during flu season.

Pneumococcal vaccination: Percent of patients that received a pneumococcal vaccination prior to discharge.

Follow-up visit within 7 days or less: Percent of eligible heart failure patients who underwent a follow-up visit within 7 days or less from time of hospital discharge.

TARGET: HEART FAILURE MEASURE

60 minutes of heart failure education: Percent of heart failure patients who received 60 minutes of heart failure education by a qualified heart failure educator.

Activity level instruction: Percent of heart failure patients discharged home with a copy of written instructions or educational materials given to patient or caregiver at discharge or during the hospital stay, addressing activity level.

Advanced care plan: Percent of heart failure patients who have an advanced care plan or surrogate decision maker document in the medical record.

Advance directive executed: Percent of patients who have documentation in the medical record that an advance directive was executed.

Beta blocker at discharge: Percent of heart failure patients on beta blockers at discharge.

Beta blocker medication at discharge (all patients): A histogram of all patients grouped by specific beta blocker medication prescribed at hospital discharge.

Beta blocker medication at discharge (eligible patients): A histogram of eligible patients

grouped by specific beta blocker medication prescribed at hospital discharge.

Blood pressure control at discharge: Percent of heart failure patients with a last recorded systolic pressure <140 mmHg and diastolic pressure <90 mmHg blood pressure.

Care transition record transmitted: A care transition record is transmitted to a next level of care provider within 7 days of discharge containing all of the following: reason for hospitalization, procedures performed during this hospitalization, treatment(s)/service(s) provided during this hospitalization, discharge medications, including dosage and indication for use, and follow-up treatment and services needed (e.g., post-discharge therapy, oxygen therapy, durable medical equipment).

Diabetes teaching: Percent of diabetic patients or newly-diagnosed diabetics receiving diabetes teaching at discharge.

Diabetes treatment: Percent of diabetic patients or newly-diagnosed diabetics receiving diabetes treatment in the form of glycemic control (diet and/ or medication) at discharge.

Diet instruction: Percent of heart failure patients discharged home with a copy of written instructions or educational materials given to patient or caregiver at discharge or during the hospital stay, addressing diet.

Discharge disposition: Patients grouped by dis- charge disposition.

Discharge instructions: Percent of heart failure patients discharged home with a copy of written instructions or educational material given to patient or caregiver at discharge or during the hospital stay addressing all of the following: activity level, diet, discharge medications, follow-up appointment, weight monitoring, what to do if symptoms worsen.

Follow-up instruction: Percent of heart failure patients discharged home with a copy of written instructions or educational materials given to patient or caregiver at discharge or during the hospital stay, addressing follow-up appointment.

Follow-up visit or contact within 48 hours of discharge scheduled: Percent of heart failure patients who had a follow-up visit or phone call scheduled to take place within 48 hours or less of hospital discharge.

Follow-up visit or contact within 72 hours of discharge scheduled: Percent of heart failure patients who had a follow-up visit or phone call scheduled to take place within 72 hours or less of hospital discharge.

Heart failure disease management program referral: Percent of heart failure patients referred

to disease management program.

ICD placed or prescribed at discharge: Percent of heart failure patients with left ventricular ejection fraction less than or equal to 35% with no contraindications, documented intolerance, or any other reason against who have ICD prior to hospitalization, had ICD placed, or were prescribed ICD at discharge.

Lipid-lowering medications at discharge: Percent of heart failure patients with either CAD, PVD, CVA, or diabetes who were prescribed lipid lowering medications at discharge.

LOS: Length of stay, defined as Arrival Date – Discharge Date (or Admission Date – Discharge Date if Arrival Date is missing).

HF REPORTING MEASURES

In-hospital mortality: Percent of patients who expired grouped by diagnosis.

Medication instruction: Percent of heart failure patients discharged home with a copy of written instructions or educational materials given to patient or care- giver at discharge or during the hospital stay, addressing discharge medications.

Outpatient cardiac rehab program referral: Percent of heart failure patients referred to outpatient cardiac rehab program.

Omega-3 fatty acid supplement use at discharge: Percent of heart failure patients without contraindication who are prescribed omega-3 fatty acid supplement at hospital discharge.

QRS duration documented: Percent of heart failure patients for whom QRS duration is documented.

Referral to AHA heart failure interactive workbook: Percent of heart failure patients who received an AHA heart failure interactive workbook.

Referral to HF disease management, 60 minutes patient education or HF interactive workbook: Percent of heart failure patients who were referred to heart failure disease management, received 60 minutes of patient education by a qualified educator, or received an AHA heart failure interactive workbook.

TARGET: HEART FAILURE MEASURE

Risk adjusted mortality ratio: A ratio comparing the actual in-hospital mortality rate to the risk-adjusted expected mortality rate. A ratio equal to 1 is interpreted as no difference

between the hospital's mortality rate and the expected rate. A ratio greater than 1 indicates that the hospital's mortality rate is higher than the expected rate. A ratio of less than 1 indicates that the hospital's mortality rate is lower than the expected rate.

Smoking cessation: Percent of heart failure patients with a history of smoking cigarettes, who are given smoking-cessation advice or counseling during hospital stay. For purposes of this measure, a smoker is defined as someone who has smoked cigarettes anytime during the year prior to hospital arrival.

Symptoms worsening instruction: Percent of heart failure patients discharged home with a copy of written instructions or educational materials given to patient or caregiver at discharge or during the hospital stay, ad- dressing what to do if symptoms worsen.

Weight instruction: Percent of heart failure patients discharged home with a copy of written instructions or educational materials given to patient or caregiver at discharge or during the hospital stay, addressing weight monitoring.

