

CHRONIC CARE MANAGEMENT:
TRANSITIONAL CARE MODELS FOR READMISSION REDUCTION

By

Daniel L. Doyle

A dissertation submitted to the Johns Hopkins University in conformity with the
requirements for the degree of Doctor of Public Health

Baltimore, Maryland

February 26, 2018

Abstract

Theory

Growing pressure on hospital systems to reduce readmissions, including efforts by the Centers for Medicare & Medicaid Services (CMS) to penalize hospitals with high readmission rates, coupled with limited inpatient bed and staff availability have placed even more focus within health systems on appropriately managing patients with chronic conditions in the most cost-effective setting. Traditional readmission reduction programs have centered on efforts within the acute care setting, however continued improvement requires leveraging transitional care programs to ensure health care continuity, prevent poor outcomes and promote safe and timely transfer of patients from the inpatient to outpatient setting. This dissertation examines the potential impact of two such transitional care programs and their effects on hospital readmissions: establishing patients in a disease management clinic and the development of a post-discharge in-home visit.

Methods

My study begins with the review of published literature on the various programs that have been deployed and shown to be effective chronic care management strategies and readmission reduction prevention programs. My next manuscript describes the development of a care transition program utilizing a chronic care disease management outpatient clinic, which was established as a bridge to outpatient management for low and underserved patient populations. Finally, my third manuscript examines the development of a care transition program utilizing a post-discharge in home visit with additional telephone support. Both of these programs were implemented at a medium sized (<250 bed) rural hospital in Southeast Texas. These studies attempt to add to the current literature base regarding outpatient chronic care management strategies.

Results

These studies demonstrate that implementing transitional care programs can be effective in reducing hospital readmissions in targeted populations. Establishing patients in an outpatient disease management clinic showed a reduction in overall inpatient utilization. The second study showed that enrolling traditional Medicare patients in a home-based transitional care visit program was associated with a reduction in hospital all-cause 30 day readmissions.

Conclusion

This program provides further evidence that a care transition program can bridge the gap between discharge and the next level of care through an outpatient disease management program. Expansion of the scope and reach of these programs is recommended to reduce the overall readmission burden on the hospital system.

Thesis Advisors

The advisors for this thesis are the following:

Laura Morlock, PhD (Health Policy and Management, JHU Bloomberg School of Public Health)

Lilly Engineer, DrPH, MD, MHA (Anesthesiology and Critical Care Medicine, JHU School of Medicine)

Cynthia Boyd, MD, MPH (Department of Medicine, JHU School of Medicine)

Mark Bittle, DrPH (Health Policy and Management, JHU Bloomberg School of Public Health)

Paul Guidroz, RN, MSN (Chief Nurse Executive, CHRISTUS Southeast Texas Health System)

Leiyu Shi, MBE, MPA, DrPH (Health Policy and Management, JHU Bloomberg School of Public Health)

David Celentano, MHS, ScD (Epidemiology, JHU Bloomberg School of Public Health)

Thesis Overview

Manuscript One: Literature Review

The literature review identified four main readmission reduction strategies for consideration in a hospital's chronic care management program. Project RED's comprehensive toolkit for improvement of the discharge process focuses on ensuring that the transitional care elements are in place prior to discharge. Telephone based reinforcement programs focus on monitoring, education, and self-care management (or combinations thereof) using telephone support after discharge in a structured format (e.g., series of scheduled calls with a specific goal, structured questioning, or use of decision support software). Home-visit based care programs included education or training focused on self-care, diet, medications, and early recognition of symptoms that may indicate a need to seek further intervention. Outpatient clinic based follow-up care focuses on services provided in one of several different types of outpatient clinics (disease specific or primary care).

Overall, intervention categories that included higher-intensity interventions (e.g., home-visiting programs, outpatient clinic-based follow up care) showed trends in reducing all-cause readmission or mortality. By contrast, categories with lower-intensity interventions (e.g., primarily educational interventions, stand-alone telephone based reinforcement) did not affect hospital readmissions in a meaningful way. These findings suggest that intensity of resource use should be a key decision point when determining intervention selection based on each local health care market.

Manuscript Two: Chronic Care Management: A Disease Management Clinic - based Transitional Care Model for Readmission Reduction

In this manuscript, the establishment of a disease management clinic is described as one hospital's effort in establishing an outpatient home for low income and underserved populations. Chronic

diseases, especially congestive heart failure (CHF) continue to be a challenge to hospitals as their care plans are now extending beyond that of the inpatient realm. To that end, a clinic was established by the hospital as a way to find an appropriate clinical setting for patients who experienced signs and symptoms of CHF exacerbation, and who could ultimately be treated effectively in an outpatient setting. This clinic was founded in 2014 with the goal of providing a transitional home for CHF patients who had no established primary care physician or cardiologist. The function of the clinic was to potentially divert chronic CHF patients from the hospital's Emergency Department and towards a more cost-effective clinic setting and by doing so, reduce readmissions at the hospital.

The disease management clinic is primarily staffed with an RN, nurse practitioner, and a dietitian to address the clinical needs of the patients presenting to the clinic. The clinic also includes the services of disease management navigators, licensed clinical social workers, financial counselors, exercise physiologists, CNAs, and respiratory therapists. The services of the mid-level providers support the work of the specialists to empower high-risk individuals to take charge of their own health and to access the appropriate level of care. The clinic visit includes an extensive questionnaire, screening, assessment by a nurse practitioner, and medication reconciliation. Education is provided individually to patients, according to their physical and/or emotional status.

This results of this study demonstrate that an outpatient disease management clinic which focuses on education, counseling, and medication titration of heart failure patients can be successful in reducing hospital readmissions. When comparing overall CHF patient discharges compared to enrolled disease management clinic patients, patients who are enrolled in the clinic had fewer 30-day (all cause) readmissions. Over the previous 4 years, only 7.9% of HF clinic patients experienced a readmission, compared to 15.8% of the general HF population not enrolled in the clinic.

Year over year improvements in the HF clinic readmission rates may indicate the cumulative success of the educational interventions, overall clinic effectiveness and ability of the clinic staff to effect meaningful difference in the behaviors of the enrolled population.

This study serves as further evidence of a successful demonstration for leveraging a care transition program to bridge the gap between discharge and next level of care through an outpatient disease management program.

Manuscript Three: Chronic Care Management: A Home-based Transitional Care Model for Readmission Reduction

This manuscript describes the development of a care transition program utilizing a post-discharge in home visit with additional telephone support implemented at a medium sized (<250 bed) rural hospital in Southeast Texas. The targeted patient population for program participants included traditional Medicare enrollees (aged 65 and older) who were admitted to the hospital between July and December, 2017 with a primary diagnosis of heart failure.

The purpose of the in-home visit is to assess clinical stability of the patient in home, and provide post-acute care for the purpose of disease management follow-up by promoting patient engagement, self-management and support post hospital discharge. After the initial in-home visit, the care management call center contacts the patient weekly for the next three weeks. Patients are also encouraged to utilize the 24/7 telephone support for any questions or medical issues that arise.

These touchpoints with the patient promoted patient engagement, self-management and support to encourage the patient to continue communication with their care team after home health discharge (transition to the community); focused on keeping communication open between patient and primary care physician to ensure appropriate patient support; ensured that the patient has access to any needed

community and caregiving services; conducted ongoing and continual medication reconciliation; and continued a focus on the importance of medication adherence.

At the time of writing of this article, the care transition in-home program has been operational for six months. During that period of time 67 patients were enrolled in the program.

By design, the study focused on early intervention and frequent touchpoints. The initial in-hospital visit was conducted as close to discharge as possible to increase the likelihood of patient adherence to the program and likelihood that the education delivered would be enduring. Likewise, the majority of the initial call center initiated calls occurred within 24 hours of discharge and the transitional care in home visit within the first 7 days. All 67 patients initially enrolled in the program successfully made it to their next level of care visit (PCP, Cardiology, etc.). This element was a major focus of the program; that is, keeping patients healthy until their next level of care. Most importantly, none of the 67 patients enrolled in the program were readmitted to the hospital within 30 days of discharge.

Based on the findings from this study, the care transition in-home visit was shown to be an effective readmission reduction strategy. Initial success in this program demonstrates the potential benefit to scaling this effort to reach a larger percentage of the CHF discharged population.

Implications for Practice and Policy

Practice: This study has several implications for clinical practice in hospitals looking to reduce readmissions among chronic disease patients. First, as emergency departments continue to be over utilized for less than emergent conditions, reducing the patient burden is increasingly important. Finding an appropriate, cost-effective treatment venue for patients in the outpatient arena is key to reducing the stress on emergency departments.

Second, by reducing readmissions to the hospital, patients are able to maintain a healthier state free from symptom exacerbation and further complications. Referring inpatients to a transitional care program should be considered for practitioners (and hospitals) as a front line treatment regimen to bridge care between the inpatient discharge and the next level of care (PCP or cardiology office visit).

Policy: Hospitals and health systems should consider their unique role in community risk assessment when investigating appropriate transitional care programs to implement. The literature review demonstrated that although low cost interventions (e.g., telephone based intervention) may be the easiest to implement, without additional home-based support these were not likely to have the desired overall effect. Additionally an outpatient clinic based approach may not be optimal in an area where access to private transportation or public transportation is limited. In these areas, a home-visit based program may be ideally situated for reaching these patients. However, in areas in which there are limited outpatient settings, and limited home-care based groups an inpatient-focused strategy (e.g., Project Re-Engineered Discharge) should be considered as a viable option.

Hospitals which are subject to the CMS penalties for excess readmissions should consider a transitional care approach to compliment an inpatient strategy. These transitional care programs have been demonstrated as effective readmission reduction strategies, and further efforts around their establishment as an adjuvant inpatient strategy should be considered.

Furthermore, preventing patients from being readmitted to the hospital is key in reducing not only inpatient utilization, but high costs to the healthcare system. Treating a patient in an outpatient setting has a much lower cost than delaying treatment until inpatient utilization is necessary. Further policy development may explore the establishment of transitional care programs as a defined part of inpatient care.

Conclusions

As inpatient demand is often outpacing bed and/or staff availability in Southeast Texas, finding the appropriate setting to care for patients with chronic conditions becomes more and more important. CMS pressure to reduce readmissions by penalizing hospitals with higher average readmissions further emphasizes the importance of platforms like these care transition programs.

These studies provide the health and supportive resources needed to empower patients and their caregivers to take charge of their health and access and utilize services appropriately. Based upon evidence from similar interventions, these efforts hope to create a significant reduction in hospitalizations, readmissions, and inappropriate emergency department utilization among those served. Care transition programs should be considered as a strong candidate for reducing hospital readmissions in targeted populations.

Acknowledgements

I would like to acknowledge the invaluable contributions and incredible patience of Laura Morlock and Lilly Engineer; the guidance of Mark Bittle and Cynthia Boyd; and the direction of Paul Guidroz and support of the CHRISTUS Health Ministry. I would also like to thank the HPM program office and all of their staff. Finally, I could not have completed this journey without the encouragement of my family who continued to push me the entire way: Mom, Dad, my kids and especially, Jen.

Table of Contents

Abstract.....	ii
Theory	ii
Methods.....	ii
Results.....	iii
Conclusion.....	iii
Thesis Advisors.....	iv
Thesis Overview	v
Manuscript One: Literature Review.....	v
Manuscript Two: Chronic Care Management: A Disease Management Clinic -based Transitional Care Model for Readmission Reduction.....	v
Manuscript Three: Chronic Care Management: A Home-based Transitional Care Model for Readmission Reduction.....	vii
Implications for Practice and Policy.....	viii
Conclusions	x
Acknowledgements.....	x
Manuscript One: Chronic Care Management: A Review of Transitional Care Models for Readmission Reduction.....	1
Abstract.....	2
Background	2
Study Methodology.....	4
Study Results.....	11
Commentary	14
Manuscript Two: Chronic Care Management: A Disease Management Clinic-based Transitional Care Model for Readmission Reduction.....	18
Abstract.....	19
Background	19
Community Needs Assessment.....	21
Study Methodology.....	23
Study Results.....	28
Commentary	32
Limitations.....	32

Discussion.....	32
Manuscript 3: Chronic Care Management: A Home-based Transitional Care Model for Readmission Reduction	35
Abstract.....	36
Background	36
Study Methodology.....	38
Study Results.....	44
Commentary	49
Limitations.....	49
Discussion.....	50
Supporting Tables	53
Biographical Statement.....	56
References	57

**Manuscript One: Chronic Care Management: A
Review of Transitional Care Models for
Readmission Reduction**

Abstract

Chronic care management programs focusing on transitional care are a prevalent component of population health strategies aimed at reducing inpatient overutilization. As health care institutions have focused more attention on transitions of care and outpatient management strategies, reductions in hospital readmissions and overall lower cost of care have been demonstrated. This paper will review the various programs that have been deployed and shown to be effective chronic care management strategies, and which serves as a guide for health care organizations seeking to implement similar transitional care based readmission reduction efforts.

Background

The Affordable Care Act of 2010 established the Hospital Value Based Purchasing (VBP) Program, which applies to payments that began in Fiscal Year (FY) 2013. The VBP program affects payment for inpatient stays based on relative performance across the county. In the FY 2012 inpatient prospective payment system final rule, CMS finalized the policies that would establish a program to penalize hospitals with high readmission rates. This program puts Medicare dollars at risk based on the relative performance of the hospital in several key disease categories. This program also put pressure on healthcare organizations to manage patients outside of the inpatient setting. The readmission reduction program set up the following criteria¹:

- *Defined readmission as an admission to a hospital within 30 days of a discharge from the same or another hospital; (specific to ‘unplanned readmissions’)*
- *Adopted readmission measures for the applicable conditions of acute myocardial infarction (AMI), heart failure (HF), and pneumonia (PN);*
- *Established a methodology to calculate the excess readmission ratio for each applicable condition, which is used, in part, to calculate the readmission payment adjustment. A hospital’s excess*

readmission ratio is a measure of a hospital's readmission performance compared to the national average for the hospital's set of patients with that applicable condition.

- *Established a policy of using the risk adjustment methodology endorsed by the National Quality Forum (NQF) for the readmissions measures to calculate the excess readmission ratios, which includes adjustment for factors that are clinically relevant including certain patient demographic characteristics, comorbidities, and patient frailty.*

In addition, CMS finalized the expansion of the applicable conditions beginning with the FY 2015 program to include: (1) patients admitted for an acute exacerbation of chronic obstructive pulmonary disease (COPD); and (2) patients admitted for elective total hip arthroplasty (THA) and total knee arthroplasty (TKA). Trends in the readmission reduction and value based purchasing programs demonstrate the expansion of government programs and target reducing healthcare costs by focusing on preventable readmissions. Accordingly, health care organizations are under increasing pressure to establish programs to manage chronic care in efficient ways. These governmental programs have had far reaching effects. Medicare under the Hospital Readmissions Reduction Program (HRRP) will reduce reimbursement for 2,573 hospitals for fiscal year (FY) 2018, according to CMS data². The latest penalties are based on readmissions between July 2013 and June 2016. The penalties will apply to Medicare payments that CMS makes to the affected hospitals between Oct. 1, 2017 and Sept. 30, 2018. Under the HRRP, CMS withholds up to 3 percent of regular reimbursements for hospitals if they have a higher-than-expected number of readmissions within 30 days of discharge for the six conditions included in the program.

According to a Kaiser Health News analysis of the data, about 80 percent of the 3,241 hospitals CMS evaluated in 2017 will face penalties. The number of penalized hospitals in FY 2018 (2,573) marks a slight decline from FY 2017, when Medicare reduced reimbursements for 2,597 hospitals³.

But are these government programs effective for changing outcomes? Preliminary results indicate that they are. A study from 2016 in the New England Journal of Medicine found that readmissions for the conditions Medicare focuses on fell from 21.5 percent in 2007 to 17.8 percent in 2015⁴. A separate study found that readmissions fell more quickly at hospitals that could face the readmission penalty than at other hospitals⁵.

Heart failure has been a focus of the readmission reduction penalty program since its inception largely due to the net potential of that patient population. A previous analysis of Medicare claims data from 2007 to 2009 found that 35% of readmissions within 30 days were for HF⁶. More recent studies have stated that up to 25% of patients hospitalized with HF are readmitted within 30 days^{7 8}. As a result, tailored interventions are needed to curtail readmissions in this population.

Programs that are targeted to preventing readmission are frequently referred to as ‘transitional care interventions’, describing how they bridge the inpatient care and outpatient environment (including a patient’s return home). These transitional care interventions have been defined as “a broad range of time-limited services designed to ensure health care continuity, avoid preventable poor outcomes among at-risk populations, and promote the safe and timely transfer of patients from one level of care to another or from one type of setting to another”⁹.

So how have these hospitals been able to accomplish these reductions? In the following sections we will explore a number of these studies and review the various transitional care strategies that have been deployed aimed at reducing hospital readmissions, and subsequent readmission penalties.

Study Methodology

Potential studies were identified through literature review using electronic search, primarily focusing on those published since the Affordable Care Act was established in 2010. Although numerous studies

existed prior to 2010, the literature review focused on those that may have been impacted by the VBP legislation. The search focused primarily on HF, based on the disease prevalence and chronic nature of this disease in the 65+ year old population and the prevalence of literature associated with it (although other interventions with similar disease states were not excluded). Studies were grouped according to overall program focus and organized by intervention focus and setting. Rationale for this grouping was done in an effort to allow for review and consideration of the programs available to healthcare organizations considering readmission reduction strategies suitable for their individual markets.

Based on this literature review, the studies have been organized according to the following interventions shown in *Table 1*. Each Program will be described in detail in the subsequent sections.

