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Implementation of a Transitional Care Pilot Program to Reduce Heart Failure Readmissions

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Abstract

Heart failure is a chronic collection of symptoms which primarily affect the elderly. The condition requires complex care and management, which is not only taxing on the patient but amass to large costs primarily from hospital admissions and readmissions. Readmissions are a key measurement in heart failure as Centers for Medicare and Medicaid with the Hospital Readmissions Reduction Program has enacted penalties to organizations with excess readmissions. Transitional care is a collection of interventions targeted at preventing readmissions and improving patient outcomes by early intervention and management after a patient has been hospitalized. This project established a pilot transitional care program for a community-based healthcare organization with an inpatient and outpatient network. Patients in the transitional care interventions had a lower rate of readmissions compared to previous historical data and those not enrolled in the program, indicating that while a transitional care program requires an increase in resources the benefits have the potential to outweigh the effort. Further studies with a larger intervention group are recommended to further evaluate the effect on heart failure readmissions.

Keywords: Hospital readmissions, Transitional care, Pilot study

Implementation of a Transitional Care Pilot Program to Reduce Heart Failure Readmissions

The American Heart Association currently estimates 6.2 million individuals in the United States experience heart failure and within 10 years this number is projected to increase by 46% (Benjamin et al., 2019). The 5-year prognosis of heart failure is approximately 50% and patients with the condition often experience marked decrease in the ability to perform activities of daily life and self-reported quality of life (Benjamin et al., 2019; Rankin, Rowen, Howe, Cleland, & Whitty, 2019). Heart failure not only has a huge impact on patients but also contributes to a large portion of spending in the United States. By 2030 the United States is expected to spend approximately 160 billion dollars annually on all cardiology care for patients with the condition (Heidenreich et al., 2013).

Hospital readmissions have become an indicator for healthcare quality and a target to address for excess costs. Due to the chronic and progressive nature of heart failure, its complexity in the pathophysiology and pharmacological management, and the high level of patient lifestyle modifications required; heart failure patients often have periods of acute exacerbations resulting in high rates of hospital admissions and readmissions. Medicare has transferred the financial burden of readmissions within 30 days to the admitting hospital through the Hospital Readmissions Reduction Program (US Centers for Medicare and Medicaid, 2020). Transitional care is a collection of early interventions to bridge care between an acute hospitalization and management after discharge to reduce readmissions and improve patient outcomes. Transitional care provides a seamless transition from the inpatient setting to community-based care. Components of the transitional care model include: Patient education, communication, and patient empowerment (Naylor et al., 2004; Albert, Barnanson, Deswal, &

Hernandez, 2015;). Transitional care performed by an advanced-practice nurse has been effective in readmission reduction and treatment adherence, but is not widely implemented (Albert, Barnanson, Deswal, & Hernandez, 2015; Naylor et al., 2004; Naylor, 2000; Naylor et al., 2018).

Background and Significance of the Complexity of Heart Failure

Heart Failure Classifications

Two distinguishable variations of heart failure exist: Heart failure with reduced ejection fraction (HFrEF) and heart failure with preserved ejection fraction (HFpEF). HFrEF results from systolic dysfunction; when the heart ejects abnormally and results in a higher ventricular end-systolic volume and a reduction the left ventricular ejection fraction (Beggs, 2017, pp 2092-2121). HFpEF often occurs from diastolic dysfunction, a decrease in compliance during diastole that affects ventricular filling (Beggs, 2017, pp 2092-2121). A large portion of heart failure patients have both systolic and diastolic dysfunction (Beggs, 2017, pp 2092-2121). Most studies have been done on heart failure patients with reduced ejection fraction and serious gaps in knowledge exist about the etiology and proper management of individuals with preserved ejection fraction (Van Riet et al., 2016). As the population in the US ages, the prevalence of heart failure with preserved ejection fraction has increased and is estimated to account for fifty percent of heart failure hospitalizations (Benjamin, et al., 2019). There is also a significant differentiation between ischemic and non-ischemic heart failure. Ischemic heart failure roots from an ischemic process such as coronary artery disease and/or previous myocardial infarction. Around 30-40% of HFrEF patients are of ischemic etiology and though treatment management is the same, ischemic heart failure has a significantly increased mortality rate and poor prognosis when compared to nonischemic because of myocardial death versus myocardial dysfunction (Zhang et al., 2020).

Etiology and Epidemiology of Heart Failure

Heart failure is a syndrome of a culmination of symptoms and physiological changes resulting from a mismatch in the body's cardiac requirements and cardiac output. This can spur from an acute disease process such as cardiogenic shock, but most often happens from long standing hypertension and coronary artery disease (Mosterd & Hoes, 2007). The population with the highest prevalence of heart failure is the elderly with around 12% of Americans over the age of 80 diagnosed with heart failure (Mosterd & Hoes, 2007; Benjamin, et al., 2019). The lifetime risk for heart failure in Americans 45-95 years in age ranges between 20 and 40 %, with significant risk factors including elevated body mass index and hypertension when age is controlled (Benjamin, et al., 2019).

Clinical Manifestations

Primary symptoms of heart failure arise from compensatory measures the body initiates once a reduction in cardiac output is recognized. These measures lead to fluid overload, increased sympathetic activation, and myocardial remodeling (Miller, 2021, pp 1-12). The cardinal symptoms of heart failure are dyspnea and fatigue, and other common signs include lower extremity or systemic edema and jugular vein distention (Beggs, 2017, pp 2092-2121). The patient may also experience cough, orthopnea, paroxysmal nocturnal dyspnea, palpitations, and presyncope or syncope (Beggs, 2017, pp 2092-2121).