HF DATA QUALITY MEASURES

HF Achievement Award Qualified: Percent of patients who have the minimum necessary data elements complete to be included in GWTG Achievement Measures for award calculation. NOTE: This does not mean the patient is compliant with the measure just that they meet the mini- mum criteria for measure inclusion.

HF Quality Award Qualified: Percent of patients who have the minimum necessary data elements complete to be included in GWTG Quality Measures for award calculation. NOTE: This does not mean the patient is compliant with the measure just that they meet the minimum criteria for measure inclusion.

Missing HF Achievement Award Qualified: Histogram of missing data for key elements needed for appropriate inclusion in GWTG Achievement Measures.

Missing HF Quality Award Qualified: Histogram of missing data for key elements needed for appropriate inclusion in GWTG Quality Measures.

Record completion rate: Percent of patient records

HF DESCRIPTIVE MEASURES

Age: Patients grouped by age. Diagnosis: Patients grouped by diagnosis. Gender: Patients grouped by gender. Race: Patients grouped by race and Hispanic ethnicity.

COMPOSITE MEASURES

HF Composite: The composite quality of care measure indicates how well your hospital does to provide appropriate, evidence-based interventions for each patient.

FREE MEASURES

HF Defect-Free: The Defect-free measure gauges how well your hospital did in providing all the appropriate interventions to every patient.

Target Heart Failure Recognition (or Defect-free) Measure: >Percent of heart failure patients who received angiotensin converting enzyme inhibitors / angiotensin receptor blockers or ARNi, Evidenced Based Beta Blockers, Aldosterone Antagonist medications at discharge (if eligible), for whom a follow-up visit or contact within 7 days of discharge scheduled, and who was referred to one or more enhanced education (referral to disease management program, 60 minutes of patient education, or HF interactive workbook).

30 DAY FOLLOW UP

30 Day angiotensin converting enzyme inhibitors /angiotensin receptor blockers or ARNi (Heart Failure): Heart failure patients with left ventricular systolic dysfunction (LVSD) and without angiotensin converting enzyme inhibitors /angiotensin receptor blockers or ARNi contra- indications who are on angiotensin converting enzyme inhibitors /angiotensin receptor blockers or ARNi 30 days post discharge.

30 Day Aldosterone Antagonist: Heart failure patients with LVSD with no contraindications or documented intolerance who were prescribed Aldosterone Antagonist 30 days post discharge.

30 Day Beta-Blocker for LVSD (Heart Failure): Percent of heart failure patients on Beta-Blocker 30 days post discharge.

30 Day Hydralazine Nitrate for LVSD: Black heart failure patients with LVSD with no contraindications or documented intolerance who were prescribed a Hydralazine Nitrate 30 days post discharge.

30 Day Lipid Lowering Medication: Percent of Heart Failure patients with either CAD, PVD, CVA or diabetes who were prescribed lipid lowering medications 30 days post discharge.

30 Day Diabetic Tx: Percent of patients receiving diabetic treatment 30 days post discharge.

30 Day Re-hospitalization (Heart Failure): Percent of heart failure patients (unadjusted) with

one or more re-hospitalization in the first 30 days post discharge.

30 Day Mortality Post Discharge (Heart Failure): Percent of heart failure patients who died in the first 30 days post discharge.

30 Day Mortality (Heart Failure): Percent of heart failure patients (unadjusted) who died in the first 30 days since admission, including in-hospital death

APPENDIX B:

EVIDENCE APPRAISAL TABLE

Article	Research Question	Design	Sample	Data Collection	Findings
Girerd, et al. (2015). Clinical Benefits of Eplerenone in Patients with Systolic Heart Failure and Mild Symptoms When Initiated Shortly After Hospital Discharge: Analysis from the EMPHASIS-HF Trial.	Does enalapril (ACEI) improve heart failure survival?	Randomized, double blind, placebo controlled trial	A total of 253 patients randomized to conventional therapy with placebo (n=126) or conventional therapy with enalapril (n=127). The patients were cared for at 6 different centers in Finland, Switzerland, and Sweden.	Patients were evaluated weekly and then monthly intervals until 12 months. The principal end points: time and cause of death were assessed by two investigators independently.	The enalapril group had a 50% reduction in mortality (p=<0.001). The ethical review committee recommended that this trial end ahead of schedule as it was deemed unjustified to withhold ACEI treatment.
McMurray, et al. (2002). Clinical Features Patients with Heart Failure: Patients in the Candesartan in Heart Failure – Assessment of Reduction in Mortality and Morbidity (CHARM) programme.	Does eplerenone (AA) improve survival and reduce hospitalizations for patients with HFrEF?	Retrospective cohort study	A total of 2,727 patients with HFrEF, NYHA class II, and a recent heart failure hospitalization were randomized to placebo or eplerenone. They were followed for 6 months.	The pharmaceutical sponsor of this study, Pfizer, was responsible for data entry and analysis.	The eplerenone group was statistically less likely to experience worsening mortality, morbidity, or rehospitalization