Program	Focus
Project RED (comprehensive)	Toolkit for improvement of the discharge process (Acute Care focus). Program focus is to ensure that the transitional care elements are in place prior to discharge.
Telephone based reinforcement	Monitoring, education, and self-care management (or combinations thereof) using telephone support after discharge in a structured format (e.g., series of scheduled calls with a specific goal, structured questioning, or use of decision support software).
Home-visit based follow up care	Home-visit based care programs included education or training focused on self-care, diet, medications, and early recognition of symptoms that may indicate

	a need to seek further intervention.
Outpatient clinic based follow-up care	Services provided in one of several different types of outpatient clinics—multidisciplinary-HF, nurse-led HF, or primary care clinic. The clinic-based intervention can be managed by a nurse or other provider depending on the site of service.

Table 1: Reviewed Interventions for Transitional Care

- **Project Re-Engineered Discharge**

Project Re-Engineered Discharge was designed by a research group at Boston University Medical Center that develops and tests strategies to improve the hospital discharge process in a way that promotes patient safety and reduces re-hospitalization rates. The RED (re-engineered discharge) intervention was founded on eleven discrete, mutually reinforcing components and has been widely utilized to reduce re-hospitalizations with an additional benefit of increased patient satisfaction outcomes¹⁰. This program differentiates itself from other studies reviewed here in that it focuses largely on actions prior to discharge. The program focus is ensuring that the patient is educated prior to discharge and includes plans for the coordination of the next level (outpatient) of care.

Project RED begins with patient education throughout the hospital course. During this education staff work with the patient to schedule follow-up appointments with the next level of care (e.g., Cardiology for heart failure patients) and any additional tests as indicated during their length of stay. Hospital staff are also tasked with ensuring any outstanding tests that were administered during the inpatient stay and which are reported after discharge are followed up on. Staff organize post-discharge services, including home health or other outpatient services. The patient medication plan is reviewed with the

care team and all medications are reconciled prior to discharge. Hospital staff then review a communication plan with the patient to ensure that there is an established pathway and steps for if/when a problem arises post discharge. The medical record, primarily the discharge summary, is then transmitted to the primary care physician. Immediately prior to discharge the patient is assessed for his/her understanding of the discharge plan, and any additional educational interventions required as a result are conducted. A copy of the written discharge plan is then provided to the patient, and finally a telephone call reinforcing the plan is conducted post-discharge.

Project RED relies on inpatient staff or hospital organized staff to accomplish the eleven elements of the program, as described above. Often, nursing personnel and case management staff are most readily in a position to accomplish these components, but this work must also be balanced with their normal workload and tasks.

- **Home-visit based follow up care**

Home-visit based follow up care can be accomplished by leveraging a home health company or directly through use of hospital staff trained in home health management. Typical home-visit based care programs include education or training (or both) focused on self-care, diet, medications, and early recognition of symptoms. Many of these programs delivered educational components before discharge as well as during home visits. Initial inpatient screening by case management can identify patients that may be ideal candidates for a home-based care transition visit. After the referral to home health, a home health care transition coordinator (who often works for the home health provider) sees the patient while still in the hospital to establish a relationship prior to setting foot in the patient's home.

Most home visits began within 7 days of discharge; three reviewed studies included visits within 24 to 48 hours of discharge^{11 12 13}, and three additional studies specified that visits occur within 14 days of

discharge^{14 15 16}. All reviewed studies included education or training and focused on self-care, diet, medications, and early recognition of symptoms.

Typically for high risk patients, the clinician will meet with the patient in-home within 24 hours of discharge¹⁷ and complete a patient assessment. Patient assessments are meant to be a broad ranging evaluation of the patient's physical and socioeconomic limitations, including: 1) an assessment of barriers to care (e.g., environment, social support system, transportation, food, drug cost/access), connecting the patient with other disciplines (e.g., social work) to further assess, and connecting with community resources as needed; 2) assessment of the patient's need for other disciplines (e.g., OT, PT, MSW services); and 3) assessment of the patient's (and family's) health literacy needs in order to develop a home health plan of care, including goals and coaching/teaching needs¹⁸.

An additional core component of a home health care transition program is patient education and follow-up coordination of health care services¹⁹. Patient education focuses on ensuring the patient knows how to contact the referring home health agency during and after hours, reviewing advanced directives with the patient, discussion of the plan of care and frequency of visits, and explaining how to recognize those clinical signs and symptoms with which to be concerned. Follow-up coordination of health services includes conducting medication reconciliation and communication with the primary care physician and pharmacist (as needed) and verifying that required follow-up appointments with specialty providers were made.

Subsequent encounters made by the home-visit care transition team should promote patient engagement and self-management. The home-visit team should also encourage the patient to continue communicating with appropriate physicians and other identified care providers after home health discharge (transition to the community) to ensure the care plan is followed, conduct ongoing medication

reconciliation and assure medication adherence, and coordinate with other appropriate support services.

For moderate-risk patients, the clinician frequently meets with the patient within 48 hours of hospital discharge²⁰. The clinician and home health team can then plan a follow up in-person visit or other contact (such as telephone or videoconferencing). Two trials reviewed included planned, structured telephone calls in addition to home visits^{21 22}. Early clinician follow-up (clinic visit or other in-person support) was common practice in these programs in which interventions offered additional telephonic support for questions or advice throughout the intervention.

Home-visit based follow up care can be accomplished by an RN, LVN or other clinically trained personnel (case management or pharmacy staff have been used in some sites).

- **Outpatient Clinic-Based follow up care**

Outpatient clinic-based follow-up care can broadly be described as services provided in one of several different types of outpatient clinics—multidisciplinary, nurse-led, or primary care clinic. The clinic-based intervention can be managed by a nurse or other provider depending on the site of service. As a whole, these clinic based settings focus on education, emphasizing self-care, recognition of symptoms, and weight monitoring.

Six studies were reviewed that specifically focused on HF clinic interventions that involved an emphasis on physician contact and access to a multidisciplinary care team (cardiology, nurses, dieticians, pharmacists) in contrast to other nurse-led clinics^{23 24 25 26 27 28}. Two additional studies described as nurse-led focused more on patient education delivered by nurses during scheduled clinic appointments than on multidisciplinary management^{29 30}.

In general, most trials included an educational component. Two trials included education on self-care delivered before discharge and education reinforcement during telephone follow-up^{31 32}.

One trial focused on improved access to primary care through allowing reserved appointment slots in the scheduling block³³. These services coordinated care with a patient's primary care physician by scheduling appointments for acute needs or alerting physicians to changes in symptoms^{34 35}.

Pharmacotherapy is often a primary focus of these clinics, which emphasizes patient education about medications, promotion of adherence to their medication schedule, and promotion of evidence-based pharmacotherapy before discharge or during follow-up (or both). These clinics utilize face-to-face contact following discharge. In most studies reviewed, this contact occurred within 7 days of discharge. Mechanisms to contact care delivery personnel (clinic personnel or pharmacists) outside of scheduled visits or normal office hours were often a primary component of the program (e.g., patient hotline). In most cases, home-visiting personnel either directly recommended medication adjustment or assisted with coordination of care (e.g., with primary care provider or cardiologist) to facilitate timely medication adjustment, based on a patient's needs rather than advising patients to call for help themselves.

All studies reviewed involved a series of scheduled outpatient clinic visits following discharge, beginning within 7 days after the hospital discharge or enrollment, and individualized care planning. These studies did not describe scheduled home visits as a part of the program. The studies described the use of usual care that included management in accordance with current clinical practice or stated that patients received conventional follow-up in primary health care.

- **Telephone Based Reinforcement**

Telephone based reinforcement is similar in nature to educational based initiatives, and primarily serve as a means to check-in on patients once the transition to their homes has occurred. These programs

focus on patient monitoring, education, and/or self-care management (or various combinations) after discharge in a structured format (e.g., series of scheduled calls with a specific goal, structured questioning, or use of decision support software).

All studies reviewed involved a series of scheduled, structured telephone calls to patients following discharge. Studies typically described one or two calls during the intervention period. In most studies, the first telephone contact was within 7 days of discharge; in one, the first call occurred at 2 weeks after discharge³⁶; and two trials did not describe the timing of the first call^{37 38}. Most calls were delivered by nurses; two studies included calls made by a pharmacist^{39 40}.

All studies reviewed included some element of patient education. In most, education or self-care training began prior to discharge and was reinforced after discharge during telephone follow-up, but some did not include an educational component before discharge^{41 42 43 44 45 46}. Five of the six reviewed studies included a patient-initiated call (optional) as support for questions that arose after discharge.

The specific messages/ content and qualifications of the individual initiating the telephone support in each of these studies varied. The following interventions were also noted, but were not consistently represented in the studies reviewed: One study involved case management intervention at the time of discharge which included care coordination with primary care and individualized discharge planning (e.g., obtaining needed services for patients such as physical therapy, and facilitating communication in the hospital among the family and providers)⁴⁷; other studies also included a focus on inpatient intervention that optimized evidence-based pharmacotherapy before discharge⁴⁸.

Study Results

- **Project Re-Engineered Discharge**

Memorial Hospital, a 97-bed community hospital in Marysville, Ohio, uses strategies from AHRQ's Re-Engineered Discharge toolkit to help newly discharged patients follow their treatment plans and improve their health in order to avoid readmission to the hospital. With this practice, the hospital's readmission rate declined to single-digit percentages. After ten months of making follow-up phone calls, the readmission rate for congestive heart failure patients averaged 9.1 percent, compared with 15.4 percent for the previous 9-month period. During the same time frame, COPD readmissions declined from 20.6 to 11.8 percent, while the readmission rate for pneumonia patients fell from 10 to 9.7 percent⁴⁹. The study did not indicate the hospital overall volume of admissions during the intervention timeline, so it is unclear whether decreased readmissions were markedly affected by a shift in volume (however no author comments suggest otherwise).

Penn Medicine Chester County Hospital, a 257-bed complex in West Chester, Pennsylvania, part of the University of Pennsylvania Health System, was one of 10 hospitals involved in AHRQ's 2011 rollout of the Re-Engineered Discharge toolkit. The readmission rate for heart failure was reduced by 50% to 14% overall⁵⁰.

Three California hospitals are among those in the San Francisco-based Dignity Health System using AHRQ's Re-Engineered Discharge Toolkit to reduce hospital readmissions and improve care transitions. Bakersfield Memorial saw 30-day readmissions for Medicare patients drop over a 6-month period that ended June 2014 to 11.3 percent from 25 percent, based on a similar period that ended in late 2013; all-payer 30-day readmissions dropped to 6.5 percent between January and July 2014 from an average of 7.5 percent in 2013⁵¹. This study did not detail non-project RED interventions at the same facilities which may or may not have affected overall program success.

St. Mary's Medical Center, a 389-bed trauma center in Long Beach, introduced RED in December 2013 for heart failure patients and saw readmissions for this population drop to 7.7 percent as of July 2014 from 22.2 percent in November 2013, helping to reduce all-cause readmissions to 5.7 percent⁵².

San Francisco's 300-bed St. Mary's Medical Center also introduced RED with heart failure patients, which helped the facility reduce the hospital's overall readmissions rate by more than 20 percent, to 5.5 percent in June 2014 from 7.6 percent in January 2013⁵³.

- **Home-visit based follow up care**

One home-visiting trial showed efficacy in reducing both 30-day and all-cause readmission rates⁵⁴. In the trial by Naylor et al., an advanced practice nurse conducted the home visit within 24 hours of discharge, and a total of eight home visits were planned. In the trial by Jaarsma et al., patients were called within 7 days following discharge to schedule a follow-up in home visit; most visits were scheduled within 10 days of discharge and no additional visits were planned. The trial by Naylor et al., which evaluated a more intensive intervention, found a lower risk of readmission for patients receiving home visits than for patients in the control group (RR, 0.34; 95% CI, 0.19 to 0.62)⁵⁵. The trial by Jaarsma et al. found no difference in all-cause readmission between patients receiving the home visit and patients in the control group (RR, 0.89; 95% CI 0.43 to 1.85)⁵⁶. Over 3 to 6 months, the meta-analysis study conducted by the Effective Health Care Program, (which included nine trials) found that patients receiving home visits had a significantly reduced risk of all-cause readmission (RR, 0.75; 95% CI, 0.66 to 0.86)⁵⁷.

At 3 months, one trial (N=282) found that patients receiving home visits had a significantly lower risk of HF-specific readmissions than controls (RR, 0.51; 95% CI, 0.31 to 0.82)⁵⁸. Another trial (N=200) reported that patients receiving home visits had significantly fewer total HF specific readmissions than did patients receiving usual care (RR, 0.54; p<0.001)⁵⁹.

- **Telephone Based Reinforcement**

One trial (N= 134) by Feltner et al., reported all-cause readmission at 30 days; the readmission rate did not differ between patients receiving structured telephone support (STS) from those receiving no telephone support (RR, 0.80; 95% CI, 0.38 to 1.65)⁶⁰. Over 3 to 6 months, “the meta-analysis conducted by the EHCP looking at telephone based interventions (N=8) found no difference in the relative risk of all-cause readmission between patients receiving STS and those receiving usual care (RR, 0.92; 95% CI, 0.77 to 1.10)⁶¹.

- **Outpatient Clinic-Based follow up care**

Among the Outpatient Clinic-Based HF interventions, the Effective Health Care Program’s analysis of outpatient clinic-based follow up care (two trials) found that patients receiving the intervention had a significantly lower risk of all-cause readmission than patients not receiving care at a disease management based clinic (RR, 0.70; 95% CI, 0.55 to 0.89). Over 3 to 6 months, the same analysis found that patients receiving a nurse-led clinic intervention and those receiving usual care had a similar risk of all-cause readmission (RR, 0.88; 95% CI, 0.57 to 1.37)^{62 63}.

Commentary

From the Comparative Effectiveness meta-analysis, the authors identified two categories of standalone interventions that reduced all-cause readmissions; home-visiting programs and HF clinic-based interventions⁶⁴. There have been limited studies outside of the Comparative Effectiveness study that were applicable to the transitional care elements discussed here. When reviewing these studies, the categories of interventions (Project RED, telephone support, clinic based intervention and in-home visits) in reality are rarely standalone interventions. For example, in practice, outpatient clinic based care is often accompanied with a telephone support system, or a home-visit based program. It is of note

that typical telephone based support programs are outbound programs, that is, the care team proactively calls the patient to assess their health status.

The 2013 American Heart Association/American College of Cardiology (AHA/ACC) Heart Failure guidelines addressed post discharge HF specific interventions. These guidelines focus on the importance of optimizing HF pharmacotherapy before discharge, providing HF education before discharge (including self-care management), and addressing barriers to care among other factors. These guidelines included a recommended follow-up visit within 7 to 14 days of discharge or a telephone follow-up within 3 days of discharge⁶⁵. The AHA/ACC guidelines also recommend initiating multidisciplinary HF disease management programs for patients at high risk for readmission⁶⁶. However, the AHA/ACC did not provide definitive guidance on the recommended components of transitional care interventions aimed at preventing readmissions for patients with HF.

In concert with the AHA/ACC and based on a review of the literature discussed here, five elements seem to be effective themes for addressing all-cause readmissions, including:

1. Education focused on self-care, which can be instituted prior to discharge and reinforced throughout the transition of care episode.
2. Focus on pharmacotherapy and the importance of ensuring access to home medications and adherence to their prescription regimen.
3. Early contact following discharge (which can come in the form of a home visit or outpatient follow-up) to help ensure any home based lifestyle barriers are mitigated.
4. A process for patients to contact personnel as problems arise or symptoms worsen (e.g., telephone support)
5. A mechanism that allows the intervention to be individualized to the patient's specific needs (including early adjustment of medications based on symptoms)

Each of the studies reviewed focused on reducing hospital readmissions as the ultimate gauge of success for each program, however the impact on quality of life should also be considered. Resource availability and the start-up and operating costs of the respective program types should also be a determining factor, which, although not discussed in this review, should be evaluated in subsequent studies.

Based on the significant dollars placed at risk by the VBP hospital readmission reduction program, hospitals aiming to reduce HF readmissions may be able to reduce readmission rates by implementing programs that employ one or more of the five AHA/ACC elements discussed previously. Although telephone based intervention may be the easiest to implement, without additional home-visit support, this intervention is less likely to have the desired overall effect. Likewise, an outpatient clinic based approach, based on the data, may not be optimal especially in rural areas or where access to transportation is limited. In these areas, a home-visit based program coupled with a provider initiated telephone support system may be ideally situated for reaching these patients. In areas in which there are limited outpatient settings, and limited home-care based groups an inpatient focused strategy (e.g., Project Re-Engineered Discharge) coupled with a provider-initiated telephone support system may be the best available option. Project RED was included in this review although it was not a focus of the Comparative Effectiveness Review, but rather a related intervention that included several interventions, and focused largely on efforts within the inpatient setting.

Overall, intervention categories that included higher-intensity interventions (i.e., home-visiting programs, telephone based reinforcement, outpatient clinic-based follow up care) showed trends in reducing all-cause readmission or mortality. By contrast, categories with lower-intensity interventions (i.e., primarily educational interventions) did not affect hospital readmissions in a meaningful way. These findings suggest that intensity of resource use should be a key decision point when determining intervention selection, which also should be tailored to each local health care market.