Pathophysiology of Heart Failure

When cardiac injury causes hemodynamic changes which lower cardiac output, compensatory neuro-hormonal changes respond to regulate cardiac output but end up enhancing damage through cardiac remodeling. When cardiac output is compromised, blood pressure decreases and the body attempts to compensate by increasing preload (Sayer & Bhat, 2014). The

body achieves this by activating the renin-angiotensin- aldosterone system (RAAS) which in turn increases water and sodium resorption. The increased blood volume increases preload and myocardial contraction (Miller, 2021, pp 1-12). The RAAS system is counter regulated by natriuretic peptides, however with longstanding heart failure peripheral resistance builds against natriuretic peptides, allowing RAAS to go unopposed causing fluid overload which further damages the heart (Harrtupe & Mann, 2017). First line heart failure treatment with angiotensin converting enzyme inhibitors (ACEi) or angiotensin receptor blockers (ARBs) work to limit the effect of the RAAS pathway and prevent harmful cardiac remodeling and hypertrophy (Sayer & Bhat, 2014). Angiotensin also initiates cardiac remodeling leading to more damage and left ventricular dysfunction (Banasik & Kim, 2013, pp 408-418; Sayer & Bhat, 2014). Aldosterone and angiotensin II also stimulate myofibroblast stimulation leading to myocardial fibrosis (Harrtupe & Mann, 2017). Even when RAAS is opposed with ACEi or ARBs, in over 30% of heart failure patient aldosterone levels continue to rise even with RAAS suppression by ACEi or ARBs, validating the needed for aldosterone antagonists within heart failure pharmacotherapy (Harrtupe & Mann, 2017). The fluid overload also causes systemic and pulmonary congestive symptoms which often decrease quality of life. Diuretics assist in symptom management resultant from volume overload (Miller, 2021, pp 1-12).

A reduction in stroke volume initiates sympathetic activation which causes increased heart rate and contraction (Miller, 2021, pp 1-12). Longstanding sympathetic activation increases afterload and puts added work on the heart causing a cyclic effect by further reducing stroke volume and compensatory hypertrophy of cardiac myocytes (Miller, 2021, pp 1-12; Chavey, 2000). Beta 1 receptor blockers (often referred simply as beta blockers) inhibit

sympathetic innervation to the heart and have been shown to reduce mortality in heart failure (Chavey, 2000).

Diagnosis and Guideline Directed Medication Therapy

There are two major guidelines established for the diagnosis and management of heart failure, the joint presentation by the American Heart Association and the American College of Cardiology, as well as the European Society of Cardiology publication. The AHA/ACC guideline is considered the gold standard for the United States. The first widely used staging tool for heart failure was created in 1964 by the New York Heart Association and classified patients from I-IV based on subjective symptoms of cardiac disease (Table 1)(New York Heart Association, 1964). The AHA/ACC guidelines created a supplementary staging which focused on objective structural changes noted in heart failure from class A-D (Table 2) (Yancy et al., 2013). Today both systems are often used simultaneously.

Recommendations for Diagnosis. The guideline emphasizes the importance on health history and strong foundational physical assessment in diagnosis of the disease. As there is no single diagnostic test for heart failure it is considered a clinical diagnosis, with other diagnostic tools such as chest x-ray, echocardiogram, and standard laboratory values providing supplementation to the clinical picture (Yancy et al., 2013). The Framingham heart failure major criteria includes paroxysmal nocturnal dyspnea or orthopnea, neck vein distention, hepatojugular reflex, acute pulmonary edema, rales, cardiomegaly, S3 gallop, and increased venous pressure (McKee, Castelli, McNamara, & Kannel, 1971). Minor criteria include nocturnal cough, ankle edema, dyspnea on exertion, hepatomegaly, and pleural effusion (McKee, Castelli, McNamara, & Kannel, 1971).

Recommendations for Management. The first pharmacological recommendation discussed for all stages is the use of an angiotensin converting enzyme (ACEi) or an angiotensin receptor blocker (ARB)(Yancy et al., 2013). After Stage A, beta blockers, aldosterone agonists, and diuretics become key pharmacotherapy standards for the management of heart failure to target the harmful compensatory measures previously discussed (Yancy et al., 2013). The AHA/ACC provides various tables and flowcharts to streamline the presentation of proper maintenance. For each category of heart failure, the guideline also provides non-pharmacologic interventions and prompts the importance of patient education and self-care. With an admission related to acute decompensated heart failure , it is recommended that the following management recommendations are achieved before discharge: exacerbating factors addressed, volume status optimized, smoking cessation completed, diuretic therapy switched to oral medications and all IV medications be completed for at least 24 hours, ejection fraction is noted, ACEi and beta blocker therapy is evaluated, patient and family education is completed and an outpatient follow up appointment is scheduled (Inamdar & Inamdar, 2016).

Current Guideline Gaps. Though the AHA/ACC and ECS guidelines often make recommendations based on high ranking level of evidence such as meta-analysis and randomized control trials, gaps remain in the literature. Heart failure with preserved or intermediate ejection fractions continue to have lacking individualized data with a less extensive body of evidence when compared to HFrEF despite incidence of HFpEF being estimated at 40% of heart failure cases (Yancy et al., 2017; Tran & Fonarow, 2014). There is also lacking consideration for groups with potential for atypical presentation such as women and underrepresented minorities, that are often not sufficiently included in studies (Tran & Fonarow, 2014). There is also a gap in translation of these guidelines and recommendations into practice despite its publication. It is

estimated that with each heart failure hospitalization an average of 3 or more medication additions or alterations must be made to align with the recommendations established in this guideline (Benjamin et al., 2019).

