2019

Implementing a discharge navigator reducing 30-Day readmissions for heart failure and sepsis populations

Karen Weeks

Implementing a Discharge Navigator Reducing 30-Day Readmissions for Heart Failure and Sepsis Populations

Karen Weeks

A Clinical Research Project submitted to the Graduate Faculty of

JAMES MADISON UNIVERSITY

In

Partial Fulfillment of the Requirements

for the degree of

Doctor of Nursing Practice

School of Nursing

December 2019

FACULTY COMMITTEE:

Committee Chair: Jeannie Garber, DNP, RN, NE-BC

Committee Members/ Readers:

Debbie Kile, DNP, RN, NE-BC

Dedication

I dedicate this project to all the nurses that are committed to the art of caring and the science of nursing that advocate for their patients every day.

I dedicate this project to my husband, children, parents, colleagues, friends and family for all your guidance, patience and support throughout this process.

Acknowledgements

I would like to express my gratitude to my project chair, Dr. Jeannie Garber, for the continued guidance, support, knowledge and most of all motivation of this project. Dr. Garber's expertise helped me develop, implement, and evaluate the impact of this project on these health populations.

To my DNP preceptor, Dr. Debbie Kile, my deepest gratitude and appreciation for all your support, guidance, perseverance, grit, comradery, motivation, collaboration and teamwork made this project possible. You will be forever in my heart for your hard work, kindness, and patience that led me to where I am today.

I would like to thank Dr. Linda Hulton and Dr. Christine Argenbright for all their knowledge, mentorship, and advise throughout this process. The Integrated Care Management team and the project facility for all of your support.

And finally, to my husband, children, and parents who were in the trenches with me throughout this process offering help, support, time alone, and most of all patience.

Table of Contents

Table of Contents

List of Tables

List of Figures

Abstract

A national focus for healthcare reform is preventing hospital readmissions. Thirty-day unplanned hospital readmissions impact patient outcomes and are costly to the healthcare system. This project explored the impact between the discharge navigator and 30-day unplanned readmissions for heart failure and sepsis populations in a 238-bed community hospital located in central Virginia. The primary aim of this discharge navigator project was to reduce 30-day readmissions for the heart failure and sepsis populations to meet the goals of the top quartile for like hospitals and the evaluation of cost avoidance for these readmissions. Heart failure and sepsis populations are high risks for readmissions nationwide because they account for the largest frequency of unplanned readmissions within 30 days. Identification is an essential piece of reducing 30-day readmissions. The discharge navigator identified high-risk readmission patients that meet the inclusion criteria, developed a comprehensive discharge plan, collaborated with pharmacy services, and aided in the transition of care from acute care to home. There was a reduction in 30-day readmissions while the project was being implemented and the goal of top quartile for like hospital was met at the end point of the project. Potential cost avoidance sums can support the discharge navigator role. The discharge navigator project added to the body of knowledge for comprehensive discharge planning, coordination and education that is needed for these types of patient populations that have a great deal of medical complexity.

Keywords: nursing, discharge navigator, readmissions, sepsis, heart failure

Introduction

A national focus for healthcare reform is preventing hospital readmissions. Hospital readmissions impact patient outcomes and are costly to the healthcare system. The 2018 30-day readmission rate for Medicare enrollees 65 years and older at a national level is 14.9% (United Health Foundation, 2018). Nearly 20% of Medicare beneficiaries are readmitted within 30 days of discharge; 34% are readmitted within 90 days of discharge (Markley et.al., 2013; Polster, 2015). One in five Medicare patients in the fee for service program had a 30-day unplanned readmission. According to the United Health Foundation (2018), the average cost of 30-day readmission for patients 65 years and older was $13,800. The cost for readmissions is staggering and exceeds $20 billion in spending for Medicare alone (Goodwin, Rice, Simpson & Ford, 2015; Kirpalani, Theobald, Anctil & Vasilevskis., 2014). The 2018 30-day readmission rate for Medicare enrollees 65 years and older at a national level is 14.9% (United Health Foundation, 2018).