Article	Research Question	Design	Sample	Data Collection	Findings
Packer, et al. (2002). Effect of Carvedilol on the Morbidity of Patients with Severe Chronic Heart Failure.	In patients intolerant of ACEI, does candesartan (ARB) improve heart failure survival?	Retrospective cohort study	A total of 7,599 patients across 25 countries were enrolled and randomized. They had to be >18 years old, be at least NYHA class II, and have ACEI intolerance.	The pharmaceutical sponsor of this study, AstraZeneca, was responsible for data entry and analysis.	In patients with HFrEF who are intolerant of ACEI, treatment with an ARB decreases morbidity and mortality.
	In patients with HFrEF who are euvolemic, does carvedilol (BB) reduce morbidity, mortality, and rehospitalizations?	Randomized, double blind, placebo controlled trial	A total of 2,289 patients were randomly assigned to conventional treatment plus placebo (n=1133) or conventional therapy plus carvedilol (n=1156).	The pharmaceutical sponsors of this study, Roche and GlaxoSmithKline, were responsible for data entry and analysis.	Patients treated with carvedilol were less likely to experience an adverse advent (p=0.002), less likely to be hospitalized for a cardiac reason (p=<0.001), they spent less days in the hospital (p=<0.001), and less likely to die from a cardiovascular cause (p=<0.001).

APPENDIX C:

DATA COLLECTION FORM

HF Patient Management Tool **October 2016**

PMT FORM SELECTION Legend: Elements in bold are required

HF | **Patient ID:**

ARRIVAL AND ADMISSION INFORMATION

Internal Tracking ID: | Physician/Provider NPI:

Arrival Date and Time: ___/___/_____ ___:___ ☐ MM/DD/YYYY only ☐ Unknown/Date UTD

Admit Date: ___/___/_____ | Transferred in (from another ED)? O Yes O No

Point of Origin for Admission or Visit:
O 1 Non-Health Care Facility Point of Origin
O 2 Clinic
O 4 Transfer From a Hospital (Different Facility)
O 5 Transfer from a Skilled Nursing Facility (SNF) or Intermediate Care Facility (ICF)
O 6 Transfer from another Health Care Facility
O 7 Emergency room
O 9 Information not available
O F Transfer from Hospice and is Under a Hospice Plan of Care or Enrolled in a Hospice Program

DEMOGRAPHIC DATA

Date of Birth: ___/___/_____

Race: ☐ American Indian or Alaska Native ☐ Asian ☐ Asian Indian ☐ Chinese ☐ Filipino ☐ Japanese ☐ Korean ☐ Vietnamese ☐ Other Asian ☐ Black or African American ☐ Native Hawaiian or Pacific Islander ☐ Native Hawaiian ☐ Guamanian or Chamorro ☐ Samoan ☐ Other Pacific Islander ☐ White ☐ UTD

Gender: O Male O Female O Unknown

Hispanic Ethnicity : O Yes O No/UTD
If yes, ☐ Mexican, Mexican American, Chicano/a ☐ Puerto Rican ☐ Cuban ☐ Another Hispanic, Latino or Spanish Origin

Payment Source: ☐ Medicaid (Title 19) ☐ Medicare (Title 18) ☐ Medicare – Private/HMO/Other ☐ No Insurance/Not Documented/UTD ☐ Private/HMO/Other

External Tracking ID: _____ | **Patient Postal Code:** _____ - _____

MEDICAL HISTORY

Medical History (Select all that apply)

☐ None	☐ Anemia	☐ Atrial Fib (Chronic or Recurrent)
☐ Atrial Flutter (Chronic or Recurrent)	☐ CAD	☐ CardioMEMS (implantable hemodynamic monitor)
☐ CRT-D (cardiac resynchronization therapy with ICD)	☐ CRT-P (cardiac resynchronization therapy-pacing only)	☐ COPD or Asthma
☐ CVA/TIA	☐ Depression	☐ Diabetes - Insulin treated
☐ Diabetes - Non-insulin treated	☐ Dialysis (chronic)	☐ Heart failure
☐ Hyperlipidemia	☐ Hypertension	☐ ICD only
☐ Pacemaker	☐ Peripheral Vascular Disease	☐ Prior CABG
☐ Prior MI	☐ Prior PCI	☐ Renal insufficiency - chronic (SCr>2.0)
☐ Valvular Heart Disease	☐ Ventricular assist device	

History of Cigarette Smoking? (in past 12 months): O Yes O No

Heart Failure History

Etiology: ☐ Ischemic/CAD ☐ Non-Ischemic
Check if history of: ☐ Hypertensive ☐ Alcohol/other drug ☐ Chemotherapy ☐ Viral ☐ Familial ☐ Other Etiology ☐ Unknown/ Idiopathic