Manuscript Two: Chronic Care Management: A Disease Management Clinic-based Transitional Care Model for Readmission Reduction

Abstract

Chronic care management programs focusing on transitional care have become prevalent as a component of population health strategies aimed at reducing inpatient overutilization. Chronic diseases, including congestive heart failure (CHF) continue to be challenges to hospitals as their care plans are now extending beyond that of the inpatient realm. Even from the hospital perspective, treatment of these diseases can no longer exist solely within the inpatient setting. To that end, this paper will describe the development of a care transition program utilizing a chronic care disease management outpatient clinic founded in 2014 at a medium sized (<250 bed) rural hospital in Southeast Texas. Results of the program demonstrate the clinic's effectiveness as a transitional care component for patients with no established primary care or cardiology home in preventing inpatient readmissions.

Background

The Affordable Care Act of 2010 established the Hospital Value Based Purchasing (VBP) Program, which affects payment for inpatient stays based on relative performance across the county. In subsequent years CMS finalized the policies that would establish the program to penalize hospitals with high readmission rates of patients with specific conditions including heart failure (HF) and patients admitted for an acute exacerbation of chronic obstructive pulmonary disease (COPD)⁶⁷. As a result of this penalty program, Medicare under the Hospital Readmissions Reduction Program will reduce reimbursement for 2,573 hospitals for fiscal year (FY) 2018⁶⁸.

Heart failure has been a focus of the readmission reduction penalty program since its inception largely due to the net potential of that patient population. A previous analysis of Medicare claims data from 2007 to 2009 found that 35% of readmissions within 30 days were for HF⁶⁹. More recent studies have stated that up to 25% of patients hospitalized with HF are readmitted within 30 days^{70 71}. As a result, specific interventions are needed to curtail readmissions in this population.

The one-year survival rate has been estimated at 80–90% in mild to moderate heart failure⁷² and 50–60% in severe heart failure⁷³, which is more malignant than breast, bowel, bladder, prostate and ovarian cancer⁷⁴. Heart failure is also associated with high morbidity and is the most common discharge diagnosis for patients over 65 years of age, in many industrialized countries^{75 76}. Issues and barriers in the management of patients with heart failure were reviewed in various studies that look at improving overall outcomes. A subset of the issues and barriers identified include, but are not limited to, less than optimal treatment⁷⁷, and the often insufficient education given to patients with heart failure in order to teach self-care.⁷⁸ It has also been shown in studies from different settings that non-compliance with medications, diet and/or symptom monitoring have been associated with 15–64% of the hospital readmissions^{79 80 81}. There is an emerging model that focuses on treating high risk populations (primarily heart failure patients) in an outpatient, nurse driven setting.

Programs that are targeted to preventing readmission are frequently referred to as ‘transitional care interventions’, which is descriptive of how they bridge the inpatient care and outpatient environment (including a patient’s return home). These transitional care interventions have been defined as “a broad range of time-limited services designed to ensure health care continuity, avoid preventable poor outcomes among at-risk populations, and promote the safe and timely transfer of patients from one level of care to another or from one type of setting to another”⁸². Utilizing an outpatient disease management clinic is one strategy that is being investigated as a part of a more comprehensive approach to transitional care interventions.

Previous studies have documented that nurse-led disease management programs for heart failure patients, including early follow-up after hospitalization and in depth patient education, have the potential to prolong event-free survival^{83 84}, decrease the number of hospital admissions^{85 86 87 88} as well as improve compliance⁸⁹, self-care behavior⁹⁰, and quality of life⁹¹.

This paper attempts to contribute to this evidence base regarding nurse and nurse practitioner-led disease management clinics for heart failure patients as a component of a successful transitional care strategy. This paper describes the development of a disease management clinic implemented by the hospital to provide outpatient services to low income and underserved populations that ordinarily would have had no other access to follow-up care. The program was measured by degree of success in enrolling patients in the clinic and reduced readmissions to the hospital of the enrolled population.

Community Needs Assessment

The service region of the disease management clinic consists of six counties in southeast Texas: Jefferson, Orange, Hardin, Jasper, Tyler and Newton. The entire service area population totals 539,681. This is an increase of 4,941 over the 2010 census, and is projected to grow to 557,125 by 2018, an increase of 3.2%. The demographics in the service region vary greatly by county. Economic growth has remained relative flat for a number of years. Jefferson County is highly industrialized and has pockets of urban poverty in both of the major cities: Beaumont and Port Arthur. In contrast, the rest of the service region is primarily rural although many residents are as economically disadvantaged as those in the cities. Beaumont, located in Jefferson County is the major medical hub for the region.

Jefferson County, Texas ranks 205 of 221 Counties in Health Outcomes, 209 in Health Behaviors, and 218 in Physical Environment. Age-Adjusted Mortality Rates per 100,000 by County are significantly higher in the service area for the following: Ischemic Heart Disease; Stroke; and Congestive Heart Failure. There are also significantly higher rates of diabetes, high cholesterol and high blood pressure. Economics, culture and physical environment are all causal factors in the poor health status of those living in the region. The County is a Medically Underserved Area as designated by the Health Resource & Services Administration, coupled with a shortage of primary care and specialty physicians. Together these factors have created a cycle in which chronic diseases go undiagnosed and or untreated until the patient is so ill

that they are frequently presenting to the emergency department for primary treatment, the most expensive setting to receive care.

Higher than average Medicare expenditures (measured by the Medicare spending per beneficiary) and preventable hospitalization rates in Southeast Texas and the shortage of primary care providers reflect the health challenges faced by residents in the identified service area. For example, 26.5% of Medicare Part A, Heart Failure patients are readmitted to the study hospital within 30 days of discharge. This rate is consistent with others throughout the region. Southeast Texas has one of the highest rates of unadjusted expenditures for non-capitated Medicare in the US. Differences in the amount and types of care used, rather than population characteristics and prices, are responsible for much of the variation in spending. In addition, the findings show that people in higher spending areas do not receive better care.

The area's higher than expected morbidity and mortality rates were key drivers in the decision to create new lower cost targeted resources for the community. Those over 65 years of age are the fastest growing segment of the population, and represent 13.4% of the population in the primary service area. The prevalence of chronic conditions such as Ischemic Heart Disease (42.2%), Diabetes (30.7%), Chronic Obstructive Pulmonary Disease (13.3%), and Heart Failure (23.5%) in this service area are above national Medicare averages. Hospital 30 day mortality rates for heart failure patients are 12.1% compared to 10.9% nationally⁹². The CHF admission rate is higher for both the 65-74 and the 75+ age groups than national averages⁹³. County residents have a higher rate of adult-smoking, obesity, physical inactivity, and poor physical health days than the statewide average, each of which puts residents at risk for common chronic diseases⁹⁴.

There are also disturbing trends that relate to the future of Southeast Texas. According to the KIDS Count Data Center, 33.5% of the children in Jefferson County live in poverty, and 32% receive social security income as well as Food Stamps. Unemployment has historically been over 10%. The ethnic

breakdown for children is as follows: 32% Anglo, 38% African American, 22% Hispanic, and Other/Unknown 8%. The service area also has 26% of its population under the age of 18⁹⁵.

The target population for this project is residents of the disease management catchment area who suffer from a primary or secondary congestive heart failure diagnosis. It is estimated that among the 10.9% of the catchment area patients who suffer from congestive heart failure, 39% are Medicaid insured or uninsured.

As previously noted, economics, culture, and history are all causal factors in the poor health outcomes of the service region. The area has a poverty rate of 22.6% and an uninsured rate of 25.2%—both of which are higher than the respective state and national rates⁹⁶. There is no county hospital district and only one Federally Qualified Health Center serving the region. The region has been continuously served by two primary, religious-sponsored, not-for-profit hospitals for over 100 years. Texas is one of the most litigious areas in the United States, and for many years recruiting and retaining physicians was a major challenge. The lack of primary care due to recruitment challenges has created a cycle in which chronic diseases go undiagnosed and/or untreated in the catchment area.

Study Methodology

Previous studies reviewed during the development of this clinic structure primarily focused on some element of patient education. In most, education or self-care training began prior to discharge and was reinforced after discharge, but some did not include an educational component before discharge^{97 98 99}

^{100 101 102}. All previously published studies reviewed had similar basic components including education or training and focused on self-care, diet, medications, and early recognition of symptoms.^{103 104 105 106 107}

¹⁰⁸. The disease management clinic was developed to support a similar model based on patient education.

The current clinic standards/ practice guidelines are based on the 2009 focused update: ACCF/AHA Guidelines for the Management of Heart Failure in Adults. The department goals are as follows:

- Provide education to patients about their disease process, the signs and symptoms of their disease, and titrate medications as needed for optimum health.
- Identify appropriate patients for cardiac rehabilitation and facilitate referral.
- Coordinate care with referring physicians.
- Identify and address any psychosocial barriers to care.
- Maintain adequate resource requirements to meet program, staff, and patient needs.
- Participate in grant activities as available.
- Educate community about heart failure through community outreach programs.

Based on the community needs assessment of the catchment area, an outpatient-based disease management clinic was established in 2014 to help address the underserved needs. This outpatient-based disease management clinic was developed and implemented in conjunction with a medium sized (<250 bed), non-academic rural hospital in the heart of Southeast Texas. The targeted patient population for program participants were patients with a primary or secondary diagnosis of HF, including medically underserved enrollees of all ages. These patients were identified through referrals from ED visits and hospitalizations, as well as direct referrals from both primary care and specialty providers. Patients identified as high risk for hospital admission/readmission and that could benefit from intensive care coordination were the first patients enrolled in 2014.

The goals of the disease management clinic are to provide education, counseling, and medication titration of heart failure patients referred to the clinic. Research nationally demonstrates that heart failure clinics can decrease readmissions, improve patient outcomes and decrease mortality. The disease management clinic was established on the foundation that patient education, including cultural

and spiritual components, is an integral component of the medical care of heart failure patients and their families. This program is provided in a competent and compassionate manner and in keeping with the mission of the hospital. In order to address the identified socio-economic challenges of the identified patient population, the clinic provided scales and sphygmomanometers for measurement and monitoring of weight and blood pressures, respectively, at home, as well as medication samples and prescription discount cards when needed.

The disease management clinic is a patient-centered practice which focuses on ongoing learning. Use of a broad range of existing community resources, staff trained to connect with these services, and the provision of follow-up care have empowered patients to access the most appropriate and cost-effective resources for their conditions. As part of the mission of the disease management clinic, all individuals and departments adhere to the ethical principles and policies outlined by the hospital, including the Code of Ethics, Associate Covenant, and Standards for Catholic Identity. Specific to the disease management clinic, all ancillary services offered in the clinic (e.g., social work, financial counseling, dietician services) are available across all types of patients, regardless of socioeconomic status, race, religion, age, sexual preference or gender.

The disease management clinic is designed for all patients with heart failure, regardless of acuity. While all patients with HF are accepted, research indicates that patient acuity levels are related to a patient's readiness to learn among all classes of HF patients¹⁰⁹. For example, a study of patients with Class II Heart Failure shows they have the best readiness to learn. The clinic provides education and support to outpatient of all ages, economic status or culture. Family members and/or significant others are encouraged to participate in the educational process. Patients are screened for the clinic and then a request is made to the physician (PCP, hospitalist or cardiologist as appropriate) for a clinic referral. Once patients are referred to the disease management clinic the clinic nurse (an RN) makes an

appointment for the patient, answers any questions for the patient about the program, and provides the patient and spouse/caregiver an information packet.

The clinic visit includes completion of an extensive questionnaire, screening, assessment by a nurse practitioner, and medication reconciliation. Patients are required to sign a contract about their responsibilities and the clinic indicates theirs. Follow up visits may include seeing a dietitian, a Licensed Clinical Social worker, and/or a pharmacist as needed. The visits consist of an initial assessment of the patient's current understanding of the signs and symptoms of the disease process, knowledge of their medications, barriers to compliance including financial, social, and/or cultural. Upon completion of the assessment, areas of concern are discussed with the patient and/or significant other to determine goals. Education is provided individually to patients, according to their physical and/or emotional status. A record of the education is documented in the medical record. Ongoing education is provided to the nursing staff as well as to the patient and family. Education is provided and conducted at the clinic site. The length of education depends on the patient's condition, physical limitations and emotional status. During the assessment and education processes, the provider may interact with many departments within the hospital setting, such as Social Services, Spiritual Care, Pharmacy, Nutrition and Foods Services, Case Management, Business Services, and various departments and levels within Nursing Services. Interaction may also occur with various community resources, such as the American Heart Association, Heart Failure Society of America, or the American Association of Heart Failure Nurses as well as identifying resources necessary to fulfill medical/educational needs.

The disease management clinic is staffed with an RN, nurse practitioner, and a dietitian. The RN and Nurse Practitioner both maintain Heart Failure Certification through continuing education or testing every 3 years to maintain certification. Eligibility to take the examination is based upon the American Association of Heart Failure Nurses. The dietitian is part of the Dietitian Department of the hospital.

Ongoing staff education is offered on-line through the hospital's Education Resource Center. Associates must maintain continuing education credits as mandated by licensure/association standards. The clinic also includes the services of disease management navigators, licensed clinical social workers, financial counselors, exercise physiologists, CNAs, and respiratory therapists. The services of the mid-level providers support the work of the specialists to empower high-risk individuals to take charge of their own health and to access the appropriate level of care.

The disease management clinic serves a group of patients with chronic illness in a resource-rich ambulatory setting supported by multidisciplinary teams. The disease management clinic team provides improved access to health and community resources, education, and self-management resources.

The disease management clinic's hours are Monday through Friday from 9am-5pm. Most referrals to date have come from the inpatient setting during the patient's index admission. A list of potential referral eligible patients is reviewed by clinic staff each day. If the patient has already been discharged, attempts are made to call the patient at home and schedule an appointment as an outpatient.

Roles of Clinic Members

- CNA: Greet patients, obtain weight & vital signs, draw labs, perform EKG, schedule & confirm appointments.
- LVN: chief complaint, reconcile medication list, administer medications.
- RN: phone assessments, case management duties, prescription refills, coordinate care after every clinic visit with cardiologist and other physicians as needed, triage incoming patient calls, calling physician offices to update with concerns and answering patient questions. (added position)

- HF Nurse Navigator: visits cardiologists' and PCPs' offices to discuss referral processes and communication. Encourages physicians to refer patients and determine if there are areas of improvement for the clinic.

The multi-disciplinary care management approach within the community provides support, training, and interventions necessary for patients to manage their chronic conditions outside of the inpatient setting.

Study Results

As of January 2018, the disease management clinic has been operational for four years, enrolling a total of 491 unique patients into the program. A summary of the patient characteristics can be found in *Table 1*.

	2014		2015		2016		2017		Grand Total	
Sex	Patients	% of Total	Patients	% of Total	Patients	% of Total	Patients	% of Total	Patients	% of Total
Female	41	49.4%	39	36.1%	58	47.2%	80	45.2%	218	44.4%
Male	42	50.6%	69	63.9%	65	52.8%	97	54.8%	273	55.6%
Grand Total	83	100.0%	108	100.0%	123	100.0%	177	100.0%	491	100.0%
Marital Status										
Divorced	8	9.6%	15	13.9%	23	18.7%	29	16.4%	75	15.3%
Legally Separated	2	2.4%	2	1.9%	4	3.3%	3	1.7%	11	2.2%
Married	33	39.8%	37	34.3%	38	30.9%	51	28.8%	159	32.4%
Single	16	19.3%	31	28.7%	40	32.5%	82	46.3%	169	34.4%
Unknown	0	0.0%	1	0.9%	1	0.8%	1	0.6%	3	0.6%
Widow/Widower	24	28.9%	22	20.4%	17	13.8%	11	6.2%	74	15.1%
Grand Total	83	100.0%	108	100.0%	123	100.0%	177	100.0%	491	100.0%
Race										
African American/Black	24	28.9%	42	38.9%	45	36.6%	76	42.9%	187	38.1%
Asian/Eastern Indian	0	0.0%	0	0.0%	1	0.8%	0	0.0%	1	0.2%
American Indian	1	1.2%	0	0.0%	0	0.0%	0	0.0%	1	0.2%
Peoples-Euro/MidEast	57	68.7%	65	60.2%	74	60.2%	101	57.1%	297	60.5%
Unknown	1	1.2%	1	0.9%	3	2.4%	0	0.0%	5	1.0%
Grand Total	83	100.0%	108	100.0%	123	100.0%	177	100.0%	491	100.0%
Age										
<40	0	0.0%	6	5.6%	19	15.4%	32	18.1%	57	11.6%
40-49	11	13.3%	13	12.0%	24	19.5%	42	23.7%	90	18.3%
50-59	8	9.6%	28	25.9%	26	21.1%	51	28.8%	113	23.0%
60-69	18	21.7%	21	19.4%	38	30.9%	38	21.5%	115	23.4%
70-79	20	24.1%	27	25.0%	10	8.1%	9	5.1%	66	13.4%
80-89	23	27.7%	12	11.1%	6	4.9%	5	2.8%	46	9.4%
90+	3	3.6%	1	0.9%	0	0.0%	0	0.0%	4	0.8%
Grand Total	83	100.0%	108	100.0%	123	100.0%	177	100.0%	491	100.0%

Table 1: Demographic Breakdown of Disease Management Clinic Participants

As the program's scope and outreach continued to expand, total enrollment also grew (*Table 2*).

Expansion of the clinic volumes was tied to better alignment with local cardiology groups as well as the employed Hospitalist group, who are contracted to see unassigned patients – many of whom were the targeted population (low income /uninsured).

Year	New Clinic Enrollees
2014	83
2015	108
2016	123
2017	177
Total	491

Table 2: New Clinic Enrollees by Year

Of the unique clinic enrollees over the previous 4 years, nearly half (50.3%) are uninsured. Of the remaining, approximately one-third (30.3%) had private insurance and 19.3% had either Medicare or Medicaid. (*Table 3*) Self pay patients are not billed for services rendered at the clinic.