Readmission rates vary by region and healthcare system. The 2018 30-day readmission rate for Virginia is 14.8% (United Health Foundation, 2018). The community hospital's readmission rate in which this project was implemented was 14.5% by the healthcare system’s data analysis tool. Avoidable reasons for rehospitalization include confusion about medication prescriptions, miscommunication from acute care to primary care providers, inadequate instruction to patients and families on how to provide proper care. These efforts to improve transition of care include patient coaching, telehealth services, and follow up after discharge (United Health Foundation, 2018).

Background

The Hospital Readmission Reduction Program (HRRP), which was established by the Affordable Care Act (ACA), charges Medicare to penalize hospitals with a reduced payment that have an excessive readmission rate. The Center for Medicaid and Medicare Services (CMS) have determined that many of these readmissions are preventable and instituted penalties to healthcare organizations that have high readmission rates (Kirpalani et. al., 2014). The hospitals have penalized a percentage of their total Center for Medicare and Medicaid Services (CMS) reimbursement starting at one percent in year one of the programs up to three percent by year three (Kirpalani et. al., 2014; Goodwin et. al., 2015).

Currently, CMS is tracking four medical conditions for unplanned readmissions. These four medical conditions include pneumonia, myocardial infarction (MI), heart failure (HF), and chronic obstructive pulmonary disease (COPD) (Goodwin et. al., 2015; Mayr et. al., 2017). These conditions increase the risk of hospital readmissions. However, other factors also increase the risk of readmissions that include age, functional status, cognitive impairment, depression, polypharmacy, lack of social and home support (Watkins, Hall & Kring, 2012).

HF and sepsis diagnoses are high-risk patients for readmissions because they account for the largest percentage of unplanned readmissions within 30 days nationwide. For sepsis and HF readmissions (observational study, $n = 1$ and retrospective studies, $n = 2$) these studies reveal the frequency of sepsis and HF as compared to the CMS four diagnosis (Chang, Tseng & Shapiro, 2015; Mayr et. al., 2017; Shah et. al., 2018;). The studies' large sample sizes are from databases that include the National Readmission

Databases (NRD), the Healthcare Cost and Utilization Project (HCUP), and the HCUP State Inpatient Database (SID) from Agency of Healthcare Research Quality (AHRQ). Of these three studies, two confirmed sepsis was the leading diagnosis for readmissions compared to the four medical diagnosis CMS tracks (*n*=2 retrospective). One study identified HF as the leading cardiac diagnosis and infections as the non-cardiac diagnosis for readmissions (*n*=1 observational) (Chang et. al., 2015; Mayr et. al., 2017; Shah et. al., 2018). Identification of these high-risk readmission patients is essential for decreasing 30-day readmissions.

A valid and reliable tool to predict and identify patients at high risk for readmission is the HOSPITAL score. The validity of this HOSPITAL score has been proven with a *C* statistic of 0.72 (95% *CI*, 0.72-0.72) and *C* statistic of 0.75 (95% CI [0.67-0.83]) (Donze et. al., 2016; Robinson & Hudali, 2017). The HOSPITAL score uses criteria for prediction. This criterion comes from Donze et al. (2016) and Robinson & Hudali (2017) studies of validating the HOSPITAL score to predict unplanned 30-day hospital readmissions. Once these high-risk patients are identified, interventions can be established to improve the transition of care (See Table 1).

Pilot Study

A prospective cohort pilot study design utilizing the discharge navigator was completed from July to September of 2018. Approval was received from the Institutional Review Board (IRB). The participants selected for this pilot project were patients admitted to the project's hospital with the following inclusion criteria:

- 65 years of age and older
- English as a primary language

- HOSPITAL score of greater than 5
- being discharged to home without home health agency
- more than one comorbidity
- and/or consultation from integrated case management, patient care coordinators, social services