Health Disparities Within Heart Failure

Large health disparities have been noted in heart failure patients and other cardiac conditions. Patients of African descent have a higher incidence of heart failure than any other race in the United States and also have the worst outcomes (Nayak, Hicks, & Morris, 2020). One contributing factor is inequity in social determinates of health such as access to healthy food and safe areas for exercise with limited environmental hazards (Nayak, Hicks, & Morris, 2020). Implicit bias can also effect the quality of care patients receive and lead to poor outcomes. It was found in an analysis of over 12 million emergency department visits that patients of African descent were less likely to be hospitalized for heart failure, even with higher acuity (Nayak, Hicks, & Morris, 2020). Another study found that patients of African descent were less likely to be seen by cardiology during an admission and in advanced cases were less likely to be offered heart transplants (Nayak, Hicks, & Morris, 2020).

Heart Failure Costs

Heart failure is a costly disease with increasing prevalence and expected to increase its large portion of the nation's spending on healthcare. Costs primarily spur from hospital admissions and readmissions from heart failure exacerbations. A retrospective analysis of Medicare costs from 2005-2011 found that the average patient with heart failure cost $34,000 annually for hospitalization fees alone (Kilgore, Patel, Kielhorn, Maya, Sharma, 2017). With the

projected costs of 160 billion dollars due to direct and indirect heart failure care and its primary population being the elderly, CMS services has invested efforts in lowering the cost burden of this disease (Heidenreich et al., 2013).

Purpose and Project Aims

The purpose of this project is to evaluate if the studied effects of TCM can translate and reproduce similar effects in a heart failure transitional care pilot program in a community hospital consisting of a network of inpatient and outpatient services. The aims of the project are to 1.) Measure the organizations rate of heart failure readmissions and patient characteristics before intervention. 2.) Create and implement a transitional care pilot program consisting of three transitional care interventions. 3.) Evaluate the effects of the interventions on readmission rates of patient participants within thirty days and determine the feasibility of the project becoming a long-standing program.

Review of Literature

Heart Failure Readmissions

Heart failure readmissions attributes to one third of total hospital readmissions in the US (Kilgore, Patel, Kielhorn, Maya, Sharma, 2017). The average readmission rate for heart failure patients within 30 days is 24%, and over half when that measurement extends to 60 days (Anand, Garg, Koene, & Thenappan, 2016). The etiology of heart failure readmission is a complex phenomenon with multiple variables. Studies have examined the predictive factors for heart failure readmission and findings have demonstrated that cardiac and non-cardiac comorbidities along with the number of new medications prescribed at discharge may contribute to 30 day readmissions (Sherer, Crane, Abel, & Efird, 2016

Readmission Risk Stratification. Many different readmission risk identification tools exist, yet there is no standardization in their utilization (Van Walraven et al., 2010; Sieck, Adams, & Burkhart, 2019; Chamberlain, Sond, Mahendraraj, Lau, & Siracuse, 2018). The LACE index, which stands for length of stay, acuity, comorbidities, and emergency department visits is one readmission risk score which is validated and has been reported in the literature (C statistic 0.684 -Hosmer–Lemeshow goodness-of-fit statistic 14.1, $p = 0.59$). The LACE index uses its naming variables to predict probability of readmission. However, the validation of this tool was proved on a generally healthy middle- age population in Canada and has had differing success with other age groups (Van Walraven et al., 2010). Better Outcomes by Optimizing Safe Transitions (BOOST) project was a multi-hospital initiative to identify general risk of readmissions for patients and provide interventions addressing these risks (0.63 95% CI, 0.61-0.65), (Sieck, Adams, & Burkhart, 2019). They established the "8 P's" risk stratification tool. The 8 P's of predictive factors for readmission included: problems medications, psychological factors, principal diagnosis, polypharmacy, poor health literacy, lack of patient support, prior hospitalization, and need for palliative care (Table 3) (Sieck, Adams, & Burkhart, 2019). In 2018 the readmission after heart failure (RAHF) score was developed and validated to predict risk of 30-day readmissions specifically in heart failure patients, though widespread implementation has yet to be seen ($R^2 = 0.9845$) (Chamberlain, Sond, Mahendraraj, Lau, & Siracuse, 2018).

CMS and Readmissions

With the affordable care act passed in 2010, the Centers for Medicare and Medicaid Services (CMS) made a commitment to value based reimbursement verses fee for service, which brought hospital readmissions further into light. The Hospital Readmissions Reduction Program (HRRP) enacted reimbursement penalties to hospitals throughout an entire fiscal year based on

excess readmissions for 6 key conditions: heart failure, acute myocardial infarctions, chronic obstructive pulmonary disease, pneumonia, coronary bypass, and total knee and hip replacements (Centers for Medicare and Medicaid Services, 2021). Since the implementation of the Affordable Care Act and Subsequent HRRP program, risk adjusted heart failure readmissions decreased over 3% and then stabilized (95% CI: 0.52% to 1.58%) (Blecker et al., 2019). In 2020, 50 percent of hospitals within HRRP program were penalized for excess readmissions, up to 3% of expected reimbursement (Centers for Medicare and Medicaid Services, 2021). The HRRP program evaluates key measures in heart failure care delivery for hospitals nation-wide such as 30-day readmission rate, 30-day mortality, and emergency department and observation visits associated with a discharge (Psotka et al., 2020). While this incentive has driven value-based care models to be adapted, it is argued that these penalties disproportionately affect hospitals that serve communities of lower socioeconomic status and disadvantaged populations (McIlvennan, Eapen, & Allen, 2015; Psotka et al., 2020).