Payor	Patient Count	Percent of Total
Medicaid	12	2.4%
Medicare	83	16.9%
Private Insurance	149	30.3%
Self-Pay/ Uninsured	247	50.3%
Total Patients	491	100.0%

Table 3: Payor Source by Patient

Clinic patient characteristics by disease group can be seen in *Table 4*. Note that patients may present with multiple co-morbid disease states. As noted, 31% of patients treated for COPD, HF or HTN had diabetes as a comorbid condition. Patients with existing hypertension were also tracked beginning in 2017 as a way to capture additional comorbid disease states of the patient population.

Primary or Secondary Disease Process	Patients	Percent of Total
HF	327	66.6%
COPD	103	21.0%
Diabetes	152	31.0%
Hypertension (Tracked Separately in 2017)	31	6.3%
All Patients	491	*Note that patients may present with multiple disease processes

Table 4: Disease Process of Clinic Patients

Once the patients enrolled in the program, the majority continued seeking treatment with the clinic at recurring visits. Nearly one third of patients enrolled in the clinic came back for five or more return visits.

Percent of Total Patients	Visit Frequency
45.4%	Single Visit
54.6%	Multiple Visits (2 or more)
31.1%	5 or More Visits

Table 5: Visit Frequency of Clinic Patient Population

When looking at the overall CHF patient discharges compared to enrolled HF clinic patients, patients who are enrolled in the clinic appear less likely to experience a 30-day (all cause) readmission. Clinic enrollment occurs following a referral to the disease management clinic from the inpatient stay, although the clinic will also accept referrals directly from a referring physician's office. Over the previous 4 years, only 7.9% of CHF disease management patients experienced a readmission, compared to 15.8% of the general CHF population not enrolled in the clinic.

Year over year improvements in the HF clinic readmission rates may indicate the cumulative success of the educational interventions, overall clinic effectiveness and ability of the clinic staff to effect meaningful differences in the behaviors of the enrolled population. As seen in *Table 6*, as clinic enrollment has increased, HF readmissions have decreased. HF specific readmissions in the hospital showed modest declines over the study time period. This may be due to the proportion of the overall hospital HF population that is enrolled in the clinic. No changes in patient characteristics were known to have occurred for either the hospital or the clinic during the study timeline.

Year	Total Hospital HF Discharges	Total Hospital HF Readmissions	Hospital HF Readmission Rate	Total Clinic Patients	Total Clinic Patient Readmissions	Clinic Patient HF Readmission Rate
2014	388	63	16.2%	83	10	12.0%
2015	454	72	15.9%	108	11	10.2%
2016	534	83	15.5%	123	11	8.9%
2017	736	115	15.6%	177	7	4.0%
Total	2112	333	15.8%	491	39	7.9%

Table 6: Readmission Rates by Hospital and Clinic Enrollees

Commentary

Limitations

The nature of this study was observational, and was not the goal of this paper to include a comparison group for analysis. As such, a comparison group with similar patient characteristics, severity and hospital discharge profiles was not included; rather the purpose of this paper was to discuss the components of a disease management clinic that was shown to be effective in bridging care for the targeted population.

The clinic is funded by the Texas Medicaid 1115 Waiver (DSRIP). In December 2011 Texas received approval from CMS for a waiver to upcoming changes in federal support for state Medicaid programs. A new 1115 waiver was approved in December, 2017 and will continue funding through 2022. Under the waiver, hospitals are encouraged to form regional health partnerships that support more localized health care solutions in order to qualify for incentive payments. The five year waiver allows Texas to continue receiving federal funds while allowing expansion of managed care. Hospitals providing care to uninsured patients in the form of uncompensated care will continue to receive this funding, however long term viability will need to be established in lieu of additional and future government support.

Discussion

The current state of the healthcare system can no longer sustain a volume based mentality but rather must focus on a value based approach to reduce costs, provide care in the most appropriate setting possible, and reward providers for improved outcomes. As such, the disease management clinic is being advanced as an effective intervention to reduce admissions among high risk and vulnerable populations and has significant value on several fronts. Nearly 1 in 6 patients that are diagnosed with heart failure

are readmitted back into the hospital within 30 days. This high HF readmission rate speaks to a current system designed to treat illness but lacking the infrastructure or focus to prevent readmissions and provide for preventive care. By engaging in a focused effort to reduce this problem in our community, a more rational use of scarce resources will be created thereby meeting the goals of the IHI Triple Aim initiative and the core values of the organization.

As inpatient demand is often outpacing bed and/or staff availability in Southeast Texas, finding the appropriate setting to care for patients with chronic conditions becomes more and more important. CMS pressure to reduce readmissions by penalizing hospitals with higher average readmissions further emphasizes the importance of platforms like this care transition program. The disease management clinic was designed as a bridging therapy between the hospital setting and the patient's next level of care (typically the PCP or Cardiologist). The clinic worked with patients and local physician groups to find permanent PCPs for those patients who did not have a continuous source of primary care.

The 2013 American Heart Association/American College of Cardiology (AHA/ACC) Heart Failure guidelines addressed post discharge HF specific interventions. These guidelines focus on the importance of optimizing HF pharmacotherapy before discharge, providing HF education before discharge (including self-care management), and addressing barriers to care among other factors. This included a follow-up visit within 7 to 14 days of discharge or a telephone follow-up within 3 days of discharge¹¹⁰. The AHA/ACC guidelines also recommend initiating multidisciplinary HF disease management programs for patients at high risk for readmission¹¹¹. However, the AHA/ACC did not provide definitive guidance on the recommended components of transitional care interventions aimed at preventing readmissions for patients with HF.

The care transition program described here includes all five of these elements that are outlined by the AHA/ACC. Initial success of this program demonstrates the potential benefit to scaling this effort to

reach a larger percentage of the CHF discharged population. In addition, future endeavors may expand to other chronic care disease states beyond CHF.

Continued success of the clinic will require alignment with local cardiovascular surgeons for post CABG patients to begin utilizing the disease management clinic for follow-up visits (currently not utilized), Ensuring sustainability for the clinic also will require increasing the overall referral base to the clinic for non-heart failure specific DRGs (currently not receiving referrals outside HF and minimal COPD/ diabetes education), obtaining grant funding through the community based need organizations to align initiatives, and contracting with a local home health agency to conduct care transition visits.

This program serves as further evidence of a successful demonstration for leveraging a care transition program to bridge the gap between discharge and the next level of care through an outpatient disease management program. Further attention should be given to scaling the program and capturing a larger share of the overall hospital's HF population.

Manuscript 3: Chronic Care Management: A Home-based Transitional Care Model for Readmission Reduction

Abstract

Chronic care management programs have become prevalent as a component of population health strategies aimed at reducing inpatient overutilization. Efforts by CMS to penalize hospitals with high readmission rates coupled with limited inpatient bed and staff availability have placed even more pressure on health systems to appropriately manage patients with chronic conditions in the most cost-effective setting. As a result, health care institutions are shifting focus to transitions of care and outpatient management programs. This paper will describe the development of a care transition program utilizing a post-discharge in home visit with additional telephone support implemented at a medium sized (<250 bed) rural hospital in Southeast Texas. Initial results of this program demonstrate the potential of home-based interventions as a successful approach to a hospital's overall readmission reduction strategy.

Background

The Affordable Care Act of 2010 established the Hospital Value Based Purchasing (VBP) Program, which affects payment for inpatient stays based on relative performance across the county. In subsequent years CMS finalized the policies that would establish the program to penalize hospitals with high readmission rates of patients with specific conditions including heart failure (HF), patients admitted for an acute exacerbation of chronic obstructive pulmonary disease (COPD), acute myocardial infarction (AMI), and pneumonia (PN)¹¹². The VBP program has had far reaching effects. Medicare under the Hospital Readmissions Reduction Program will reduce reimbursement for 2,573 hospitals for fiscal year (FY) 2018, according to CMS data¹¹³.

Heart failure has been a focus of the readmission reduction penalty program since its inception largely due to the net potential of that patient population. A previous analysis of Medicare claims data from 2007 to 2009 found that 35% of readmissions within 30 days were for HF¹¹⁴. More recent studies have

stated that up to 25% of patients hospitalized with HF are readmitted within 30 days^{115 116}. As a result, tailored interventions are needed to curtail readmissions in this population.

Programs that are targeted to preventing readmission are frequently referred to as ‘transitional care interventions’, describing how they bridge the inpatient care and outpatient environment (including a patient’s return home). These transitional care interventions have been defined as “a broad range of time-limited services designed to ensure health care continuity, avoid preventable poor outcomes among at-risk populations, and promote the safe and timely transfer of patients from one level of care to another or from one type of setting to another”¹¹⁷.

There currently exists limited evidence on the effectiveness of home-visit based programs in reducing all-cause 30 day (unplanned) readmissions. However, the meta-analysis study conducted by the Effective Health Care Program, (which included nine trials) found that patients receiving home visits had a significantly reduced risk of all-cause readmission over 3 to 6 months (RR, 0.75; 95% CI, 0.66 to 0.86)¹¹⁸. At 3 months, one trial by Rich et al., included in the meta-analysis (N=282) found that patients receiving home visits had a significantly lower risk of HF-specific readmissions than controls (RR, 0.51; 95% CI, 0.31 to 0.82)¹¹⁹. Another trial by Kimmelstiel et al., (N=200) reported that patients receiving home visits had significantly fewer total HF specific readmissions than did patients receiving usual care (RR, 0.54; $p < 0.001$)¹²⁰. The meta-analysis also found (in eight trials) no difference in the relative risk of all-cause readmission between patients receiving telephone based reinforcement and those receiving usual care (RR, 0.92; 95% CI, 0.77 to 1.10)¹²¹.

This paper attempts to contribute to the evidence related to the effectiveness of home-visit based programs in reducing all cause unplanned readmissions in the targeted population. This paper also seeks to demonstrate that a home-visit based intervention can be an effective strategy further

supplemented by telephone support as a means to approach reduction in hospital 30-day all cause readmissions.

Study Methodology

Previous studies reviewed in the development of this program, which focused on telephone based reinforcement as a supplemental component in addition to the in-home visit, included patient education as a major component. In some of the reviewed studies, education or self-care training began prior to discharge and was reinforced after discharge during telephone follow-up, while others did not include an educational component before discharge^{122 123 124 125 126 127}. Most reviewed studies included an option for a patient-initiated call as support for questions that arose after discharge. Previously published studies involving home-visit based follow up all had the following elements - education or training focused on self-care, diet, medications, and early recognition of symptoms.^{128 129 130 131 132 133}.

Based on the review of successful previous studies, a home-based transitional care program was developed and implemented at a medium sized (<250 bed) non-academic rural hospital in Southeast Texas. The targeted patient population for program participants included traditional English speaking Medicare enrollees (aged 65 and older) who were admitted to the hospital between July and December, 2017 with a primary diagnosis of heart failure. A visual depiction of the program touchpoints can be found in Figure 1.

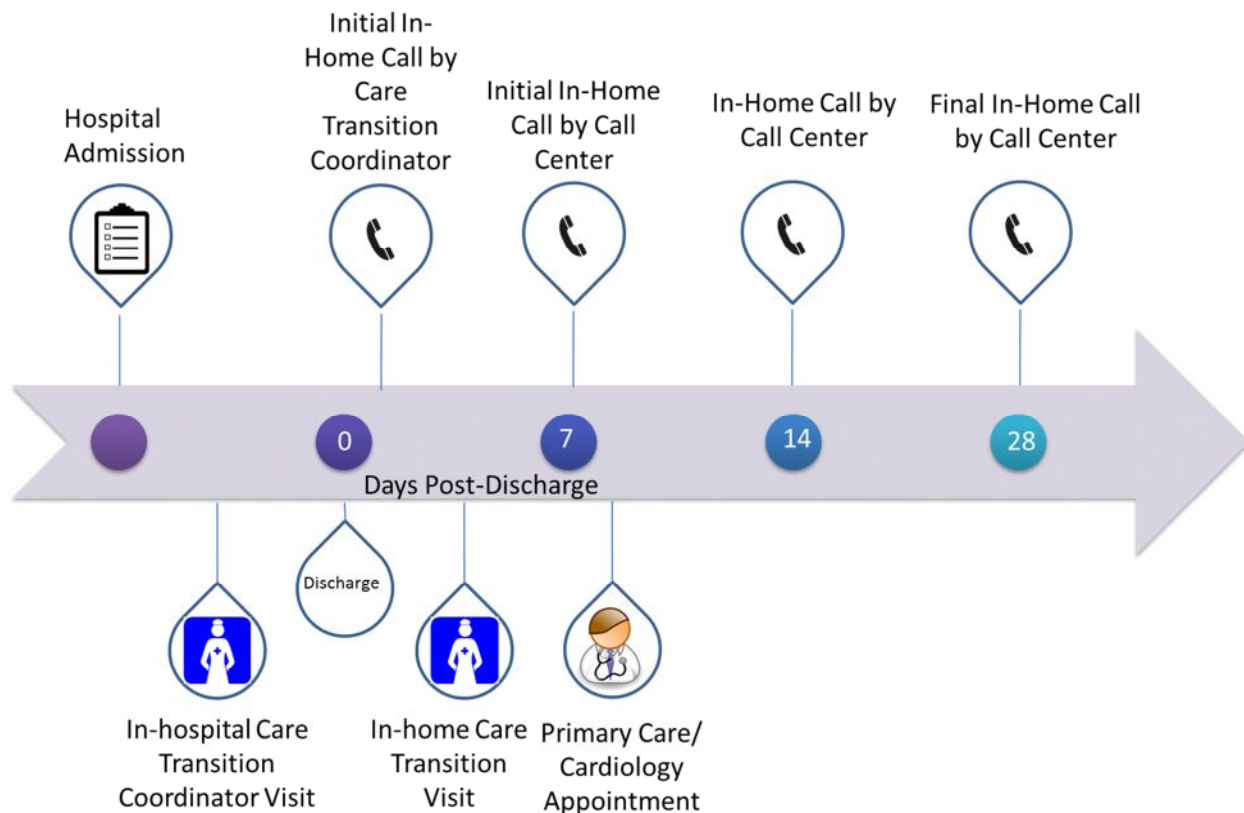


Figure 1

During the initial hospital admission, patients are assessed by the hospital’s heart failure clinician (registered nurse) to determine if the patient clinically meets initial program criteria and confirm underlying heart failure. The hospital’s heart failure clinician is focused on educating patients within the hospital for new onset CHF. This position was previously referred to as the “Core Measures Nurse” and ensured the hospital was compliant with the CMS core measures pertaining to heart failure (e.g., ensuring discharge instructions were included in the record, systolic function was measured and documented in the record, patient was on Beta-blockers, etc.). Currently the role covers primarily patient education. The heart failure clinician reviews the patient’s pertinent lab work (BNP), physician documentation, weight increase, chest x-ray to assess any pulmonary edema or vascular congestion and any history of failed outpatient diuretic changes. Based on this review the heart failure clinician confirms

that the patient is a candidate, is being discharged directly home, and then notifies the care transition coordinator (also a registered nurse) of a new patient to the program. Patients being discharged to a skilled nursing facility, nursing home, acute rehab, or other post-acute non-home based setting were excluded from participating in the program. From 2014-2017 HF discharge dispositions for the study hospital were as follows: Home self-care (53.7%), home health (23.2%), SNF (15.8%), long term care (4.4%), rehab (2.9%). Since the goal of the program was to bridge services between discharge and the next level of care (PCP or Cardiology visit), patients discharged home to self-care were felt to be of higher risk of readmission. Data from the study hospital showed that patients 65 years and older that were discharged home (to self-care) had a 13.5% 30 day all-cause readmission rate.

The care transition coordinator visits with the patient prior to discharge and presents the patient with a welcoming letter that includes a section titled “What does this mean for you?”. The letter explains that the patient will be: 1) visited by a Registered Nurse to review their medications, perform a clinical assessment, and answer any health-related questions they may have; 2) that a home visit will occur 1-2 days after discharge; 3) that the patient will be receiving a telephone call to check in with them over the next 30 days; and, 4) that the patient will have access to a “Call Us First Program” where a clinician is available 24 hours a day, 7 days a week to walk through any health related concerns or questions they may have for 30 days following discharge from the hospital. Also included in the letter is language stating that the program is “intended to improve your quality of care when you get home and is at no cost to you or your insurance”. This language was added to mitigate potential patients from opting out of the program for fear of cost to themselves or cost to their insurance. Prior to discharge the care transition coordinator distributes a ‘personal health record’ booklet and reviews the following checklist with the patient:

- I have the name and phone number of a person to contact if I have questions.

- I understand where I am going and what will happen next in my recovery.
- I understand what my medications are, how to obtain them and take them.
- I understand the potential side effects and symptoms of my medications and whom to call if I experience any.
- My doctor or nurse has answered my most important questions prior to leaving.
- I have a follow-up appointment scheduled with my doctor and transportation has been coordinated.
- I have the necessary equipment ordered and ready to be delivered.

Although many of the items in the booklet are yes/ no responses, the purpose of reviewing the information is to further engage the patient in their personal health. The care transition coordinator then completes the following specific assessment to determine the patient's readiness to transition home and helps guide any tailored interventions needed.

Care Transition Risk Assessment Tool	Suspected Barriers to Transition Home
Age 80 or older	May not have transportation to appointments
Moderate to severe functional deficits	May be unable to afford medications
History of mental/emotional illness	May be unable to afford food or other basic items
Four or more coexisting health conditions	Home environment may be unsuitable/unsafe
Six or more prescribed medications	Lives alone
High risk medications*	Deficits in patient understanding (health literacy)
Two or more hospitalizations in the last 6 months	Lives with someone who is unable or unlikely to assist
Hospitalization in the past 30 days	Language barrier
History of non-adherence to medical regimen	Other:

* **High Risk Meds include:** insulin, narcotics/opiates, anticoagulants, inotropics, chemo drugs, lithium, clozapine, epinephrine, propranolol, digoxin/lanoxin.