Known history of HF prior to this admission? O Yes O No

HF Patient Management Tool **October 2016**

	# hospital admissions in past 6 mo. for HF: O 0 O 1 O 2 O >2 O Unknown		
	☐ Patient listed for transplant		
DIAGNOSIS			
Cardiac Diagnosis	☐ Heart Failure with CAD ☐ Heart Failure, no CAD		
Atrial Fibrillation (At presentation or during hospitalization)	O Yes O No	Documented New Onset? ☐	
Atrial Flutter (At presentation or during hospitalization)	O Yes O No	Documented New Onset? ☐	
New Diagnosis of Diabetes	O Yes O No O Not Documented		
Basis for Diagnosis	☐ HbA1c ☐ Oral Glucose Tolerance	☐ Fasting Blood Sugar ☐Test Other	
Characterization of HF at admission or when first recognized	O Acute pulmonary edema O Dizziness/syncope O Dyspnea O ICD Shock/Sustained Ventricular Arrhythmia	O Pulmonary congestion O Volume overload/Weight Gain O Worsening fatigue O Other	
Other Conditions Contributing to HF Exacerbation *Select all that apply*	☐ Arrhythmia ☐ Pneumonia/respiratory process ☐ Worsening renal failure ☐ Noncompliance – medication	☐ Ischemia/ACS ☐ Uncontrolled HTN ☐ Noncompliance – dietary ☐ Other	
MEDICATIONS AT ADMISSION			
Medications Used Prior to Admission *Select all that apply*	☐ Patient on no meds prior to admission ☐ ACE inhibitor ☐ Aldosterone antagonist ☐ Angiotensin receptor blocker (ARB) ☐ Angiotensin receptor neprilysin inhibitor (ARNI) ☐ Antiarrhythmic ☐ Anticoagulation Therapy ☐ Warfarin ☐ Direct Thrombin Inhibitor ☐ Factor Xa Inhibitor ☐ Other ☐ Antiplatelet agent (excluding aspirin) ☐ Aspirin ☐ Beta Blocker ☐ Ca channel blocker ☐ Diabetic Medications (Any) ☐ Digoxin	☐ Diuretic ☐ Thiazide/Thiazide-like ☐ Loop ☐ Hydralazine ☐ Ivabradine ☐ Lipid lowering agent (Any) ☐ Statin ☐ Other lipid lowering agent ☐ Nitrate ☐ Omega-3 fatty acid supplement ☐ Renin Inhibitor ☐ Other	
EXAM/LABS AT ADMISSION			
Symptoms (closest to admission) *Check all that apply*	☐ Chest pain ☐ Dyspnea at rest ☐ Orthopnea	☐ Decreased appetite/early satiety ☐ Dyspnea on exertion ☐ Palpitations	☐Dizziness/lightheadedness/syncope ☐ Fatigue ☐ PND
Vital Signs (closest to admission)	Height _____ O inches O cm ☐ Not documented		
	Weight _____ O lbs O kg ☐ Not documented		
	Waist Circumference _____ O inches O cm ☐ Not documented		
	BMI _____ (automatically calculated)		
	Heart Rate _____ bpm ☐ ND		
	BP-Supine _____ / _____ mmHg (systolic/diastolic) ☐ ND		
	Respiratory Rate _____ breaths per minute		
Exam	JVP: O Yes O No O Unknown If yes, _____cm		

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(closest to admission)	Rales:	O Yes O No O Unknown If yes, O <1/3 O ≥1/3 O N/A
	Lower extremity edema:	O Yes O No O Unknown If yes, O trace O 1+ O 2+ O 3+ O 4+ O N/A
Lipids	TC: _____ mg/dL HDL: _____ mg/dL LDL: _____ mg/dL TG: _____ mg/dL	☐ Lipids Not Available
Labs (closest to admission)	**Na** _____	O mEq/L O mmol/L O mg/dL ☐ Not Available
	Hgb _____	O g/dL O g/L ☐ Not Available
	Albumin _____	O g/dL O g/L ☐ Not Available
	BNP _____	O pg/mL O pmol/L O ng/L ☐ Not Available
	NBNP _____	O pg/mL O ng/L ☐ Not Available
	SCr _____	O mg/dL O µmol/L ☐ Not Available
	BUN _____	O mg/dL O µmol/L ☐ Not Available
	Troponin (Peak) _____	O ng/mL O ug/L O T O I O Normal O Abnormal ☐ Not Available
	K _____	O mEq/L O mmol/L O mg/dL ☐ Not Available
	HbA1C _____ %	☐ Not Available
	Fasting Blood Glucose (mg/dL) _____	☐ Not Available
	EKG QRS Duration (ms) _____	☐ Not Available
	EKG QRS Morphology	O Normal O LBBB O RBBB O NS-IVCD O Paced O Not Available
IN-HOSPITAL CARE		
Procedures	☐ No Procedures ☐ Cardioversion ☐ CRT-D (cardiac resynchronization therapy with ICD) ☐ Dialysis or Ultrafiltration unspecified ☐ Left Ventricular assist device ☐ PCI ☐ Stress Testing	☐ Atrial Fibrillation Ablation or Surgery ☐ CardioMEMS (implantable hemodynamic monitor) ☐ CRT-P (cardiac resynchronization therapy-pacing only) ☐ ICD only ☐ Mechanical ventilation ☐ PCI with Stent ☐ Transplant (Heart)	☐ Cardiac Cath/Coronary angiography ☐ Coronary artery bypass graft ☐ Dialysis ☐ Intra-aortic balloon pump ☐ Pacemaker ☐ Right Cardiac Catheterization ☐ Ultrafiltration
EF – Quantitative	_____ %	Obtained: O This Admission O W/in the last year O > 1 year ago
EF – Qualitative	O Not applicable O Normal or mild dysfunction O Qualitative moderate/severe dysfunction O Performed/results not available O Planned after discharge O Not performed	Obtained: O This Admission O W/in the last year O > 1 year ago
Documented LVSD?	O Yes O No	
LVF Assessment?	O Yes O No O Not done, reason documented	
Oral Medications during hospitalization *Select all that apply*	☐ None ☐ ARNI ☐ Hydralazine nitrate	☐ ACE inhibitor ☐ Aldosterone antagonist	☐ ARB ☐ Beta Blocker