Transitional Care and the Transitional Care Model

The Transitional Care Model (TCM) is one approach to ensure high quality care while decreasing hospital re-admission rates. Developed by Mary Naylor from the University of Pennsylvania in 1980, The TCM model uses interdisciplinary services to promote complicated and costly patient populations during transitions of care, such as from hospital admission to home (Naylor, 2000). Transitional care from one agency to another or from the inpatient to outpatient care services consists of various interventions such as inpatient transitional care provider rounding, patient targeted plans of care, discharge planning, home visits, and telephone calls (Naylor et al., 2004).

The TCM model has been implemented in many different care settings each discipline having specific interventions; however, there are nine core concepts of the TCM model: screening, staffing, maintaining relationships, engaging patients and care givers, assessing and managing risks and symptoms, educating and promoting self-management, collaborating, promoting continuity, and fostering coordination of care (Hirschman, Shaid, McCauley, Pauly,& Naylor, 2015). Transitional care reinforces a culture of safety, collaboration, and patient centered care within inpatient and outpatient services (Radhakrishnan, Jones, Weems, Knight, & Rice, 2018).

The model has shown improvement in patient outcomes, readmission rates, hospital costs, quality of life and management adherence (Naylor et al., 2018; Patel, Lewandowski, Bhardwaj, Berkovitz, & Clemson, 2018; Naylor et al., 2004; Feltner et al., 2014; Wong et al., 2016; Radhakrishnan, Jones, Weems, Knight, & Rice, 2018). One study saw a significant (N=378 11% vs. 26%, $p < 0.001$) reduction in readmissions for patients enrolled in a transitional care program and a 4% reduction in 30-day mortality (Patel, Lewandowski, Bhardwaj, Berkovitz, & Clemson, 2018). This study also experienced a 92% increase in patient appointments in the clinic per day after transitional care providers visited patients before discharge (Patel, Lewandowski, Bhardwaj, Berkovitz, & Clemson, 2018). Transitional care also has benefits for patients who may not wish for heavy intervention or life saving measures. A transitional care program for palliative care-based end stage heart failure patients saw improvements in self-reported quality of life and a significantly decreased rate of depressive symptoms ($\chi 2(1, N = 68) = 1.6, p<0.05$) (Wong et al., 2016).

TCM and Heart Failure Patients

The TCM model is appropriate for the management of heart failure because it is patient centered focusing on self-management, medication adherence, and symptom control. Studies have found a reduction in 30- day readmission, a decrease in mortality rate, and decreased costs for heart failure specific transitional care (Stauffer et al., 2011; Albert et al., 2015; Naylor et al., 2004; Mai Ba, Son, Lee, & Kim, 2020; Radhakrishnan, Jones, Weems, Knight, & Rice, 2018; Feltner et al., 2014). Transitional care has been endorsed for the treatment of heart failure patients by the AHA (Albert et al., 2015). In a randomized control trial of 339 heart failure patients, those who were enrolled in a three-month advanced-practice nurse discharge planning program under the TCM model had significantly less readmissions than the control group after 52 weeks from index admission (Naylor et al., 2004). The intervention group also had lower mean hospital associated costs by over $4,000 per admission (Naylor et al., 2004). Since this randomized control trial, the model has been implemented to cardiac and heart failure patients through translational studies.

An integrative review evaluating the effects of transitional care specifically on heart failure patients found 54% of studies evaluated showed a statistically significant reduction in heart failure readmissions, and a 67% of studies showing significant improvements in patient quality of life from transitional care interventions (Mai Ba, Son, Lee, & Kim, 2020). One study using physical therapists and nurses to implement transitional care in a post-acute setting identified a 16% reduction in 30 day readmissions for heart failure patients ($\chi 2(1, N = 462) = 13.36, p < .001$) (Miller, Edenfield, Roberto, & Erb, 2017). Another 7- hospital pilot study found that transitional care implementation was able to decrease heart failure 30-day readmission rates to 7%, and all hospital readmission rates to 4%, well below national standards in the United States (Radhakrishnan, Jones, Weems, Knight, & Rice, 2018). An additional meta-analysis

evaluating 40 heart failure specific randomized control trials found heart failure specific clinics and telephone encounter as transitional care interventions that reduced heart failure readmissions (Feltner et al., 2014).

Operationalization of Transitional care

In an effort to increase transitional care interventions, in 2013 CMS began reimbursing for transitional care with private insurances to follow. Providers may use specific CPT codes for transitional care if the patient was contacted within 48 business hours after discharge and see the patient between 7 to 14 days depending on the code used (Nicoletti, 2016). Providers are incentivized to use complete these visits as they not only have the potential to decrease costs by reducing readmissions but to also generate more revenue CMS offers additional reimbursement for office visits coded under transitional care compared to established office visits with similar level of detail (Nicoletti, 2016).

Underutilization and Limitations of Transitional Care

While transitional care is increasing in popularity due to the increasing pressures in the last decade for tackling readmissions, it has not been implemented widespread. Underutilization for transitional care spurs from cost concerns and limited cost analysis reported in previous work, established culture for delivery of care, and sustainability concerns (Naylor, Mary & Berlinger, 2016; Naylor, Mary D. et al., 2018; Stauffer et al., 2011). One study found that while their transitional care services may have been directly more costly than standards of care, when cost per quality adjusted life year saved were considered it was beneficial (Blum et al., 2020). Given the complexity of heart failure as well as socio-economic and personal struggles many heart failure patients face can also impede on the delivery of transitional care. The AHA released

a diagram best conveying the complexity of healthcare delivery during transitions (Albert et al., 2015)

Methodology

Project Design and Review Board Approval

The project conducted was a program evaluation with a quantitative pre- and post-analysis of a pilot program using the Transitional Care Model (TCM) to create a set of heart failure specific transitional interventions. This project utilizes Donabedian's Framework for Quality Improvement to achieve these aims, focusing on changing healthcare processes to improve outcomes (1988). Transitional care alters the process in which discharging patients receive their care to reduce readmissions, an undesired outcome. The hospitals institutional review board determined the project to be quality improvement in nature and the Seattle University Institutional Review Board determined the project to exempted as "internal quality assurance" and not human subjects' research.