Preliminary Medication Reconciliation
Obtained list of medications patient was taking prior to hospitalization/facility stay
Compared to MAR and/or discharge medication list

	Communicated with facility and ensured any discrepancies were intentional
	Communicated with facility and ensured any potential clinically significant issues were resolved
	Ensured patient/caregiver had a plan to obtain all prescribed medications following discharge

Following discharge, the care transition coordinator conducts an initial phone call with the patient within 24 hours. The care transition coordinator introduces the concept of this call while the patient is still admitted to the hospital, and in conjunction with the hospital's heart failure clinician begins to educate the patient and their family on the disease process. The care transition coordinator (if allowed) also enters the phone number of the call center from which the call will originate into the patient's phone, so that the patient will recognize the number when it occurs. The focus of this call is on medication management and ensuring that the patient remembers their next level of care appointment (cardiologist, primary care physician, etc.), which was scheduled by case management prior to discharge. The date and exact time of the upcoming in-home visit is also confirmed with the patient. A reminder phone call is also placed to the patient the evening before the initial in-home visit.

During the in-home visit, the registered nurse completes an in depth screening that covers both medical and social barriers to the patient's wellness. The care transition coordinators operate in conjunction with an outpatient disease management clinic that is a department of the hospital. As part of the program, a protocol was developed to clinically guide the in-home visit and direct follow-up care coordination with the disease management clinic as needed. The in-home visit consists of the following elements, which were developed and written as a part of the patient's care transition protocol: personal health goal (purpose), clinical risk factors, in-home based visit assessment and educational components to review.

The purpose of the in-home visit is to assess clinical stability of the patient at home following post-acute care and to promote patient engagement, self-management and support post hospital discharge.

An accurate patient weight will be assessed in home at time of visit to evaluate volume status for signs and symptoms of heart failure exacerbation.

- For patients with a weight gain of 2-5 pounds from in-hospital baseline:
 - Contact physician of record for further instructions
- For patients with a weight gain of >5 pounds from in-hospital baseline:
 - Notify Heart Failure Disease Management Clinic for potential nurse practitioner evaluation (at the disease management clinic)
- For any of the following vital signs outside of noted parameters, the physician of record will be contacted. If physician cannot be reached, the Disease Management Clinic will be contacted for potential Nurse Practitioner evaluation:
 - Oxygen saturation 90% or less on room air
 - Blood pressure systolic change of >30 mmHg from baseline
 - Heart rate >120 bpm

While in the home, the care transition coordinator (RN) will do the following:

- Conduct an onsite patient assessment to ensure safe transition to home
- Assess presence of barriers to care (e.g., cognitive, environmental, social, transportation)
- Perform medication reconciliation and risk assessment
- Review with patient all appointments with PCP and Cardiologist and ensure patient can attend visits
- Coordinate care with patient, family, hospital and PCP as appropriate
- Provide a food inventory/ nutrition screen as indicated
- Conduct community health needs screening

Also during the in-home visit, the following educational elements are reinforced with the patient:

- Discuss the concept of the transition program including personal goals/behavior modifications
- Education on recognition of worsening signs/symptoms of their disease state
- Educate on medications including purpose and side effects and importance of adherence
- Reinforce proper monitoring of daily weight (e.g. first thing in am after voiding)
- Review and educate on comorbidities (COPD, Diabetes, etc.)

Education in the home continues the concepts that were reviewed by the Hospital's heart failure clinician prior to discharge. Patients are further instructed to call if any of the following issues arise:

- Swelling in ankles, legs, or abdomen that has become worse
- Shortness of breath that has become worse
- Extreme fatigue or decreased ability to carry out daily activities
- A respiratory infection or a cough that has become worse or won't go away
- Frequent chest pain or discomfort on exertion
- Rapid, irregular or difficulty breathing while resting or carrying out regular activities
- Dizziness, lightheadedness or restlessness

After that initial in-home visit, the care management call center contacts the patient weekly for the next three weeks. Patients are also encouraged to utilize the 24/7 telephone support for any questions or medical issues that arise.

Study Results

As of December 2017, the care transition in-home program at the Southeast Texas hospital under study has been operational for 6 months. During that period, 67 patients were enrolled in the program

described in the study methodology section. A summary of patient age and gender is provided in *Table*

1. All patients were 65 years or older and were under traditional Medicare services.

Age	% of Total	# of Patients	Male	Female
65-69	41.8%	28	19	9
70-74	13.4%	9	5	4
75-79	20.9%	14	8	6
80-84	9.0%	6	4	2
85-89	9.0%	6	4	2
90-94	4.5%	3	2	1
95+	1.5%	1	0	1
Total	100.0%	67	42	25

Table 1: Age Breakdown by Study Participants

As described in *Table 2*, the majority of patients enrolled were primary CHF patients (83.6%); 16.4% of the enrollees had a primary diagnosis of COPD, however all patients had an accompanying secondary diagnosis of heart failure.

Chief Complaint	No. of Patients	% of Total
CHF	56	83.6%
COPD	11	16.4%
Total	67	100.0%

Table 2: Chief Complaint of Study Participants

Table 3 details the number of patients enrolled by month since the inception of the program in July, 2017. Enrollments during the months of September and October were impacted by the effects of Hurricane Harvey on the service area.

Discharge Month	Number of New Program Enrollees
July	1
August	12
September	11

October	11
November	26
December	6
Total	67

Table 3: Discharge Month of Study Participants

As reflected in *Table 4*, the majority (59.8%) of enrolled patients were seen on the day of discharge or the day immediately prior to discharge. By design, the initial in-hospital visit was conducted as close to discharge as possible to increase the likelihood of patient adherence to the program and likelihood that the education delivered would be enduring. Early intervention was thought to be key in helping reinforce health habits and also make the transition into the home.

Care Transition Coordinator In-hospital Visit (Patient Seen)	No. of Patients	% of Total
Day of Discharge	20	29.9%
Day Prior to Discharge	20	29.9%
Two Days Prior to Discharge	11	16.4%
Three or More Days Prior to Discharge	16	23.9%
Total	67	100.0%

Table 4: Care Transition Coordinator In-hospital Visit Day of Visit

All patients enrolled in the program had the initial phone call conducted within the first 4 days following discharge. The majority (76.1%) were conducted within 24 hours of discharge (*Table 5*).

Initial Phone Call Conducted (By Care Transition Coordinator)	No. of Patients	% of Total
Within 24 Hours of discharge	51	76.1%
Within 48 Hours of Discharge	4	6.0%
Within 72 Hours of Discharge	10	14.9%
Within 96 Hours of Discharge	2	3.0%
Total	67	100.0%

Table 5: Study Participant Initial Phone Call Timing

Based on the data presented in *Table 6*, following the initial post-discharge follow-up phone call, 54 patients (80.6%) successfully completed the in-home visit. Of the 13 patients who did not have an in-home care transition visit, 8 patients (61.5%) declined to continue in the program, 2 patients (15.4%) were admitted to a traditional home health program (and thus were disqualified from the care transition program), 1 patient (7.7%) was evacuated due to Hurricane Harvey, 1 patient (7.7%) was unable to be reached once in home, and 1 patient (7.7%) was lost to follow-up. Later initial visits (i.e. the longer the time between discharge and the initial in-home visit) were often seen associated with Friday/weekend discharges, and holiday (Thanksgiving) schedules.

These touchpoints (including the in-hospital visit introduction, initial phone call and in-home visit) with the patient were designed to: 1) promote patient engagement, self-management and support to encourage the patient to continue communication with their care team after hospital discharge (transition to the community); 2) assure communication between the patient and PCP/Cardiologist for appropriate patient support; 3) ensure the patient has access to any needed community and caregiving services; 4) conduct ongoing and continual medication reconciliation and reinforce the importance of medication adherence.

Initial Home Visit Date Post-discharge	No. Patients	% of Total
Within 72 Hours of Discharge	18	33.3%
Within 7 days of Discharge	22	40.7%
Within 14 days of Discharge	11	20.4%
Within 21 days of Discharge	3	5.6%
Total	54	100.0%

Table 6: Study Participant Initial Home Visit Timing

Based on the data presented in *Table 7*, the vast majority (88.2%) of the call center initiated calls occurred within 7 days of discharge. Three additional patients were lost to follow-up at this stage. Subsequent attempts to reach the remaining patients by phone became less successful as the program

continued. Patients that did not have all three care transition coordinator calls had multiple attempts to reach the individual. Whether the phone calls were simply unsuccessful in reaching the patient or the patient consciously chose not to continue engagement in the program is not known.

The telephone based reinforcement is similar in nature to educational based initiatives, and primarily serves to check-in on patients following transition to home. These programs historically have focused on patient monitoring and/or self-care management (or various combinations) after discharge in a structured format through the use of decision support software.

Follow-up Phone Call #1 Post-Discharge (By Call Center)	No. Patients	% of Total
Within 7 days	45	88.2%
Within 14 days	6	11.8%
Total	51	100.0%

Table 7: Follow-up Phone Call #1 Timing of Study Participants

Follow-up Phone Call #2 Following Initial CTC Call (By Call Center)	No. Patients	% of Total
Within 7 days	37	84.09%
Within 14 days	7	15.91%
Total	44	100.00%

Table 8: Follow-up Phone Call #2 Timing of Study Participants

Follow-up Phone Call #3 Following Second CTC Call (By Call Center)	No. Patients	% of Total
Within 7 days	25	71.43%
Within 14 days	10	28.57%
Total	35	100.00%

Table 9: Follow-up Phone Call #3 Timing of Study Participants

Although not all patients were able to complete all three CTC follow-up calls (68% successfully completed all three calls), all 67 patients initially enrolled in the program successfully made it to their next level of care visit (PCP, Cardiology, etc.) (Table 10). This element was a major milestone of the

program; that is, keeping patients healthy until their next level of care. Most importantly, none of the 67 patients enrolled in the program were readmitted to the hospital within 30 days of discharge.

Although not all patients had every touchpoint (initial call, in home visit, plus 3 follow-up calls), all were included in the review as education began in the inpatient setting and focused on staying healthy until the next level of care appointment. For that reason, they were included in the final count of patients in the study (although 54 of the 67 patients had the in-home care transition visit). Of the 13 patients who did not have the in-home visit, 8 of the patients had a PCP or Cardiologist office visit within the 7 days following discharge. This may have contributed to the reason for declining the in-home visit.

Follow-up Next Level of Care (PCP, Cardiologist, etc.)	No. Patients	% of Total
Within 7 Days	51	76.12%
Within 14 Days	13	19.40%
Within 21 Days	3	4.48%
Total	67	100.00%

Table 10: Study Participant Follow-up Visit Timing

In the same 6 month period (July- December) of the prior year, the study hospital's 30-day all-cause (same facility) readmission rate for CHF patients in the 65+ age group was 14.75%. When examining the subset of these patients that would have been candidates for the care transition program had the program existed (i.e. those 65+, CHF, traditional Medicare, discharged direct to home, without home health), that subpopulation's 30-day all-cause (same facility) readmission rate was 12.96%.

Commentary

Limitations

Based on the limited number of study participants to date, caution should be taken in interpreting definitive outcome changes as a result of the program. While the study population was small (67 patients) the outcome of the study demonstrates the potential effectiveness of the program. The

methods for care delivery in the outpatient setting (the in-home visit) were well suited to the Southeast Texas region, however this study took place in a small rural facility, and as such, its implications and effectiveness in other settings may be different.

Also, by nature, patients discharged home to self-care are typically healthier than those being discharged to SNFs or rehabs or other post-acute care. This study did not set out to compare differences in readmission rates across different venues (i.e., SNF vs. in-home transitional care program or home health vs. in-home transitional care program) but rather to establish the in-home transitional care program as a viable option for consideration in a hospital's overall readmission reduction efforts.

Discussion

The home-visit based program described here serves as a trial demonstration for leveraging a care transition program to bridge the gap between discharge and next level of care. No patients initially enrolled in the study were readmitted within 30 days post discharge. Successful conversion (67 patients enrolled and 54 patients completing the in-home visit) demonstrates the effectiveness of the program in how it was presented to the patient (introductory face to face handoff by hospital staff, introductory letter, reinforcing phone call).

This initial trial of the program demonstrates the potential effectiveness of a home-based care transition program with the following elements: 1) approaching patients early in the inpatient stay; 2) immediate contact with the patient following discharge (within 24 hours); 3) early in-home visit conducted by the care team (within 72 hours); 4) continued touchpoints by the care transition team through 30 days post discharge via telephone support; and 5) availability of a telephone support for the patient to utilize if they are experiencing symptom exacerbation. Further attention should be given to scaling the program and capturing a larger share of the discharged-to-home (self-care) population.

As inpatient demand is often outpacing bed and/or staff availability in Southeast Texas, reducing preventable admissions of patients with chronic conditions is increasingly important. CMS pressure to reduce preventable readmissions by penalizing hospitals with higher-than-average readmissions further emphasizes the importance of platforms like this care transition program.

The 2013 American Heart Association/American College of Cardiology (AHA/ACC) Heart Failure guidelines addressed post discharge HF specific interventions. These guidelines focus on the importance of optimizing HF pharmacotherapy before discharge, providing HF education before discharge (including self-care management), and addressing barriers to care among other factors. These guidelines included a follow-up visit within 7 to 14 days of discharge or a telephone follow-up within 3 days of discharge¹³⁴. The AHA/ACC guidelines also recommend initiating multidisciplinary HF disease management programs for patients at high risk for readmission¹³⁵. However, the AHA/ACC did not provide definitive guidance on the recommended components of transitional care interventions aimed at preventing readmissions for patients with HF.

In concert with the AHA/ACC guidelines and based on a review of the literature discussed here, five elements seem to be effective themes for addressing all-cause readmissions, including:

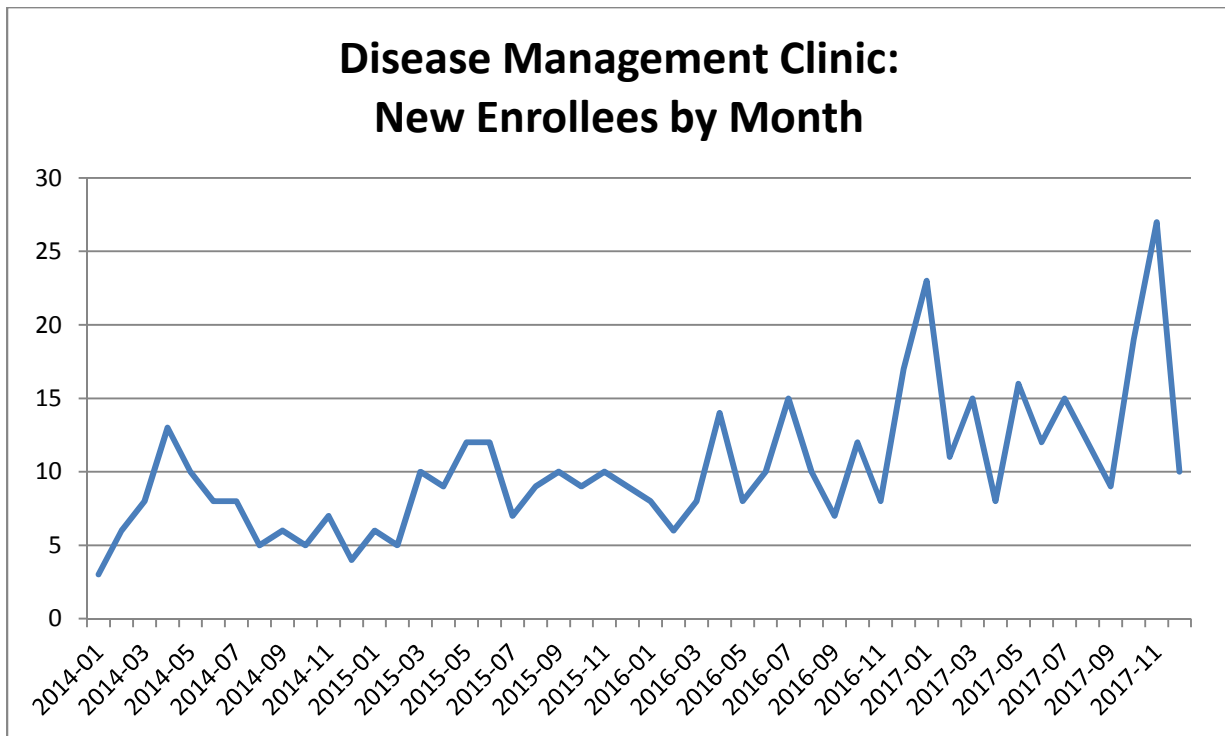
1. Education focused on self-care, which can be instituted prior to discharge and reinforced throughout the transition of care episode. In this demonstration, education began in the inpatient setting by the care transition coordinator and the hospital's heart failure clinician.
2. Focus on pharmacotherapy and the importance of ensuring access to home medications and adherence to their prescription regimen. The care transition coordinator focused on medication reconciliation prior to discharge and also at the in-home visit to ensure that the patient was able to acquire the needed medications, was educated on taking the medications (frequency,

purpose, instructions) and understood the importance of taking the medications per the doctor's orders.