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Parenteral Therapies during hospitalization *Select all that apply*	☐ None ☐ Dopamine ☐ Milrinone ☐ Nesiritide ☐ Nitroglycerine ☐ Vasopressin antagonist	☐ Dobutamine ☐ Loop diuretics ☐ Intermittent bolus ☐ Continuous infusion ☐ Other IV vasodilator
Was the patient ambulating at the end of hospital day 2?	**O** Yes **O** No **O** Not Documented	
Was DVT prophylaxis initiated by the end of hospital day 2?	**O** Yes **O** No/Not Documented **O** Contraindicated	
If yes,	**O** Low dose unfractionated heparin (LDUH) **O** Low molecular weight heparin (LMWH) **O** Warfarin **O** Intermittent pneumatic compression devices (IPC) **O** Factor Xa Inhibitor **O** Direct thrombin inhibitor **O** Venous foot pumps (VFP) **O** Other	
Was DVT or PE (pulmonary embolus) documented?	**O** Yes **O** No/Not Documented	
Influenza Vaccination	**O** Influenza vaccine was given during this hospitalization during the current flu season **O** Influenza vaccine was received prior to admission during the current flu season, not during this hospitalization **O** Documentation of patient's refusal of influenza vaccine **O** Allergy/sensitivity to influenza vaccine or if medically contraindicated **O** Vaccine not available **O** None of the above/Not documented/UTD.	
Pneumococcal Vaccination	**O** Pneumococcal vaccine was given during this hospitalization **O** Pneumococcal vaccine was received in the past, not during this hospitalization **O** Documentation of patient's refusal of pneumococcal vaccine **O** Allergy/sensitivity to pneumococcal vaccine **O** None of the above/Not documented/UTD	

DISCHARGE INFORMATION

Discharge Date/Time ___/___/_____ ___:___	☐ MM/DD/YYYY only	
Get With The Guidelines® HF Mortality Risk Score	[Calculated in the PMT]	
For patients discharged on or after 04/01/2011: What was the patient's discharge disposition on the day of discharge?	1 – Home 2 – Hospice – Home 3 – Hospice – Health Care facility 4 – Acute Care Facility 5 – Other Health Care facility 6 – Expired 7 – Left Against Medical Advise/AMA 8 – Not Documented or Unable to Determine (UTD)	
If Other Health Care Facility	O Skilled Nursing Facility (SNF) O Inpatient Rehabilitation Facility (IRF) O Long Term Care Hospital (LTCH)	O Intermediate Care facility (ICF) O Other
If Home, special discharge circumstances	O Home Health O Homeless O International	O Prison/Incarcerated O None/UTD
Primary Cause of Death	**O** Cardiovascular **O** Non-cardiovascular **O** Unknown If cardiovascular: **O** Acute coronary syndrome **O** Worsening heart failure **O** Sudden death **O** Other cardiovascular	
When is the earliest physician/APN/PA documentation of comfort measures only?	**O** Day 0 or 1 **O** Day 2 or after **O** Timing unclear **O** Not Documented/UTD	

HF Patient Management Tool **October 2016**

Symptoms (closest to discharge)	O Worse O Unchanged O Better, symptomatic O Better, asymptomatic O Unable to determine	
Vital Signs (closest to discharge)	Weight _____ O lbs O kg ☐ Not well documented	
	Heart Rate _____ bpm ☐ND	
	BP-Supine _____/_____ mmHg (systolic/diastolic) ☐ ND	
Exam (closest to discharge)	JVP _____ O Yes O No O Unknown If yes, _____ cm	
	Rales _____ O Yes O No O Unknown If yes, O <1/3 O ≥1/3 O N/A	
	Lower extremity edema _____ O Yes O No O Unknown If yes, O trace O 1+ O 2+ O 3+ O 4+ O N/A	
Labs (closest to discharge)	Na _____ O mEq/L O mmol/L O mg/dL ☐ Not well documented	
	BNP _____ O pg/mL O pmol/L O ng/L ☐ Not well documented	
	SCr _____ O mg/dL O µmol/L ☐ Not well documented	
	BUN _____ O mg/dL O µmol/L ☐ Not well documented	
	NT-BNP (pg/mL) _____ O pg/mL ☐ Not well documented	
	K _____ O mEq/L O mmol/L O mg/dL ☐ Not well documented	
DISCHARGE MEDICATIONS		
ACEI	**Prescribed?**	O Yes O No
	If yes,	Medication: Dosage: Frequency:
	Contraindicated?	O Yes O No
	Contraindications or Other Documented Reason(s) For Not Providing ACEI:	☐ Hypotensive patient who was at immediate risk of cardiogenic shock ☐ Hospitalized patient who experienced marked azotemia ☐ Other ☐ Patient Reason ☐ System Reason
ARB	**Prescribed?**	O Yes O No
	If yes,	Medication: Dosage: Frequency:
	Contraindicated?	O Yes O No
	Contraindications or Other Documented Reason(s) For Not Providing ARB:	☐ Hypotensive patient who was at immediate risk of cardiogenic shock ☐ Hospitalized patient who experienced marked azotemia ☐ Other ☐ Patient Reason ☐ System Reason
ARNI	**Prescribed?**	O Yes O No
	If yes,	Medication: Dosage: Frequency:
	Contraindicated?	O Yes O No
	Contraindications or Other Documented Reason(s) For Not Providing ARNI:	☐ Ace inhibitor use within the prior 36 hours ☐ Allergy ☐ Hyperkalemia ☐ Hypotension ☐ Other Medical reasons ☐ Patient reason ☐ Renal dysfunction defined as creatinine > 2.5 mg/dL in men or > 2.0 mg/dL in women ☐ System reason
	Reasons for not switching to ARNI at discharge:	O Yes O No O ARNI was prescribed at discharge
	If yes,	☐ New onset heart failure ☐ NYHA Class I ☐ NYHA Class IV ☐ Not previously tolerating ACEI or ARB
ASA	Prescribed?	O Yes O No
	If yes,	Dosage: Frequency:

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Anticoagulation Therapy	Contraindicated?	O Yes O No
	Prescribed?	O Yes O No
	If yes,	**Class:** Medication: Dosage: Frequency: O Warfarin O Direct thrombin inhibitor O Factor Xa Inhibitor O Other
	Contraindicated?	O Yes O No
	If yes,	Contraindication(s): ☐ Allergy to or complication r/t anticoagulation therapy (hx or current) ☐ Patient/Family refused ☐ Risk for bleeding or discontinued due to bleeding ☐ Serious side effect to medication ☐ Terminal illness/Comfort Measures Only
Clopidogrel	Prescribed?	O Yes O No
	If yes,	Dosage: Frequency:
	Contraindicated?	O Yes O No
Other Antiplatelet(s)	Prescribed?	O Yes O No
	If yes,	Medication: Dosage: Frequency:
Beta Blocker	**Prescribed?**	O Yes O No
	If yes, Class of Beta Blocker	O Evidence-Based Beta Blocker O Non Evidence-Based Beta Blocker O Unknown Class
	If yes,	**Medication:** Dosage: Frequency:
	Contraindicated?	O Yes O No
	Contraindications or Other Documented Reason(s) For Not Providing Beta Blockers:	☐ Low blood pressure ☐ Fluid overload ☐ Asthma ☐ Patient recently treated with an intravenous positive inotropic agent ☐ Other ☐ Patient Reason ☐ System Reason
Aldosterone Antagonist	**Prescribed?**	O Yes O No
	If yes,	Medication: Dosage: Frequency:
	Contraindicated?	O Yes O No
	Contraindications or Other Documented Reasons(s) for Not Providing Aldosterone Antagonist at Discharge	☐ Allergy due to aldosterone receptor antagonist ☐ Hyperkalemia ☐ Renal dysfunction defined as creatinine > 2.5 mg/dL in men or > 2.0 mg/dL in women ☐ Other medical reasons ☐ Other contraindications ☐ Patient Reason ☐ System Reason
Diabetic Tx:	☐ None prescribed/ND ☐ None – contraindicated ☐ Insulin ☐ Oral agents ☐ Other subcutaneous/injectable agents	
Lipid Lowering Medication(s)	Prescribed?	O Yes O No
	If yes,	Class: Medication: Dosage: Frequency: Class: Medication: Dosage: Frequency: Class: Medication: Dosage: Frequency:
	Contraindicated?	O Yes O No
Omega-3 fatty acid supplement	Prescribed?	O Yes O No
	Contraindicated?	O Yes O No
Hydralazine Nitrate	**Prescribed?**	O Yes O No
	Contraindicated?	O Yes O No
	Contraindications or Other Documented Reason(s) For Not Providing Hydralazine Nitrate:	☐ Medical Reason ☐ Patient Reason ☐ System Reason

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Ivabradine	**Prescribed?**	O Yes O No
	Contraindicated?	O Yes O No
	Contraindications or Other Documented Reason(s) For Not Providing Ivabradine:	☐ Allergy to Ivabradine ☐ NYHA class I or IV ☐ Not treated with maximally tolerated dose beta blockers or beta blockers contraindicated ☐ New Onset HF ☐ Not in sinus rhythm ☐ Patient 100% atrial or ventricular paced ☐ Other medical reasons ☐ Patient reasons ☐ System reasons
Other Medications at Discharge	☐ Antiarrhythmic ☐ Amiodarone ☐ Dofetilide ☐ Sotalol ☐ Other ☐ Ca Channel blocker ☐ Digoxin	☐ Diuretic ☐ Loop Diuretic ☐ Thiazide Diuretic Nitrate ☐ Nitrate ☐ Ranolazine ☐ Renin inhibitor ☐ Other anti-hypertensive ☐ Other
OTHER THERAPIES		
ICD Therapy	**Counseling?**	O Yes O No
	Reason for not counseling?	O Yes O No
	Documented Medical Reason(s) for Not Counseling?	☐ ICD or CRT-D device in patient ☐ Multiple or significant comorbidities ☐ Limited life expectancy ☐ other reasons not eligible for ICD (e.g. EF > 35%, new onset HF) ☐ other reasons for not counseling
	Placed or Prescribed?	O Yes O No
	Reason for not Placing or Prescribing?	O Yes O No
	Documented Reason(s) for Not Placing or Prescribing ICD Therapy?	☐ Contraindications ☐ Not receiving optimal medical therapy ☐ Any other physician documented reason including; AMI in prior 40 days, recent revascularization, recent onset of HF ☐ Patient Reason ☐ System Reason
CRT Therapy	**CRT-D Placed or Prescribed?**	O Yes O No
	CRT-P Placed or Prescribed	O Yes O No
	Reason for not Placing or Prescribing?	O Yes O No
	Documented Medical Reason(s) for Not Placing or Prescribing CRT Therapy?	☐ Contraindications ☐ Not receiving optimal medical therapy ☐ Not NYHA functional Class III or ambulatory Class IV ☐ Any other physician documented reason including AMI in prior 40 days, recent revascularization, recent onset of HF ☐ QRS duration <120 ms ☐ Patient Reason ☐ System Reason
RISK INTERVENTIONS		
Smoking Cessation Counseling Given		O Yes O No