Setting and Stakeholders

This project took place within a healthcare organization with both inpatient and outpatient services, which allowed for thorough tracking of patients through transitions of care. The organization is the primary healthcare network for a Washington urban county with a population of over 200,000 individuals (US Census, 2018). Need for the project arose from recent organizational reporting's revealed that cardiovascular conditions attributed to the highest portion of preventable hospital stays in 2016 and reported over 400 preventable admissions related to heart failure (Harrison, 2017). Primary stakeholders of the project included heart failure patients in the community and the heart failure clinic staff providing the transitional care services.

Participants and Sampling Method

Historical data evaluated included all patients with a primary diagnosis code of heart failure who readmitted within 30 days from January 2018-December 2019. Inclusion criteria for the study included patient data with an appropriate diagnosis code for heart failure at time of admission with a subsequent discharge. Exclusion criteria included data of patients who expired before discharge of their novel admission or readmitted under end-of-life care. Using the same inclusion and exclusion criteria, intervention data came from patient participants who underwent transitional care from December 2020-Feburary 2021. Convenience sampling was used for subject recruitment in the transitional care team's work; based on participant interest and provider availability. The program evaluation has minimal human subjects concern as it works exclusively with deidentified data within the scope of quality improvement. The intervention of transitional care included education and risk assessment consistent with current heart failure treatment guidelines and evidence-based practice (Naylor et al, 2004). All patients during the transitional care process implemented by the organization had the right to refuse the transitional care interventions at any time.

Intervention

The three components of the transitional care team include inpatient rounding, initiation calls, and transitional care appointments prior to discharge from the hospital. Providers from the heart failure clinic began building rapport with patients and start risk stratification and assessment before the patients transitioned to the outpatient care setting. Following discharge, patients in the intervention were contacted within 48 hours for a TCM call. The TCM call was done by either the heart failure program coordinator, a primary care clinic nurse, or the heart failure clinic registered nurse. The TCM calls included a script of criteria recommended by

Family Practice Management (FPM) a subset of the American Academy of Family Physicians as well as an additional heart failure questions developed by the organization implementing the pilot study (Bloink, J & Adler, K, 2013). The final component of the pilot study includes provider TCM appointments. These appointments included heart failure specific education, reconciliation of medications, and provider recommendations for readmission prevention. The appointments followed the TCM guidelines by FPM (Figures 1,2, & 3) (Bloink, J & Adler, K, 2013).

Data Collection and Analysis Plan

The organization's informatics department and heart failure clinic coordinator assisted in extracting deidentified data from the organization's electronic health records. The average day to readmission was assessed retrospectively for 2018-2020 before intervention. During implementation, all heart failure admissions were assessed and tracked, and comparisons were made between those enrolled or not enrolled in the TCM team. Key variables within the differing groups were assessed using descriptive statistics in Microsoft Excel such as ejection fraction, sex, and age. Days from discharge to readmission was evaluated to look at changes between the historical data, intervention, and current standards of care (those not enrolled in program) using an analysis of variance (ANOVA) in SPSS statistical software.

Results

Historical Data

Patient Demographics. Between 2018-2019 185 patients readmitted within 30 days and were included in the analysis. Of the 185 patients, 41% were female and 59% male. The average age of collected patients was 72 years old. There were slightly more patients presenting with reduced ejection fraction (44.8%), verses preserved (40.5%) or borderline (14.6%)(Table 4).

Information on race and ethnicity was not collected for these patients. When evaluated by each sex, females consisted of 43% preserved ejection fraction, 15.7% borderline, and 40% reduced. Males saw 47.7% reduced ejection fraction, 13.7% borderline, and 38.5% preserved showing slightly differing distribution of the type of heart failure each sex was more likely to have.

Readmission Rate and Average Day to Readmission. In 2018 347 admissions were coded under heart failure, with 80 30 day readmissions for a readmission rate of 23%. The organization did not keep records of heart failure admissions in 2019 but based on CMS penalty data had a similar readmission rate (US Center for Medicare and Medicaid, 2021). Within the two years of data, patients who readmitted within 30 days on average spent 11.7 days out of the hospital between discharge and readmission. The average day to readmittance for cardiac readmissions was 11.3, and non-cardiac was 12.9 days. Those who attended a follow up appointment before readmission on average stayed 14.8 days out of the hospital while those who did not attend an appointment spent 8.8 days.

Gender and Readmission. The average day to readmission for males in 2018/2019 was 11 days, while females readmitted on average in 13 days. There was no statistically significant difference between sex and days to readmission ($t(183)=-1.27$, $p=0.86$).

Ejection Fracture and Readmission. Ejection fracture and days to readmission was evaluated to determine if there was any connection between the subset of heart failure and the time it took to readmit. A linear regression showed a slightly negative, non-significant relationship between ejection fraction and days to readmit ($F(1,179)=0.469$, $p=0.495$ $B=-0.25$, $R^2=0.03$).

Age and Readmission. Age and days to readmission was evaluated to see if there was any connection with age of the patient and time it took to readmit. A linear regression showed a

slightly positive, non-significant relationship between ejection fraction and days to readmit ($F(1,182)=2.941$, $p=0.08$, $B=0.91$ $R^2= 0.016$).