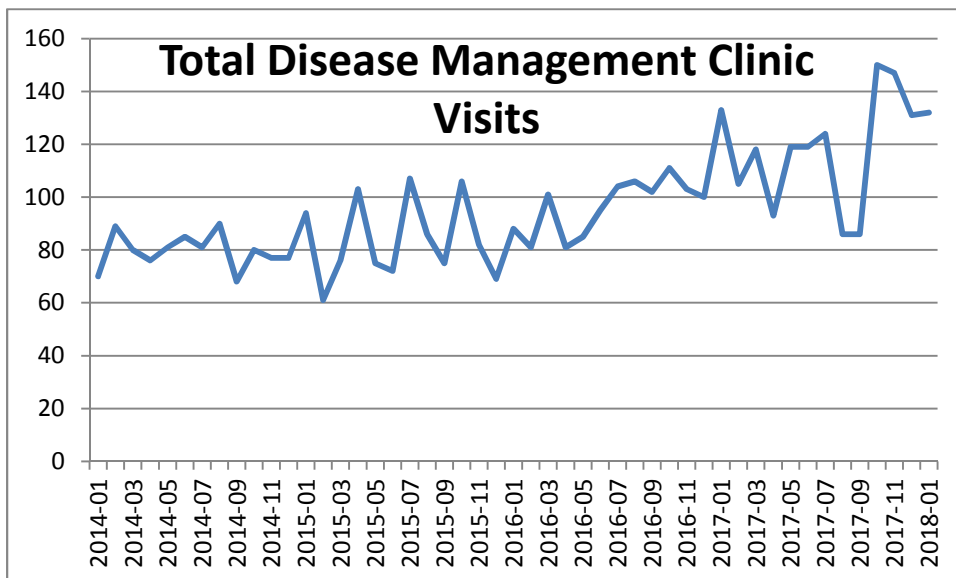
3. Early contact following discharge (which can come in the form of a home visit or outpatient follow-up) to help ensure any home based lifestyle barriers are mitigated. The program described here made contact with the patient within 24 hours by phone and within the first 72 hours (goal) with the in-home visit.
4. A process for patients to contact personnel as problems arise or symptoms worsen (e.g., telephone support). The same call center that made outbound calls to the patient was also capable of taking in-bound calls from the patient based on questions or concerns that the patient had.
5. A mechanism that allows the intervention to be individualized to the patient's specific needs (including early adjustment of medications based on symptoms). All of the education was tailored to the individual patient's needs and learning comprehension.

The care transition program described here includes all five of these elements that are outlined by the AHA/ACC. Initial success in this program demonstrates the potential benefit to scaling this effort to reach a larger percentage of the CHF discharged population. In addition, future endeavors may expand to other chronic care disease states beyond CHF.

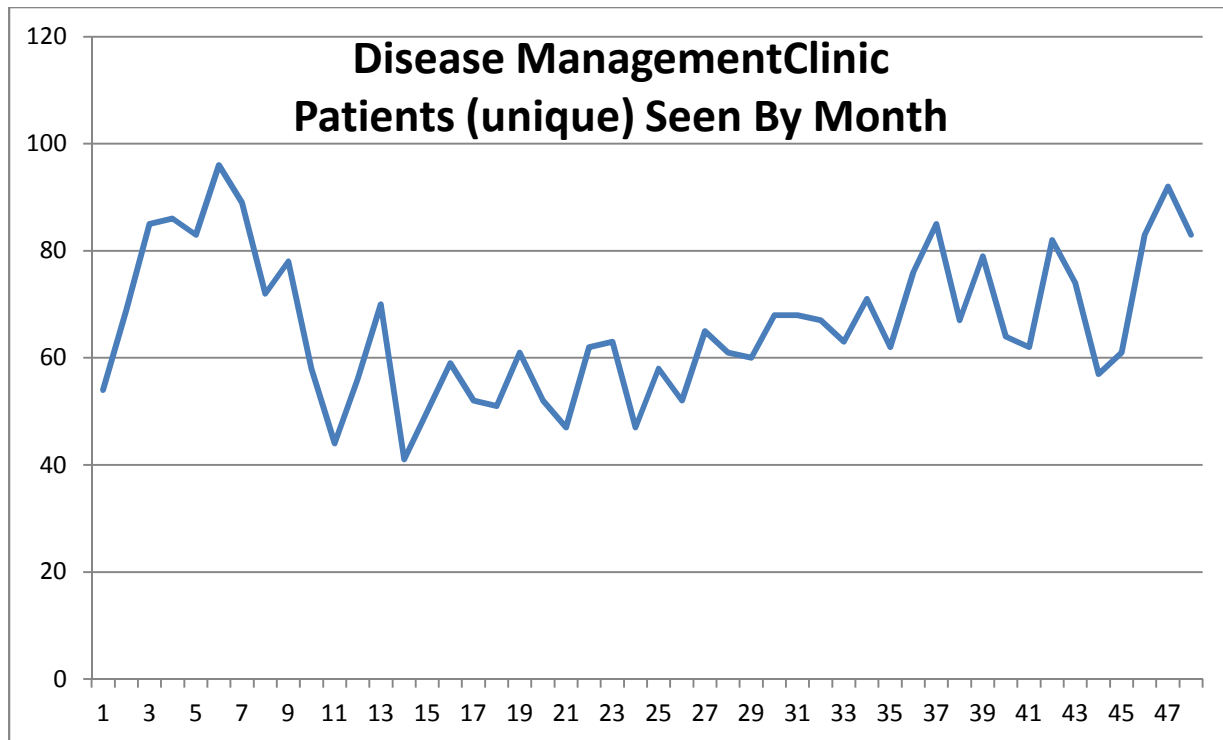
Supporting Tables



Supplemental Table 1: Disease Management Clinic Enrollees by Month



Supplemental Table 2: Disease Management Clinic Visits by Month



Supplemental Table 3: Disease Management Patients by Month

Marital Status	# of Patients	% of Total
Divorced	5	7.5%
Legally Separated	1	1.5%
Married	36	53.7%
Single	11	16.4%
Widow/Widower	14	20.9%
Grand Total	67	100%

Supplemental Table 4: Marital Status of Care Transition Patients

Race	# of Patients	% of Total
African American/Black	16	23.9%
Peoples-Euro/MidEast	51	76.1%
Grand Total	67	100%

Supplemental Table 5: Race of Care Transition Patients

Discharge Disposition	Readmitted Patients	Discharges	Readmission Rate
HOME HEALTH SERVICES	45	298	15.1%
HOME, SELF-CARE	82	688	11.9%
LONG TERM CARE	12	56	21.4%
REHAB FACILITY	7	37	18.9%
SKILLED NURSING FACILITY	29	203	14.3%
Grand Total	175	1282	13.7%

Supplemental Table 6: Study Hospital HF (primary) discharges by discharge disposition (1/1/2014 – 1/1/2017)

Biographical Statement

Daniel Doyle is a candidate for the DrPH degree in Health Leadership and Management within the Johns Hopkins University Bloomberg School of Public Health Department of Health Policy and Management.

Daniel received his Master of Science degree in Healthcare Administration from Trinity University in 2005 and Bachelor of Business Administration from Baylor University in 2002. He currently serves as the Regional Director of Quality for the CHRISTUS Southeast Texas Health System where he has worked since 2013.

References

- ¹ <https://www.cms.gov/medicare/medicare-fee-for-service-payment/acuteinpatientpps/readmissions-reduction-program.html>
- ² <https://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/AcuteInpatientPPS/FY2018-IPPS-Final-Rule-Home-Page-Items/FY2018-IPPS-Final-Rule-Data->
- ³ <https://www.advisory.com/daily-briefing/2017/08/07/hospital-penalties>
- ⁴ Zuckerman RB ; Sheingold SH ; Orav EJ; et al. Readmissions, observation, and the Hospital Readmissions Reduction Program. *N Engl J Med*. 2016; 374: 1543-1551
- ⁵ Nihar R. Desai, Joseph S. Ross, Ji Young Kwon, Jeph Herrin, Kumar Dharmarajan, Susannah M. Bernheim, Harlan M. Krumholz, Leora I. Horwitz. Association Between Hospital Penalty Status Under the Hospital Readmission Reduction Program and Readmission Rates for Target and Nontarget Conditions. *JAMA*. 2016;316(24):2647–2656. doi:10.1001/jama.2016.18533
- ⁶ Kumar Dharmarajan, Angela F. Hsieh, Zhenqiu Lin, Héctor Bueno, Joseph S. Ross, Leora I. Horwitz, José Augusto Barreto-Filho, Nancy Kim, Susannah M. Bernheim, Lisa G. Suter, Elizabeth E. Drye, Harlan M. Krumholz. Diagnoses and Timing of 30-Day Readmissions After Hospitalization for Heart Failure, Acute Myocardial Infarction, or Pneumonia. *JAMA*. 2013;309(4):355–363. doi:10.1001/jama.2012.216476
- ⁷ Dharmarajan, K. Diagnoses and timing of 30-day readmissions after hospitalization for heart failure, acute myocardial infarction, or pneumonia. *JAMA* 2013;309:355-363
- ⁸ Bernheim SM, Grady J, Lin Wang, National patterns of risk-standardized mortality and readmission for acute myocardial infarction and heart failure. Update on publicly reported outcomes measures based on the 2010 release. *Circ Cardiovasc Qual Outcomes* 2010;3:459-67
- ⁹ Naylor MD, Aiken LH, Kurtzman ET, et al. The care span: the importance of transitional care in achieving health reform. *Health Aff (Millwood)* 2011 Apr;30(4):746–54. Epub: 2011/04/08
- ¹⁰ Clancy, Carolyn M. *American Journal of Medical Quality*. 2009; 24: 344. Reengineering Hospital Discharge: A Protocol to Improve Patient Safety, Reduce Costs, and Boost Patient Satisfaction.
- ¹¹ Naylor MD, Brooten DA, Campbell RL, et al. Transitional care of older adults hospitalized with heart failure: a randomized, controlled trial. *J Am Geriatr Soc*. 2004 May;52(5):675-84. Epub: 2004/04/17. PMID: 15086645.
- ¹² Rich MW, Beckham V, Wittenberg C, et al. A multidisciplinary intervention to prevent the readmission of elderly patients with congestive heart failure. *N Engl J Med*. 1995 Nov 2;333(18):1190-5. Epub: 1995/11/02. PMID: 7565975.
- ¹³ Rich MW, Vinson JM, Sperry JC, et al. Prevention of readmission in elderly patients with congestive heart failure: results of a prospective, randomized pilot study. *J Gen Intern Med*. 1993 Nov;8(11):585-90. Epub: 1993/11/01. PMID: 8289096.
- ¹⁴ Sethares KA, Elliott K. The effect of a tailored message intervention on heart failure readmission rates, quality of life, and benefit and barrier beliefs in persons with heart failure. *Heart Lung*. 2004 Jul-Aug;33(4):249-60. Epub: 2004/07/15. PMID: 15252415.
- ¹⁵ Pugh LC, Havens DS, Xie S, et al. Case management for elderly persons with heart failure: the quality of life and cost outcomes. *Medsurg Nurs*. 2001;10(2):71-8.
- ¹⁶ Holland R, Brooksby I, Lenaghan E, et al. Effectiveness of visits from community pharmacists for patients with heart failure: HeartMed randomised controlled trial. *BMJ*. 2007 May 26;334(7603):1098. Epub: 2007/04/25. PMID: 17452390.
- ¹⁷ Medicare program regulations require that the home health initial assessment visit “must be held either within 48 hours of referral, or within 48 hours of the patient’s return home, or on the physician-ordered start of care date.” 42 C.F.R. § 484.55(a)(1).
- ¹⁸ “AHHQI Home Health Model of Care Transitions” <http://ahhqi.org/quality-initiatives/care-transitions>
- ¹⁹ “AHHQI Home Health Model of Care Transitions” <http://ahhqi.org/quality-initiatives/care-transitions>
- ²⁰ As stated in footnote 2 supra, Medicare program regulations require that the home health initial assessment visit “must be held either within 48 hours of referral, or within 48 hours of the patient’s return home, or on the physician-ordered start of care date.” 42 C.F.R. § 484.55(a)(1)

-
- ²¹ Triller DM, Hamilton RA. Effect of pharmaceutical care services on outcomes for home care patients with heart failure. *Am J Health Syst Pharm*. 2007 Nov 1;64(21):2244-9. PMID: 17959576.
- ²² Woodend AK, Sherrard H, Fraser M, et al. Telehome monitoring in patients with cardiac disease who are at high risk of readmission. *Heart Lung*. 2008 Jan-Feb;37(1):36-45. PMID: 18206525.
- ²³ McDonald K, Ledwidge M, Cahill J, et al. Elimination of early rehospitalization in a randomized, controlled trial of multidisciplinary care in a high-risk, elderly heart failure population: the potential contributions of specialist care, clinical stability and optimal angiotensin-converting enzyme inhibitor dose at discharge. *Eur J Heart Fail*. 2001 Mar;3(2):209-15. Epub: 2001/03/14. PMID: 11246059.
- ²⁴ McDonald K, Ledwidge M, Cahill J, et al. Heart failure management: multidisciplinary care has intrinsic benefit above the optimization of medical care. *J Card Fail*. 2002 Jun;8(3):142-8. Epub: 2002/07/26. PMID: 12140806.
- ²⁵ Ledwidge M, Barry M, Cahill J, et al. Is multidisciplinary care of heart failure cost-beneficial when combined with optimal medical care? *Eur J Heart Fail*. 2003(3):381-9. PMID: CN-00456908.
- ²⁶ Kasper EK, Gerstenblith G, Hefter G, et al. A randomized trial of the efficacy of multidisciplinary care in heart failure outpatients at high risk of hospital readmission. *J Am Coll Cardiol*. 2002 Feb 6;39(3):471-80. Epub: 2002/02/02. PMID: 11823086.
- ²⁷ Ducharme A, Doyon O, White M, et al. Impact of care at a multidisciplinary congestive heart failure clinic: a randomized trial. *CMAJ*. 2005 Jul 5;173(1):40-5. Epub: 2005/07/06. PMID: 15997043.
- ²⁸ Liu MH, Wang CH, Huang YY, et al. Edema index-guided disease management improves 6-month outcomes of patients with acute heart failure. *Int Heart J*. 2012;53(1):11-7. Epub: 2012/03/09. PMID: 22398670.
- ²⁹ Ekman I, Andersson B, Ehnfors M, et al. Feasibility of a nurse-monitored, outpatient-care programme for elderly patients with moderate-to-severe, chronic heart failure. *Eur Heart J*. 1998 Aug;19(8):1254-60. Epub: 1998/09/18. PMID: 9740348.
- ³⁰ Stromberg A, Martensson J, Fridlund B, et al. Nurse-led heart failure clinics improve survival and self-care behaviour in patients with heart failure: results from a prospective, randomised trial. *Eur Heart J*. 2003 Jun;24(11):1014-23. Epub: 2003/06/06. PMID: 12788301.
- ³¹ McDonald K, Ledwidge M, Cahill J, et al. Heart failure management: multidisciplinary care has intrinsic benefit above the optimization of medical care. *J Card Fail*. 2002 Jun;8(3):142-8. Epub: 2002/07/26. PMID: 12140806.
- ³² Oddone EZ, Weinberger M, Giobbie-Hurder A, et al. Enhanced access to primary care for patients with congestive heart failure. Veterans Affairs Cooperative Study Group on Primary Care and Hospital Readmission. *Eff Clin Pract*. 1999 Sep-Oct;2(5):201-9. Epub: 2000/01/06. PMID: 10623052.
- ³³ Oddone EZ, Weinberger M, Giobbie-Hurder A, et al. Enhanced access to primary care for patients with congestive heart failure. Veterans Affairs Cooperative Study Group on Primary Care and Hospital Readmission. *Eff Clin Pract*. 1999 Sep-Oct;2(5):201-9. Epub: 2000/01/06. PMID: 10623052.
- ³⁴ Ekman I, Andersson B, Ehnfors M, et al. Feasibility of a nurse-monitored, outpatient-care programme for elderly patients with moderate-to-severe, chronic heart failure. *Eur Heart J*. 1998 Aug;19(8):1254-60. Epub: 1998/09/18. PMID: 9740348.
- ³⁵ McDonald K, Ledwidge M, Cahill J, et al. Heart failure management: multidisciplinary care has intrinsic benefit above the optimization of medical care. *J Card Fail*. 2002 Jun;8(3):142-8. Epub: 2002/07/26. PMID: 12140806.
- ³⁶ Tsuyuki RT, Fradette M, Johnson JA, et al. A multicenter disease management program for hospitalized patients with heart failure. *J Card Fail*. 2004 Dec;10(6):473-80. Epub: 2004/12/16. PMID: 15599837.
- ³⁷ Jerant AF, Azari R, Nesbitt TS. Reducing the cost of frequent hospital admissions for congestive heart failure: a randomized trial of a home telecare intervention. *Med Care*. 2001 Nov;39(11):1234-45. Epub: 2001/10/19. PMID: 11606877.
- ³⁸ Duffy JR, Hoskins LM, Dudley-Brown S. Improving outcomes for older adults with heart failure: a randomized trial using a theory-guided nursing intervention. *J Nurs Care Qual*. 2010 Jan-Mar;25(1):56-64. Epub: 2009/06/11. PMID: 19512945.
- ³⁹ Rainville EC. Impact of pharmacist interventions on hospital readmissions for heart failure. *Am J Health Syst Pharm*. 1999 Jul 1;56(13):1339-42. Epub: 2000/02/22. PMID: 10683133.
- ⁴⁰ Lopez Cabezas C, Falces Salvador C, Cubi Quadrada D, et al. Randomized clinical trial of a postdischarge pharmaceutical care program vs regular follow-up in patients with heart failure. *Farm Hosp*. 2006 Nov-Dec;30(6):328-42. Epub: 2007/02/15. PMID: 17298190.