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Activity Level	O Yes O No
Follow-Up	O Yes O No
Symptoms Worsening	O Yes O No
Diet (Salt restricted)	O Yes O No
Medications	O Yes O No
Weight Monitoring	O Yes O No
Follow-Up Visit Scheduled	O Yes O No
Date/Time of first follow-up visit:	___/___/_____ ___:___ ☐ MM/DD/YYYY only ☐ Unknown
Location of first follow-up visit:	O Office Visit O Home Health Visit O Not Documented
Medical or Patient Reason for no follow-up appointment being scheduled?	O Yes O No
Follow up Phone Call Scheduled O Yes O No	**Date of first follow-up phone call:** ___/___/_____ ☐ Unknown
TLC (Therapeutic Lifestyle Change) Diet	O Yes O No O Not Documented O Not Applicable
Obesity Weight Management	O Yes O No O Not Documented O Not Applicable
Activity Level/Recommendation	O Yes O No O Not Documented O Not Applicable
Referred to Outpatient Cardiac Rehab Program	O Yes O No O Not Documented O Not Applicable
Anticoagulation Therapy Education	O Yes O No O Not Documented O Not Applicable
Was Diabetes Teaching Provided?	O Yes O No O Not Documented O Not Applicable
PT/INR Planned follow-up	O Yes O No O Not Documented O Not Applicable
Referral to Outpatient HF Management Program	O Yes O No O Not Documented O Not Applicable
If Yes,	☐ Telemanagement ☐ Home Visit ☐ Clinic-based
Referral to AHA Heart Failure Interactive Workbook	O Yes O No O Not Documented O Not Applicable
Provision of at least 60 minutes of Heart Failure Education by a qualified educator	O Yes O No O Not Documented O Not Applicable
Advanced Care Plan/Surrogate Decision Maker Documented Or Discussed?	O Yes O No O Not Documented O Not Applicable
Advance Directive Executed	O Yes O No
POST DISCHARGE TRANSITION	
Care Transition Record Transmitted	O By the seventh post-discharge day O Exists, but not transmitted by the seventh post-discharge day O No Care Transition Record/UTD
Care Transition Record Includes	☐ All were included *(Check all yes)* Discharge Medications O Yes O No Follow-up Treatment(s) and Service(s) Needed O Yes O No Procedures Performed During Hospitalization O Yes O No Reason for Hospitalization O Yes O No Treatment(s)/Service(s) Provided O Yes O No
OPTIONAL FIELDS	

Field 1	Field 2	Field 3	Field 4	Field 5
Field 6	Field 7	Field 8	Field 9	Field 10
Field 11		Field 12		
Additional Comments				
ADMIN/JOINT COMMISSION				

HF Patient Management Tool **October 2016**

ICD-9 Principal Diagnosis Code	_____		
ICD-9 Other Diagnoses Codes	1.	2.	3.
	4.	5.	6.
	7.	8.	9.
	10.	11.	12.
	13.	14.	15.
	16.	17.	18.
	19.	20.	21.
	22.	23.	24.
ICD-9-CM Principal Procedure Code	_____ Date: __/__/____ ☐ Date UTD		
ICD-9 Other Procedure Codes	1. _____ Date: __/__/____ ☐ Date UTD		
	2. _____ Date: __/__/____ ☐ Date UTD		
	3. _____ Date: __/__/____ ☐ Date UTD		
	4. _____ Date: __/__/____ ☐ Date UTD		
	5. _____ Date: __/__/____ ☐ Date UTD		
ICD-10-CM Principal Diagnosis Code	_____		
ICD-10-CM Other Diagnoses Codes	1.	2.	3.
	4.	5.	6.
	7.	8.	9.
	10.	11.	12.
	13.	14.	15.
	16.	17.	18.
	19.	20.	21.
	22.	23.	24.
ICD-10-PCS Principal Procedure Code	_____ Date: __/__/____ ☐ Date UTD		
ICD-10-PCS Principal Procedure Code	1. _____ Date: __/__/____ ☐ Date UTD		
	2. _____ Date: __/__/____ ☐ Date UTD		
	3. _____ Date: __/__/____ ☐ Date UTD		
	4. _____ Date: __/__/____ ☐ Date UTD		
	5. _____ Date: __/__/____ ☐ Date UTD		
CPT Code			
CPT Code Date	__/__/____ ☐ Unknown		
What is the patient's source of payment for this episode of care?	O Medicare O Non-Medicare		
Was this Case Sampled?	O Yes O No		
During this hospital stay, was the patient enrolled in a clinical trial in which patients with the same condition as the measure set were being studied (i.e. AMI, CAC, HF, PN, PR, SCIP)?			O Yes O No
PMT used concurrently or retrospectively or combination?	O Concurrently O Retrospectively O Combination		
Standardized order sets used?	O Yes O No		
Patient adherence contract/compact used?	O Yes O No		
Discharge checklist used?	O Yes O No		

APPENDIX D:

BANNER HEALTH IRB APPROVAL FORM

October 4, 2017

Kathryn Sisterman, MSN, FNP, AGACNP

RE: NRDUC Project: 1708699468: Improving Care for Patients Hospitalized with Heart Failure (GWTG)
New Project UA Form 203 v 2016-07, forwarded to Non-Research Data Use Committee on 8/11/2017; Banner Health Non-Research Data Use Application received on 2/27/17
Non-Research Data Use Committee Evaluation: Approved on 10/4/2017

Dear Kathryn Sisterman,

Thank you for your submission of both the UA Form 203 and the Non-Research Data Use Application which outlined the above noted project. The project information you provided was reviewed and subsequently approved on October 4, 2017 by the BH NRDUC. Should you have any questions or concerns please feel free to reach out to the NRDUC chair at any time.