Effect of post discharge appointment. Within the historical data set, attendance of a follow up appointment was noted and tracked for every patient, however the days from discharge this appointment took place was not assessed. were re-admitted for heart failure within 30 days of discharge. Sixty-five patients attended a post discharge clinic visit while 95 patients did not attend a follow-up appointment. Twenty-three patients were lost to follow-up. Attendance at a post discharge clinic visit is associated with a 32% reduction in hospital readmission (Figure 6). For those patients who were re-admitted, there was a statistically significant longer duration days between discharge and re-admission for those who attended a post discharge follow up ($t(160)=5.09$, $p<0.001$).Within those who attended a follow up appointment, there was no significant difference from those who attended that appointment at the heart failure clinic compared to those who saw cardiology or primary care ($t(56)=.166$, $p=0.239$).

Intervention Data

Between December 2020 and February 2021 there were 42 individuals who were admitted with a primary diagnosis of HFrEF (76.9%) or HFpEF (17.9%) with the average age of 66 years old. Nine females and thirty three males were admitted at this time. The transitional care pilot completed eleven inpatient rounding consults, and seven transitional care phone calls and appointments with one patient receiving both interventions. There were ten readmissions and three fatalities. The total readmission rate was 23.8%(Table 5).

Readmissions. Out of the 10 readmissions, eight were males and two were females. The average number of days from discharge to readmission was 10.8 days. Only one patient from the intervention of inpatient rounding readmitted, with 16 days out of the hospital. Nine patients

readmitted in the non-intervention group, for a readmission rate of 36% (Figure 7) The average days from discharge to readmission from non-intervention patients was 10.2 days. The average ejection fraction of readmissions was 27.5. The average age of those who readmitted was 61.9.

Inpatient Rounding. Inpatient rounding was completed on 11 admissions. Out of these patients, 1 mortality was noted and 1 readmission, giving a readmission rate of 10%. The readmission occurred 16 days after discharge.

Transitional Care Calls and Appointments. Seven transitional care calls were completed. Out of these admissions, no readmissions or mortalities were noted within 30 days. Out of the completed TCM calls, there was 1 no show to the transitional care appointment and 1 appointment unsuitable for transitional care billing as it was an audio-only televisit. One admission had both inpatient rounding as well as a transitional call and appointment.

Discussion

Implications for Practice

This project contributes to the understanding and usage for transitional care teams for heart failure and other resource heavy diseases. The transitional care interventions appeared to show positive impact on readmissions and mortality for those patients chosen, but a larger sample size must be evaluated for a greater understanding of the effect on total readmissions. If a similar reduction in readmissions were seen with an increase in scale over time this project could reduce prevent potentially 20-30 readmissions annually. In 2019 this hospital's average charge for heart failure patient's admission with an average length of stay of 2.4 days was $27,203; so these measures could potentially save up to $816,090 and prevent financial penalties from Medicare (Washington State Hospital Association, 2019). Transitional care may prove to be even more impactful if other cost-burdened conditions such as chronic obstructive pulmonary disease,

myocardial infarctions, sepsis and hip fractures were to create a standardized transition of care model.

The lessons learned from this program will help inform future transitional care implementation techniques. On an organizational level this pilot program has clarified important factors addressed in the limitations section that need to be completed before a large-scale project can be successfully implemented.

Limitations

The sample size due to a multitude of factors was significantly smaller than originally anticipated. A stronger sample size could help determine statistical significance as well as measure true impact the intervention have on readmissions for this communities' patients. Another difficulty limiting this project was scheduling patient appointments for after discharge. Variability exists on whose responsibility it is within the organization to schedule patient appointments for after discharge. Staff need further guidance on appropriate referrals to the heart failure clinic verses cardiology or a primary care appointment. Availability of the providers was also limited where transitional care appointments were attempted but could not be scheduled in the 7-to-14 day window. This difficulty should resolve within the upcoming months as an additional provider is added to the team.

Early on it was clear that organization is a key aspect of making a transitional care program function appropriately. In order to do so a clinic staff must be able to manage and track when patients are scheduled to discharge and plan ahead for clinic appointments. This was challenging when staff had other primary responsibilities in the clinic. A nurse navigator would provide that availability of organization and implementing the interventions.

Health Disparities Related to Race. A significant limitation of the project is the lack of patient information regarding race and ethnicity. This was not a parameter mined for in both the retrospective and intervention data. As previously discussed, large health disparities have been noted in minorities with cardiac care. Given these key inequities, it is important for every organization to evaluate any differences in management between races, an opportunity this project missed.

Multiple Pilot Studies. While in the process of implementing the pilot study, other subsets within the organizations have also made strides towards their own transitional care role out plan. While ultimately having multiple subsets performing TCM ensures that a large number of patients receive it, coordination must be established as only one provider may bill for TCM per admission and multiple calls and appointments has the potential to overwhelm patients and reduce compliance. It is a hope of the organization for these differing subsets to come together for continuity of how to best care for these patients during transition.

Future Opportunities

In order to have a successful long term transitional care team, the limitations of the study above must be addressed. One ideal recommendation would be the addition of a nurse navigator to lead the program and complete the transitional calls and coordination with the patients. The potential cost savings already discussed would allow for a location appropriate salary of this position. For the providers, alternating weeks completing inpatient rounding and clinic time may help continuity of care and availability. Providers schedules may be blocked in the morning for transitional care appointment of patients who were rounded on in the hospital the week before.