-
- ⁴¹ Kimmelstiel C, Levine D, Perry K, et al. Randomized, controlled evaluation of short- and long-term benefits of heart failure disease management within a diverse provider network: the SPAN-CHF trial. *Circulation*. 2004 Sep 14;110(11):1450-5. Epub: 2004/08/18. PMID: 15313938.
- ⁴² Barth V. A nurse-managed discharge program for congestive heart failure patients: outcomes and costs. *Home Health Care Manag Pract*. 2001(6):436-43. PMID: CN-00773514.
- ⁴³ Riegel B, Carlson B, Kopp Z, et al. Effect of a standardized nurse case-management telephone intervention on resource use in patients with chronic heart failure. *Arch Intern Med*. 2002 Mar 25;162(6):705-12. Epub: 2002/03/26. PMID: 11911726.
- ⁴⁴ Riegel B, Carlson B, Glaser D, et al. Randomized controlled trial of telephone case management in Hispanics of Mexican origin with heart failure. *J Card Fail*. 2006 Apr;12(3):211-9. Epub: 2006/04/21. PMID: 16624687.
- ⁴⁵ Dunagan WC, Littenberg B, Ewald GA, et al. Randomized trial of a nurse-administered, telephone-based disease management program for patients with heart failure. *J Card Fail*. 2005 Jun;11(5):358-65. Epub: 2005/06/11. PMID: 15948086.
- ⁴⁶ Duffy JR, Hoskins LM, Dudley-Brown S. Improving outcomes for older adults with heart failure: a randomized trial using a theory-guided nursing intervention. *J Nurs Care Qual*. 2010 Jan-Mar;25(1):56-64. Epub: 2009/06/11. PMID: 19512945.
- ⁴⁷ Laramie AS, Levinsky SK, Sargent J, et al. Case management in a heterogeneous congestive heart failure population: a randomized controlled trial. *Arch Intern Med*. 2003 Apr 14;163(7):809-17. Epub: 2003/04/16. PMID: 12695272.
- ⁴⁸ Rainville EC. Impact of pharmacist interventions on hospital readmissions for heart failure. *Am J Health Syst Pharm*. 1999 Jul 1;56(13):1339-42. Epub: 2000/02/22. PMID: 10683133.
- ⁴⁹ <https://www.ahrq.gov/policymakers/case-studies/201507.html>, last accessed December, 2017.
- ⁵⁰ <https://www.ahrq.gov/policymakers/case-studies/201506.html> last accessed December, 2017.
- ⁵¹ <https://www.ahrq.gov/policymakers/case-studies/201522.html> last accessed December, 2017.
- ⁵² <https://www.ahrq.gov/news/newsroom/case-studies/201522.html> last accessed December, 2017.
- ⁵³ <https://www.ahrq.gov/policymakers/case-studies/201522.html> last accessed December, 2017.
- ⁵⁴ Naylor MD, Broton DA, Campbell RL, et al. Transitional care of older adults hospitalized with heart failure: a randomized, controlled trial. *J Am Geriatr Soc*. 2004 May;52(5):675–84. Epub: 2004/04/17
- ⁵⁵ Rainville EC. Impact of pharmacist interventions on hospital readmissions for heart failure. *Am J Health Syst Pharm*. 1999 Jul 1;56(13):1339-42. Epub: 2000/02/22. PMID: 10683133.
- ⁵⁶ Jaarsma T, Halfens R, Huijter Abu-Saad H, et al. Effects of education and support on self-care and resource utilization in patients with heart failure. *Eur Heart J*. 1999 May;20(9):673-82. Epub: 1999/04/20. PMID: 10208788.
- ⁵⁷ Feltner C, Jones CD, Cené CW, et al. Transitional Care Interventions To Prevent Readmissions for People With Heart Failure [Internet]. Rockville (MD): Agency for Healthcare Research and Quality (US); 2014 May. (Comparative Effectiveness Reviews, No. 133.)
- ⁵⁸ Rich MW, Beckham V, Wittenberg C, et al. A multidisciplinary intervention to prevent the readmission of elderly patients with congestive heart failure. *N Engl J Med*. 1995 Nov 2;333(18):1190-5. Epub: 1995/11/02. PMID: 7565975.
- ⁵⁹ Kimmelstiel C, Levine D, Perry K, et al. Randomized, controlled evaluation of short- and long-term benefits of heart failure disease management within a diverse provider network: the SPAN-CHF trial. *Circulation*. 2004 Sep 14;110(11):1450-5. Epub: 2004/08/18. PMID: 15313938.
- ⁶⁰ Riegel B, Carlson B, Glaser D, et al. Randomized controlled trial of telephone case management in Hispanics of Mexican origin with heart failure. *J Card Fail*. 2006 Apr;12(3):211-9. Epub: 2006/04/21. PMID: 16624687.
- ⁶¹ Feltner C, Jones CD, Cené CW, et al. Transitional Care Interventions To Prevent Readmissions for People With Heart Failure [Internet]. Rockville (MD): Agency for Healthcare Research and Quality (US); 2014 May. (Comparative Effectiveness Reviews, No. 133.)
- ⁶² Ekman I, Andersson B, Ehnfors M, et al. Feasibility of a nurse-monitored, outpatient-care programme for elderly patients with moderate-to-severe, chronic heart failure. *Eur Heart J*. 1998 Aug;19(8):1254-60. Epub: 1998/09/18. PMID: 9740348.

-
- ⁶³ Stromberg A, Martensson J, Fridlund B, et al. Nurse-led heart failure clinics improve survival and self-care behaviour in patients with heart failure: results from a prospective, randomised trial. *Eur Heart J*. 2003 Jun;24(11):1014-23. Epub: 2003/06/06. PMID: 12788301.
- ⁶⁴ Feltner C, Jones CD, Cené CW, et al. Transitional Care Interventions To Prevent Readmissions for People With Heart Failure [Internet]. Rockville (MD): Agency for Healthcare Research and Quality (US); 2014 May. (Comparative Effectiveness Reviews, No. 133.)
- ⁶⁵ Agvall B, Alehagen U, Dahlstrom U. The benefits of using a heart failure management programme in Swedish primary healthcare. *Eur J Heart Fail*. 2013 Feb;15(2):228–36. Epub: 2012/10/31
- ⁶⁶ Jessup M, Abraham WT, Casey DE, et al. 2009 focused update: ACCF/AHA Guidelines for the Diagnosis and Management of Heart Failure in Adults: a report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines: developed in collaboration with the International Society for Heart and Lung Transplantation. *Circulation*. 2009 Apr 14;119(14):1977-2016. Epub: 2009/03/28. PMID: 19324967.
- ⁶⁷ <https://www.cms.gov/medicare/medicare-fee-for-service-payment/acuteinpatientpps/readmissions-reduction-program.html>
- ⁶⁸ <https://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/AcuteInpatientPPS/FY2018-IPPS-Final-Rule-Home-Page-Items/FY2018-IPPS-Final-Rule-Data->
- ⁶⁹ Kumar Dharmarajan, Angela F. Hsieh, Zhenqiu Lin, Héctor Bueno, Joseph S. Ross, Leora I. Horwitz, José Augusto Barreto-Filho, Nancy Kim, Susannah M. Bernheim, Lisa G. Suter, Elizabeth E. Drye, Harlan M. Krumholz. Diagnoses and Timing of 30-Day Readmissions After Hospitalization for Heart Failure, Acute Myocardial Infarction, or Pneumonia. *JAMA*. 2013;309(4):355–363. doi:10.1001/jama.2012.216476
- ⁷⁰ Dharmarajan,K, Diagnoses and timing of 30-day readmissions after hospitalization for heart failure, acute myocardial infarction, or pneumonia.*JAMA*201330935563
- ⁷¹ Bernheim SM, Grady J, Lin Wang, National patterns of risk-standardized mortality and readmission for acute myocardial infarction and heart failure. Update on publicly reported outcomes measures based on the 2010 release. *Circ Cardiovasc Qual Outcomes*2010345967
- ⁷² The SOLVD investigators . Effect of enalapril on survival in patients with reduced left ventricular ejection fraction and congestive heart failure. *N Engl J Med* . 1991;325:293–302.
- ⁷³ CONSENSUS trial study group . Effect of enalapril on mortality in severe congestive heart failure. *N Engl J Med* . 1987;316:1429–1435.
- ⁷⁴ Stewart S, MacIntyre K, Hole DJ et al. More ‘malignant’ than cancer? Five-year survival following a first admission for heart failure. *Eur J Heart Fail* 2001;3:315–22.
- ⁷⁵ McMurray J, McDonagh T, Morrison CE et al. Trends in hospitalization for heart failure in Scotland 1980–1990. *Eur Heart J* 1993;14:1158–62.
- ⁷⁶ Reitsma JB, Mosterd A, de Craen AJM et al. Increase in hospital admission rates for heart failure in the Netherlands, 1980–1993. *Heart* 1996;76:388–92.
- ⁷⁷ ACC/AHA Task Force Report. ACC/AHA Guidelines for the Evaluation and Management of Chronic Heart Failure in the Adult: Executive Summary A Report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines. *Circulation* 2001;104:2996–3007
- ⁷⁸ Ni H, Nauman D, Burgess D et al. Factors influencing knowledge of and adherence to self-care among patients with heart failure. *Arch Intern Med* 1999;159:1613–9.
- ⁷⁹ Opasich C, Febo O, Riccardi G. Concomitant factors of decompensation in chronic heart failure. *Am J Cardiol* 1996; 78:354–7
- ⁸⁰ Bennett SJ, Huster GA, Baker SL et al. Characterization of the precipitants of hospitalization for heart failure decompensation. *Am J Crit Care* 1998;7:168–74.
- ⁸¹ Michalsen A, Ko“nig G, Timme W. Preventable causative factors leading to hospital admission with decompensated heart failure. *Heart* 1998;80:437–41.
- ⁸² Naylor MD, Aiken LH, Kurtzman ET, et al. The care span: the importance of transitional care in achieving health reform. *Health Aff (Millwood)* 2011 Apr;30(4):746–54. Epub: 2011/04/08
- ⁸³ Stewart S, Vanderbroek AJ, Pearson S et al. Prolonged beneficial effects of a home-based intervention on unplanned readmission and mortality among patients with congestive heart failure. *Arch Intern Med* 1998;159:257–61.

-
- ⁸⁴ Krumholz HM, Amatruda J, Smith GL et al. Randomized trial of an education and support intervention to prevent readmission of patients with heart failure. *J Coll Cardiol* 2002;39:83–9.
- ⁸⁵ Stewart S, Vanderbroek AJ, Pearson S et al. Prolonged beneficial effects of a home-based intervention on unplanned readmission and mortality among patients with congestive heart failure. *Arch Intern Med* 1998;159:257–61.
- ⁸⁶ Rich MW, Beckham V, Wittenberg C et al. A multidisciplinary intervention to prevent the readmission of elderly patients with congestive heart failure. *N Engl J Med* 1995; 333:1190–5.
- ⁸⁷ Stewart S, Marley JE, Horowitz JD. Effects of a multidisciplinary, home-based intervention on unplanned readmissions and survival among patients with chronic congestive heart failure. *Lancet* 1999;354:1077–83.
- ⁸⁸ Blue L, Strong E, McMurray JJV et al. Randomised controlled trial of specialist nurse intervention in heart failure. *BMJ* 2001;323:715–8.
- ⁸⁹ Rich MW, Baldus D, Beckham V et al. Effect of a multidisciplinary intervention on medication compliance in elderly patients with congestive heart failure. *Am J Med* 1996;101:270–6.
- ⁹⁰ Jaarsma T, Halfens R, Abu-Saad HH et al. Effect of education and support on self-care and resource utilization. *Eur Heart J* 1999;20:673–82.
- ⁹¹ Rich MW, Beckham V, Wittenberg C et al. A multidisciplinary intervention to prevent the readmission of elderly patients with congestive heart failure. *N Engl J Med* 1995; 333:1190–5.
- ⁹² Tung Y-C, Chou S-H, Liu K-L, et al. Worse Prognosis in Heart Failure Patients with 30-Day Readmission . *Acta Cardiologica Sinica*. 2016;32(6):698-707. doi:10.6515/ACS20151113A.
- ⁹³ NCHS Data Brief, No. 108, October 2012, <https://www.cdc.gov/nchs/data/databriefs/db108.pdf>
- ⁹⁴ <https://datawarehouse.hrsa.gov/tools/analyzers/maufind.aspx>, accessed July, 2016.
- ⁹⁵ Internal study hospital claims data. Data from December, 2017.
- ⁹⁶ <https://www.census.gov/quickfacts/fact/table/jeffersoncountytexas/PST045216>, accessed December, 2017.
- ⁹⁷ Kimmelstiel C, Levine D, Perry K, et al. Randomized, controlled evaluation of short- and long-term benefits of heart failure disease management within a diverse provider network: the SPAN-CHF trial. *Circulation*. 2004 Sep 14;110(11):1450-5. Epub: 2004/08/18. PMID: 15313938.
- ⁹⁸ Barth V. A nurse-managed discharge program for congestive heart failure patients: outcomes and costs. *Home Health Care Manag Pract*. 2001(6):436-43. PMID: CN-00773514.
- ⁹⁹ Riegel B, Carlson B, Kopp Z, et al. Effect of a standardized nurse case-management telephone intervention on resource use in patients with chronic heart failure. *Arch Intern Med*. 2002 Mar 25;162(6):705-12. Epub: 2002/03/26. PMID: 11911726.
- ¹⁰⁰ Riegel B, Carlson B, Glaser D, et al. Randomized controlled trial of telephone case management in Hispanics of Mexican origin with heart failure. *J Card Fail*. 2006 Apr;12(3):211-9. Epub: 2006/04/21. PMID: 16624687.
- ¹⁰¹ Dunagan WC, Littenberg B, Ewald GA, et al. Randomized trial of a nurse-administered, telephone-based disease management program for patients with heart failure. *J Card Fail*. 2005 Jun;11(5):358-65. Epub: 2005/06/11. PMID: 15948086.
- ¹⁰² Duffy JR, Hoskins LM, Dudley-Brown S. Improving outcomes for older adults with heart failure: a randomized trial using a theory-guided nursing intervention. *J Nurs Care Qual*. 2010 Jan-Mar;25(1):56-64. Epub: 2009/06/11. PMID: 19512945.
- ¹⁰³ Naylor MD, Brooten DA, Campbell RL, et al. Transitional care of older adults hospitalized with heart failure: a randomized, controlled trial. *J Am Geriatr Soc*. 2004 May;52(5):675-84. Epub: 2004/04/17. PMID: 15086645.
- ¹⁰⁴ Rich MW, Beckham V, Wittenberg C, et al. A multidisciplinary intervention to prevent the readmission of elderly patients with congestive heart failure. *N Engl J Med*. 1995 Nov 2;333(18):1190-5. Epub: 1995/11/02. PMID: 7565975.
- ¹⁰⁵ Rich MW, Vinson JM, Sperry JC, et al. Prevention of readmission in elderly patients with congestive heart failure: results of a prospective, randomized pilot study. *J Gen Intern Med*. 1993 Nov;8(11):585-90. Epub: 1993/11/01. PMID: 8289096.
- ¹⁰⁶ Sethares KA, Elliott K. The effect of a tailored message intervention on heart failure readmission rates, quality of life, and benefit and barrier beliefs in persons with heart failure. *Heart Lung*. 2004 Jul-Aug;33(4):249-60. Epub: 2004/07/15. PMID: 15252415.