PLEASE NOTE
The NRDUC determination is based on the information you provided to the committee on your application version 2016-07 and supporting documents received on 2/27/17 and forwarded to the NRDUC on 8/11/2017. If the project is modified in any way, including re-analysis of data, the determination is no longer valid. You must resubmit the project to the NRDUC for review and approval.
Please note: As part of continuing process improvement, random audits could be conducted to assess compliance and adherence with submitted/approved applications.

A copy of this letter will be placed in the NRDUC project file.

Sincerely,

Kristen Eversole, BS, RHIA, CHPC
Banner Health Privacy Program Director – University Medicine, NRDUC Chair

APPENDIX E:

EMAILED REPORT TO CARE TEAMS

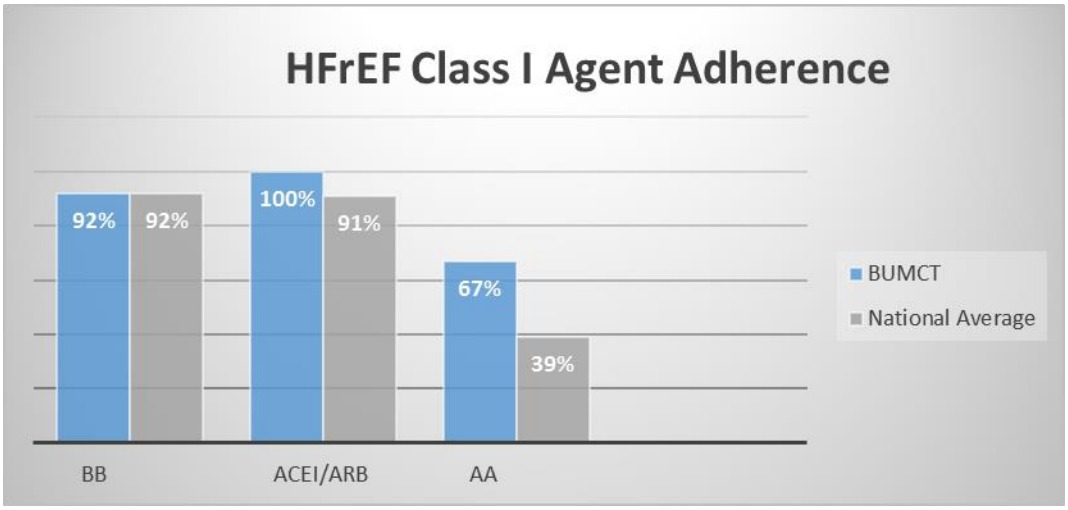
Banner University Medical Center Tucson Hospital is participating in the American Heart Association's quality improvement program, Get With The Guidelines – Heart Failure

Project Aim: Promote adherence to ACCF/AHA guideline directed medical therapy for patients discharged from BUMCT with the diagnosis of decompensated heart failure with reduced ejection fraction

Measures: Discharge prescription of appropriate beta blocker (BB), angiotensin converting enzyme inhibitor (ACEI) or angiotensin receptor blocker (ARB), and aldosterone receptor antagonist (AA)

Goal: Maintain adherence >70% for all three medication recommendations in patients without a guideline defined contraindication

Results: Last month's adherence rates to guideline directed medical therapy upon discharge:
Beta Blocker: 76% versus national average 92%
Angiotensin converting enzyme inhibitor or angiotensin receptor blocker: 95% versus 91%
Aldosterone antagonist: 67% versus national average 39%



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https://www.heart.org/idc/groups/heart-public/@wcm/@hcm/@gwtg/documents/downloadable/ucm_456868.pdf

Sincerely,
Jennifer Cook, MD and Kathryn Sisterman, NP

Please direct any questions or concerns to kathryn.sisterman@bannerhealth.com

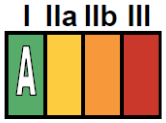
Pharmacological Treatment for Stage C HF*r*EF (cont.)

Aldosterone receptor antagonists [or mineralocorticoid receptor antagonists (MRA)] are recommended in patients with NYHA class II-IV and who have LVEF of 35% or less, unless contraindicated, to reduce morbidity and mortality. Patients with NYHA class II should have a history of prior cardiovascular hospitalization or elevated plasma natriuretic peptide levels to be considered for aldosterone receptor antagonists. Creatinine should be 2.5 mg/dL or less in men or 2.0 mg/dL or less in women (or estimated glomerular filtration rate >30 mL/min/1.73m2) and potassium should be less than 5.0 mEq/L. Careful monitoring of potassium, renal function, and diuretic dosing should be performed at initiation and closely followed thereafter to minimize risk of hyperkalemia and renal insufficiency.

Helping Cardiovascular Professionals Learn. Advance. Heal.

Pharmacological Treatment for Stage C HF*r*EF (cont.)

Diuretics are recommended in patients with HF*r*EF who have evidence of fluid retention, unless contraindicated, to improve symptoms.



ACE inhibitors are recommended in patients with HF*r*EF and current or prior symptoms, unless contraindicated, to reduce morbidity and mortality.

ARBs are recommended in patients with HF*r*EF with current or prior symptoms who are ACE inhibitor-intolerant, unless contraindicated, to reduce morbidity and mortality.

Pharmacological Treatment for Stage C HF*r*EF (cont.)

Harm

Routine *combined* use of an ACE inhibitor, ARB, and aldosterone antagonist is potentially harmful for patients with HF*r*EF.

Use of 1 of the 3 beta blockers proven to reduce mortality (i.e., bisoprolol, carvedilol, and sustained-release metoprolol succinate) is recommended for all patients with current or prior symptoms of HF*r*EF, unless contraindicated, to reduce morbidity and mortality.

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