Through the role out of this project and evaluation of the benefits of a strong transitional care program can have on patients a transitional care committee for all admitting diagnoses has

been established. This committee consists of the heart failure program coordinator, program coordinators for sepsis and other high-risk conditions, the hospitals quality improvement team, and representatives from the hospitalists and specialist provider teams. The transitional care committee has also solicited the assistance of a nurse navigator from a neighboring hospital still within the organization who has successfully implemented transitional care at two clinics in the area.

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Appendix A: Tables

Table 1.

The New York Heart Association Classifications for Cardiac Disease (New York Heart Association, 1964).

New York Heart Association Classification	
Class	Subjective Limitations
I	Cardiac disease with no limitation
II	Cardiac disease with slight limitations with ordinary activity, comfortable at rest
III	Cardiac disease with less than ordinary activity limitations, comfortable at rest
IV	Cardiac disease with limitations both at rest and with activity

Table 2.

AHA/ACC Heart Failure Stages (Yancy et al., 2013).

AHA/ACC HF stages	
Stage	Objective changes
A	At high risk for heart failure but no structural changes in the heart
B	Structural changes with no signs or symptoms of heart failure
C	Structural changes with current or prior signs and symptoms of heart failure
D	Refractory heart failure requiring special interventions

Table 3.

The BOOST model 8 P's of Readmissions (Sieck, Adams, & Burkhart, 2019).

The 8 Ps of Readmissions	
Problem Medications	High risk medications such as digoxin, narcotics, anticoagulants
Psychological	Diagnosis of depression or hx of
Principle Diagnosis	Key Diagnosis: cancer, stroke, diabetes, heart failure, COPD
Polypharmacy	More than 5 routine medications
Poor Health Literacy	Inability to do teach back
Patient Support	No assistance with discharge and home care
Prior Hospitalization	Prior hospitalization within last 6 months
Palliative Care	Advanced or progressive conditions

Table 4.

Historical Data Patient Information

Heart Failure Historical Data 2018-2019	
Heart failure patients 2018	347
Heart failure patients 2019	-
30 day readmissions 2018	80
30 day readmissions 2019	105
Combined total 30 day readmissions	185
Combined % female	41%
Combined % male	59%
Combined % reduced EF	44.8%
Combined % borderline EF	14.6%
Combined % preserved EF	40.5%

Table 5.

Intervention Group Patient Information

Intervention Data	
Admissions total	42
Readmissions	10
Mortality after discharge	3
Average age	66
No intervention	25
Inpatient rounding	11 (1 patient included in both rounding and calls/ appointments)
TCM calls/ appointments	7 (1 patient included in both rounding and calls/ appointments)
Female	9
Male	33
% reduced	76.9%
%preserved	17.9%
% borderline	5.2%

Appendix B: Figures

Figure 1.

Family Practice Management Recommendation for TCM call Documentation

Patient name: _____

Date of contact: _____ / _____ / _____

Sources of information:

□ Patient, family member, or caregiver (Name:

_____)

□ Hospital discharge summary

□ Hospital fax

□ List of recent hospitalizations or ED visits

□ Other:

_____

_____

Discharged from: _____ on

_____ / _____ / _____

Diagnosis/problem:

_____

_____

_____

_____

Medication changes: □ Yes □ No

Medication list updated: □ Yes □ No

Needs referral or lab: □ Yes □ No

Needs follow-up appointment:

□ Within seven days of discharge (highly complex visit).

□ Within 14 days of discharge (moderately complex visit).

Appointment made for _____ / _____ / _____ with:

_____

Additional information needed and requested: □ Yes □ No

Figure 2.

Healthcare Organizations Heart Failure TCM call Script

TRANSITIONAL CARE Initial Phone Contact

Transitional Care reference article - for additional assistance

Admit date:

D/C date:

D/C from Inpatient Hospital/SNF:

Date of contact:

Family members present for conversation:

D/C Diagnoses:

Discharge Meds: *(Ensure patient has update med list and has picked up prescriptions and is taking them as prescribed.)*

Med Changes (additions/discontinued) at Discharge:

Do you have the medication list from the hospital?

Do you have all the medicines at home?

Are you taking all the medicines as directed?

All prescriptions have been filled, sufficient meds on hand.

Daily Weights :

Are you weighing yourself?

Are you recording your weights?

Diet:

How much sodium can you consume in a day?

Are you maintaining a low sodium diet?

Reinforced the importance to eat a low salt diet of 2GM (2000mg) per day.

Activity:

Are you getting exercise every day?

How do you feel when you exercise?

Disease Illness education/Signs and symptoms of heart failure:

Can you tell me what are signs of worsening heart failure?

When do you call the doctor?

Who do you call?

Diagnostic tests reviewed:

Home health/community services/referrals coordinated:

(*Review referrals tab and note to identify any referrals recommended but not placed as orders.)*

Discussions w/ other healthcare providers:

Assessment/support of treatment regimen adherence:

(Report on patient's ability to take care of ADLs and if they have adequate support to follow the discharge care plan):

Appointments coordinated: *(Identify pending appointment dates, times and clinic location*

Questions, Problems or Concerns Addressed.:

Plan:

TCM f/u at HFC:

Additional f/u:

Route this note to the provider seeing the patient in follow-up.

Figure 3.

Family Practice Management Recommendation for TCM Appointment Charting

For use in plan section of visit note.