-
- ¹⁰⁷ Pugh LC, Havens DS, Xie S, et al. Case management for elderly persons with heart failure: the quality of life and cost outcomes. *Medsurg Nurs*. 2001;10(2):71-8.
- ¹⁰⁸ Holland R, Brooksby I, Lenaghan E, et al. Effectiveness of visits from community pharmacists for patients with heart failure: HeartMed randomised controlled trial. *BMJ*. 2007 May 26;334(7603):1098. Epub: 2007/04/25. PMID: 17452390.
- ¹⁰⁹ Holland R, Rechel B, Stepien K, Harvey I, Brooksby I. Patients' Self-Assessed Functional Status in Heart Failure by New York Heart Association Class: A Prognostic Predictor of Hospitalizations, Quality of Life and Death. *Journal of Cardiac Failure*. 2010;16(2-4):150-156. doi:10.1016/j.cardfail.2009.08.010.
- ¹¹⁰ Agvall B, Alehagen U, Dahlstrom U. The benefits of using a heart failure management programme in Swedish primary healthcare. *Eur J Heart Fail*. 2013 Feb;15(2):228-36. Epub: 2012/10/31
- ¹¹¹ Jessup M, Abraham WT, Casey DE, et al. 2009 focused update: ACCF/AHA Guidelines for the Diagnosis and Management of Heart Failure in Adults: a report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines: developed in collaboration with the International Society for Heart and Lung Transplantation. *Circulation*. 2009 Apr 14;119(14):1977-2016. Epub: 2009/03/28. PMID: 19324967.
- ¹¹² <https://www.cms.gov/medicare/medicare-fee-for-service-payment/acuteinpatientpps/readmissions-reduction-program.html>
- ¹¹³ <https://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/AcuteInpatientPPS/FY2018-IPPS-Final-Rule-Home-Page-Items/FY2018-IPPS-Final-Rule-Data->
- ¹¹⁴ Kumar Dharmarajan, Angela F. Hsieh, Zhenqiu Lin, Héctor Bueno, Joseph S. Ross, Leora I. Horwitz, José Augusto Barreto-Filho, Nancy Kim, Susannah M. Bernheim, Lisa G. Suter, Elizabeth E. Drye, Harlan M. Krumholz. Diagnoses and Timing of 30-Day Readmissions After Hospitalization for Heart Failure, Acute Myocardial Infarction, or Pneumonia. *JAMA*. 2013;309(4):355-363. doi:10.1001/jama.2012.216476
- ¹¹⁵ Dharmarajan, K. Diagnoses and timing of 30-day readmissions after hospitalization for heart failure, acute myocardial infarction, or pneumonia. *JAMA* 2013;309:355-363.
- ¹¹⁶ Bernheim SM, Grady J, Lin Wang, National patterns of risk-standardized mortality and readmission for acute myocardial infarction and heart failure. Update on publicly reported outcomes measures based on the 2010 release. *Circ Cardiovasc Qual Outcomes* 2010;3:459-467.
- ¹¹⁷ Naylor MD, Aiken LH, Kurtzman ET, et al. The care span: the importance of transitional care in achieving health reform. *Health Aff (Millwood)* 2011 Apr;30(4):746-54. Epub: 2011/04/08
- ¹¹⁸ Feltner C, Jones CD, Cené CW, et al. Transitional Care Interventions To Prevent Readmissions for People With Heart Failure [Internet]. Rockville (MD): Agency for Healthcare Research and Quality (US); 2014 May. (Comparative Effectiveness Reviews, No. 133.)
- ¹¹⁹ Rich MW, Beckham V, Wittenberg C, et al. A multidisciplinary intervention to prevent the readmission of elderly patients with congestive heart failure. *N Engl J Med*. 1995 Nov 2;333(18):1190-5. Epub: 1995/11/02. PMID: 7565975.
- ¹²⁰ Kimmelstiel C, Levine D, Perry K, et al. Randomized, controlled evaluation of short- and long-term benefits of heart failure disease management within a diverse provider network: the SPAN-CHF trial. *Circulation*. 2004 Sep 14;110(11):1450-5. Epub: 2004/08/18. PMID: 15313938.
- ¹²¹ Feltner C, Jones CD, Cené CW, et al. Transitional Care Interventions To Prevent Readmissions for People With Heart Failure [Internet]. Rockville (MD): Agency for Healthcare Research and Quality (US); 2014 May. (Comparative Effectiveness Reviews, No. 133.)
- ¹²² Kimmelstiel C, Levine D, Perry K, et al. Randomized, controlled evaluation of short- and long-term benefits of heart failure disease management within a diverse provider network: the SPAN-CHF trial. *Circulation*. 2004 Sep 14;110(11):1450-5. Epub: 2004/08/18. PMID: 15313938.
- ¹²³ Barth V. A nurse-managed discharge program for congestive heart failure patients: outcomes and costs. *Home Health Care Manag Pract*. 2001(6):436-43. PMID: CN-00773514.
- ¹²⁴ Riegel B, Carlson B, Kopp Z, et al. Effect of a standardized nurse case-management telephone intervention on resource use in patients with chronic heart failure. *Arch Intern Med*. 2002 Mar 25;162(6):705-12. Epub: 2002/03/26. PMID: 11911726.
- ¹²⁵ Riegel B, Carlson B, Glaser D, et al. Randomized controlled trial of telephone case management in Hispanics of Mexican origin with heart failure. *J Card Fail*. 2006 Apr;12(3):211-9. Epub: 2006/04/21. PMID: 16624687.

-
- ¹²⁶ Dunagan WC, Littenberg B, Ewald GA, et al. Randomized trial of a nurse-administered, telephone-based disease management program for patients with heart failure. *J Card Fail.* 2005 Jun;11(5):358-65. Epub: 2005/06/11. PMID: 15948086.
- ¹²⁷ Duffy JR, Hoskins LM, Dudley-Brown S. Improving outcomes for older adults with heart failure: a randomized trial using a theory-guided nursing intervention. *J Nurs Care Qual.* 2010 Jan-Mar;25(1):56-64. Epub: 2009/06/11. PMID: 19512945.
- ¹²⁸ Naylor MD, Brooten DA, Campbell RL, et al. Transitional care of older adults hospitalized with heart failure: a randomized, controlled trial. *J Am Geriatr Soc.* 2004 May;52(5):675-84. Epub: 2004/04/17. PMID: 15086645.
- ¹²⁹ Rich MW, Beckham V, Wittenberg C, et al. A multidisciplinary intervention to prevent the readmission of elderly patients with congestive heart failure. *N Engl J Med.* 1995 Nov 2;333(18):1190-5. Epub: 1995/11/02. PMID: 7565975.
- ¹³⁰ Rich MW, Vinson JM, Sperry JC, et al. Prevention of readmission in elderly patients with congestive heart failure: results of a prospective, randomized pilot study. *J Gen Intern Med.* 1993 Nov;8(11):585-90. Epub: 1993/11/01. PMID: 8289096.
- ¹³¹ Sethares KA, Elliott K. The effect of a tailored message intervention on heart failure readmission rates, quality of life, and benefit and barrier beliefs in persons with heart failure. *Heart Lung.* 2004 Jul-Aug;33(4):249-60. Epub: 2004/07/15. PMID: 15252415.
- ¹³² Pugh LC, Havens DS, Xie S, et al. Case management for elderly persons with heart failure: the quality of life and cost outcomes. *Medsurg Nurs.* 2001;10(2):71-8.
- ¹³³ Holland R, Brooksby I, Lenaghan E, et al. Effectiveness of visits from community pharmacists for patients with heart failure: HeartMed randomised controlled trial. *BMJ.* 2007 May 26;334(7603):1098. Epub: 2007/04/25. PMID: 17452390.
- ¹³⁴ Agvall B, Alehagen U, Dahlstrom U. The benefits of using a heart failure management programme in Swedish primary healthcare. *Eur J Heart Fail.* 2013 Feb;15(2):228-36. Epub: 2012/10/31
- ¹³⁵ Jessup M, Abraham WT, Casey DE, et al. 2009 focused update: ACCF/AHA Guidelines for the Diagnosis and Management of Heart Failure in Adults: a report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines: developed in collaboration with the International Society for Heart and Lung Transplantation. *Circulation.* 2009 Apr 14;119(14):1977-2016. Epub: 2009/03/28. PMID: 19324967.

In-home visit encounter detail:

DISCHARGE DATE	CTC VISIT	CTC CALL	HOME VISIT	CMD CALL 1	CMD CALL 2	CMD CALL 3	FOLLOW UP APPT/WEN T	DX/READMISSION (Y/N)
7/26/2017	7/26/2017	7/27/17	ADMITTED TO HH	-----		-----	7/31/17, YES	CHF, N
8/2/2017	8/1/2017	8/3/2017	8/4/2017	8/10/2017	8/18/2017	8/25/2017	8/23/17, YES	CHF, N
8/4/2017	8/4/2017	8/5/2017	8/7/2017	8/10/2017	8/18/2017	ADMITTED TO HH	8/10/17, YES	COPD, N
8/2/2017	8/2/2017	8/3/2017	8/8/2017	8/10/2017	8/17/2017	8/24/2017	8/9/17, YES	CHF, N
8/9/2017	8/9/2017	8/10/2017	8/11/2017	8/18/2017	8/25/2017	9/11/2017	9/11/17, YES	CHF, N
8/12/2017	8/11/2017	8/13/2017	8/15/2017	8/21/2017	8/28/2017	9/5/2017	8/16/17, YES	CHF, N
8/15/2017	8/14/2017	8/17/2017	8/18/2017	8/22/2017	8/30/2017	9/5/2017	8/18/17, YES	CHF, N
8/17/2017	8/16/2017	8/18/2017	8/20/2017	8/25/2017	9/1/2017	9/8/2017	8/24/17, YES	CHF, N
8/20/2017	8/17/2017	8/18/2017	8/22/2017	8/25/2017	9/1/2017	9/8/2017	8/24/17, YES	CHF, N
8/21/2017	8/21/2017	8/22/2017	8/24/2017	8/31/2017	9/5/2017	9/12/2017	8/23/17, YES	CHF, N
8/15/2017	8/14/2017	8/16/2017	8/18/2017	8/30 & 8/31 NA	9/1/17 NA	9/5/2017	8/22/17, YES	CHF, N
8/17/2017	8/15/2017	8/18/2017	8/22/2017	8/25/2017	9/1/2017	ADMITTED TO HH	8/23/17, YES	CHF, N
8/24/2017	8/21/2017	8/25/2017	PT EVACUATED	8/31/2017	9/7/2017	9/12/17, 9/14/17	8/28/17, YES	CHF, N
9/7/2017	9/5/2017	9/8/2017	9/10/2017	9/14 & 9/15 NA	9/16/2017	9/21 & 9/22 & 9/28 NA	9/11/17, YES	CHF, N

9/7/2017	9/6/2017	9/8/2017	9/15/2017	9/16/2017	9/21/2017	9/28/2017	9/14/17, YES	CHF, N
9/11/2017	9/11/2017	9/12/2017	9/14/2017	9/18/2017	9/25/2017	10/2/2017	9/18/17, YES	CHF, N
9/15/2017	9/15/2017	9/18/2017	9/19/2017	9/22/2017	9/29/2017	10/6/2017	9/27/17, YES	CHF, N
9/21/2017	9/18/2017	9/22/2017	9/24/2017	9/29/2017	10/3/2017	10/10/2017	9/25/17, YES	CHF, N
9/21/2017	9/20/2017	9/22/2017	9/26/2017	10/2/2017	10/9/2017	10/16/2017	9/25/17, YES	CHF, N
9/23/2017	9/22/2019	9/25/2017	9/30/2017	ADMITTED TO HH			10/2/17, YES	CHF, N
9/23/2017	9/21/2017	9/25/2017	ADMITTED TO HH				9/26/17, YES	CHF/COPD, N
9/22/2017	9/18/2017	9/23/17 NA	UNABLE TO REACH X 3 ATTEMPTS	10/10/2017	10/16/17 NA	10/23/2017	9/24/17, YES	COPD, N
9/26/2017	9/20/2017	9/27/2017	9/29/2017	10/2/2017	10/11/201 7	N/A	10/9/17, YES	CHF, N
9/26/2017	9/26/2017	9/27/2017	9/28/2017	10/4/2017	10/11/201 7	10/18/2017	9/29/17, YES	CHF, N
10/2/2017	10/2/2017	10/3/2017	10/6/2017	10/10/2017	10/17/201 7	10/24/2017	10/9/17, YES	CHF/COPD, N
10/2/2017	10/2/2017	10/3/2017	10/6/2017	10/12/2017	10/17/201 7	10/24/2017	10/9/17, YES	CHF, N
10/2/2017	10/2/2017	10/3/2017	10/5/17 NA	10/12/2017	10/13/201 7	ADMITTED TO HH	10/18/17, YES	CHF, N
10/5/2017	10/2/2017	10/6/2017	10/13/2017	10/10/2017	10/17/201 7	10/24/2017	10/10/17, YES	COPD, N
10/10/201 7	10/10/201 7	10/11/201 7	10/13/2017	10/20/2017	10/25/201 7	10/30/2017	10/17/17, YES	CHF, N
10/17/201 7	10/16/201 7	10/18/201 7	10/23/2017	11/3/2017	11/7/2017	11/14/17 N/A	10/26/17, YES	CHF, N
10/18/201	10/17/201	10/18/201	10/24/2017	10/30/2017	11/8/2017	11/14/2017	11/1/17,	CHF, N

7	7	7					YES	
10/26/2017	10/19/2017	10/30/2017	11/1/2017	11/3/2017	11/8/2017	11/14/17 N/A	11/8/2017, YES	CHF, N
10/27/2017	10/25/2017	10/30/2017	DECLINED FOR 11/2/17	PT REFUSED	PT REFUSED	PT REFUSED	11/3/17, YES	CHF, N
10/28/2017	10/25/2017	10/31/2017	REFUSED 11/1/17	PT REFUSED	PT REFUSED	PT REFUSED	11/1/17, YES	CHF, N
10/31/2017	10/30/2017	11/1/2017	11/3/2017	11/7/2017	11/14/17 N/A	11/20/17 N/A	11/1/17, YES	COPD, N
11/2/2017	11/1/2017	11/3/2017	PT REFUSED 11/8/17	PT REFUSED	PT REFUSED	PT REFUSED	11/7/17, YES	COPD, N
11/2/2017	10/25/2017	11/3/2017 NA	11/6/17 NA	11/14/17 NA	11/20/17 NA	11/28/2017 NA	11/14/17, YES	CHF, N
11/4/2017	11/2/2017	11/6/2017	11/8/17 REFUSED	PT REFUSED	PT REFUSED	PT REFUSED	11/6/17, YES	CHF, N
11/2/2017	11/1/2017	11/3/2017 N/A	11/5/17 DECLINED	11/10/17 NA	11/17/17 NA	12/5/2017 NA	11/5/17, YES	COPD, N
11/2/2017	10/31/2017	11/3/2017	11/6/2017	11/10/17 NA	11/16/2017	12/5/2017	11/9/17, YES	CHF, N
11/5/2017	11/3/2017	11/6/2017	11/8/2017	11/16/17 NA	11/24/2017	N/A	11/14/17, YES	COPD, N
11/6/2017	11/3/2017	11/7/2017	11/9/2017	11/16/2017	11/24/2017		11/8/17, YES	CHF, N
11/2/2017	10/31/2017	11/2/2017	11/9/17 NA	11/7/17 NA	11/14/17 NA		11/8/17, YES	COPD, N
11/7/2017	11/6/2017	11/8/2017	Declined	Declined	NA	NA	11/14/17, YES	CHF, N
11/8/2017	11/2/2017	11/9/2017	11/16/2017	11/17/2017	DECLINED	12/8/2017	11/16/17, YES	CHF, N
11/10/2017	11/6/2017	11/13/2017	11/15 & 11/16/17 NA	11/24/2017	12/5/17 NA	DECLINED	11/17/17, YES	COPD, N
11/15/2017	11/15/2017	11/16/2017	DECLINED 11/20/17/HOSPICE	NA	NA	NA	11/20/17, YES	CHF, N

11/8/2017	11/7/2017	11/9/2017	11/12/2017	11/17/2017	11/21/2017 7	DECLINED	11/15/17, YES	CHF, N
11/8/2017	11/8/2017	11/9/2017	11/14/2017	11/17/2017	11/24/17 NA	12/15/2017	11/10/17, YES	CHF, N
11/17/2017 7	11/16/2017 7	11/20/2017 7	11/27/2017	12/1/2017	HOSPICE	HOSPICE	11/20/17, YES	CHF, N
11/16/2017 7	11/16/2017 7	11/17/2017 7	12/1/2017	12/7/2017	12/14/2017 7	12/21/2017	11/21/17, YES	CHF, N
11/15/2017 7	11/15/2017 7	11/16/2017 7	11/30/2017	12/8/2017	12/14/2017 7	12/21/2017	11/17/17, YES	CHF, N
11/15/2017 7	11/13/2017 7	11/16/2017 7 NA	11/20/2017	11/24/17 NA	11/27/17 NA	11/29/17 NA	11/21/17, YES	COPD, N
11/17/2017 7	11/17/2017 7	11/20/2017 7	NA	NA	NA	NA	11/28/17, YES	CHF, N
11/20/2017 7	11/20/2017 7	11/21/2017 7	NA	NA	NA	NA	11/28/17, YES	CHF, N
11/20/2017 7	11/17/2017 7	11/21/2017 7	11/30/17 NA	DECLINED	DECLINED	DECLINED	11/27/17, YES	CHF, N
11/21/2017 7	11/20/2017 7	11/22/2017 7	11/30/2017	12/5/2017	12/8/2017	12/14/2017	11/28/17, YES	COPD, N
11/23/2017 7	11/21/2017 7	11/27/2017 7	12/12/2017	12/15/2017	12/20/2017 7	12/27/2017	11/29/17, YES	CHF, N
11/24/2017 7	11/21/2017 7	11/27/2017 7	12/7/17 NA	DECLINED	DECLINED	DECLINED	11/29/17, YES	CHF, N
11/28/2017 7	11/27/2017 7	11/29/2017 7	12/10/2017	12/15/2017	12/18/2017 7	12/26/2017	12/1/17, YES	CHF, N
11/28/2017 7	11/27/2017 7	11/29/2017 7	12/10/2017	12/15/2017	12/18/2017 7	12/26/2017	12/5/17, YES	CHF/COPD, N
12/1/2017	11/30/2017 7	12/4/2017	12/14/2017	12/15/2017	12/19/2017 7	1/2/2018	12/7/17, YES	CHF, N
12/4/2017	12/1/2017	12/5/2017	12/14/2017	12/15/2017	12/19/2017 7	1/2/2018	12/13/2017, YES	CHF, N
12/6/2017	12/4/2017	12/7/2017	12/13/2017	12/18/2017	12/25/2017 7	1/8/2018	12/14/2017	CHF, N

12/8/2017	12/8/2017	12/11/2017 7	12/15/2017	12/16/2017	12/18/2017 7	12/25/2017	12/12/2017 , YES	CHF, N
12/8/2017	12/5/2017	12/11/2017 7	12/14/2017	12/19/2017	12/26/2017 7	1/9/2018	12/12/17, YES	
12/11/2017 7	12/11/2017 7	12/12/2017 7	12/18/2017	12/25/2017	1/1/2018	1/15/2018	12/13/17, YES	

Clinic Variables:

Entity - Code
Patient Encounter
Location - Description
Insurance Plan 1 - Insurance Plan Group
DRG
Secondary Diagnosis
Admit Date
Discharge Date
Service Date - Date
Patient Type
Patient Type - Rollup
Attend Physician - Physician Name
Zip Code