Medication reconciliation:

□ Medication list updated

□ New medication list given to patient/family/caregiver

Referrals:

□ None needed

□ Referrals made to:

_____

_____

Community resources identified for patient/family:

□ None needed

□ Home health agency

□ Assisted living

□ Hospice

□ Support group

□ Education program:

_____

_____

Durable medical equipment ordered:

□ None needed

□ DME ordered:

_____

_____

Additional communication delivered or planned:

□ Family/caregiver:

_____

_____

□ Specialists:

_____

_____

□ Other:

_____

_____

Patient education:

Topics discussed:

_____

_____

_____

_____

_____

Handouts given:

_____

_____

_____

_____

_____

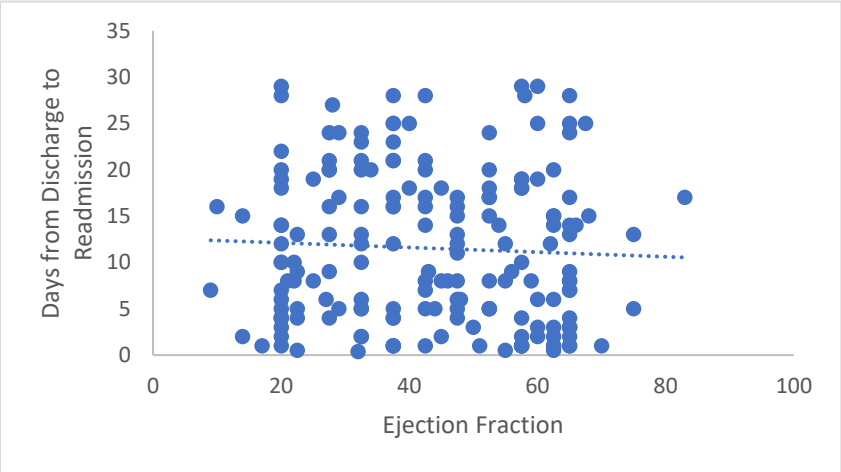
_____

Initial transitional care contact was made on _____ / _____ / _____ (see separate note)

FACE-TO-FACE TRANSITIONAL CARE VISIT DOCUMENTATION

Figure 4.

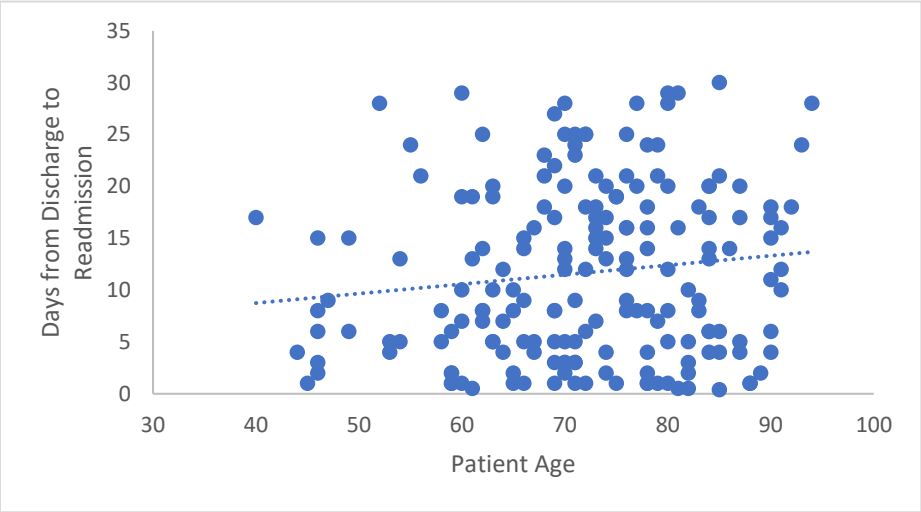
Relationship Between Days from Discharge to Readmission and Ejection Fraction.



Note: A linear regression shows a slightly negative non-significant relationship between ejection fraction and days to readmission ($F(1,179)=0.469, p=0.495$ $B=-0.25$, $R^2=0.03$)

Figure 5.

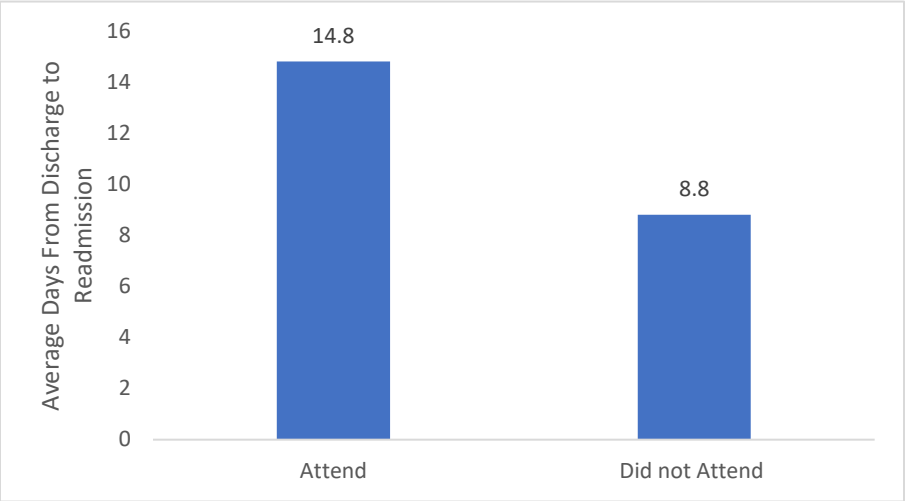
Days from Discharge to Readmission and Patient Age



Note: Linear regression showed slightly positive not statistically significant relationship between age and days to readmission ($F(1,182)=2.941$, $p=0.08$, $B=0.91$ $R^2= 0.016$).

Figure 6.

Effect of Appointment Attendance and Days to Readmission



Note: For those patients who were re-admitted, there was a statistically significant longer duration days between discharge and re-admission for those who attended a post discharge follow up ($t(160)=5.09$, $p<0.001$)

Figure 7.

Readmission Rates for Different Intervention Groups