The discharge navigator, which was the lead investigator, identified the at-risk patient(s) or received a consult for discharge services. The other investigator obtained consent from the patient for the discharge navigator services and gave the discharge ticket to be filled out. The discharge navigator made the initial visit with the patient within 24 hours to explain the role and establish a rapport. The discharge navigator rounded on the patient on a daily basis until discharge. The discharge navigator assessed learning style, support for the patient once discharged and any needs not addressed previously. The discharge navigator focused on medication review and education, resources for the patient until seen by the primary care provider (PCP). Participants were given resources and numbers for any issues that arose before their follow up appointment. If the participant did not have a PCP, the patient was instructed to call the Transition of Care Clinic (TOCC) for a phone consultation. All the discharge information was provided in the transition of care (TOC) binder and the patient was instructed on how to use the binder. Prior to discharge, the discharge navigator reviewed key education points, ensured proper medication supply and administration, reinforced follow up appointments and addressed any last-minute concerns.

Results. Twenty-five patients met inclusion criteria or were referrals (n = 25). Fifteen consented to participate in the pilot study (n=15) with a 60% participation rate.

Participant age ranged from 58 to 83 years old with an average age of 70. There were ten males and five females. The index diagnosis consisted of HF, cardiac related and non-cardiac. The readmission diagnosis consisted of HF, cardiac related, non-cardiac and referral (See Table 2). The number of days to readmission ranged from 10 to 62 days with an average of 24 days (*n* =8). Two participants had readmissions of greater than 30 days (*n* = 2). Five participants did not have any readmissions (*n* = 5) but were identified as high-risk readmission patients.

Out of the 15 participants (*n* = 15), six (*n* = 6) were readmitted to an acute care facility (40%). One participant (*n* = 1) was readmitted the next day and transferred to a tertiary system for a diagnosis unrelated to discharge diagnosis. One participant (*n* = 1) had a length of stay greater than 30 days and readmitted with a different diagnosis. Three participants (*n* = 3) returned with the same diagnosis on discharge. Out of the three participants that returned, one participant followed the steps of calling the provider twice before coming to the acute care facility. One participant returned with a new cause of diagnosis and decided to be placed in Hospice care. One participant went to another acute care facility (6%). Nine participants (*n* = 9) were not readmitted within 30 days of discharge.

Of the participants readmitted within 30 days of discharge and after consultation with the discharge navigator, two participants (*n* = 2) were classified as being readmitted for the same issue of heart failure. One participant (*n* = 1) had a length of stay greater than 30 days and readmitted with a different diagnosis. Some participants were readmitted; however, did not meet CMS criteria for readmissions. However, for this pilot study, these participants were included in the results. The pilot study was successful in

avoiding eleven readmissions within the 30-day period. Nine participants did not return to the acute care facility and two did not meet CMS' readmission criteria (See Table 3).

Cost Avoidance. The cost avoidance for this pilot study was calculated by the project readmission rates assuming 100% of the patients would be readmitted. The national average conservative cost for heart failure readmissions is $9,051 per readmission (Mayr et. al., 2017; Casey, 2017). Some studies noted national HF readmission costs as high as $14,631 per readmission (Kilgove, Patel, Kielhorn, Maya & Sharma, 2017). For this pilot study, the conservative number of $9,051 was used for cost avoidance. The cost avoidance for the nine participants that were not readmitted within 30 days after the discharge navigator consultation is $81,459. Adding the two participants that did not count in the CMS' criteria for readmission statistics, leading to a total of 11 participants, the cost avoidance is $99,561. The penalties from CMS for excessive readmissions were not calculated in these cost avoidance numbers (See Table 4).

Discharge Navigator – Literature Support. The discharge process is an area that is noted in the literature as fragmented and flawed is the transition of care from acute care to home (Polster, 2015). The literature also supports that these complex patients need more intensive, one on one education with additional assessments to reduce the gaps in the transition of care. Two systematic reviews (n = 2) support the need of discharge navigators to create comprehensive discharge plans to close the gaps in this process, as well as, reduce 30-day unplanned readmissions (Maderson, McMurray, Piraino, & Stolee, 201; Schell, 2014). An intervention to investigate is the relationship of a discharge nurse navigator on 30-day unplanned readmissions with a focus for HF and sepsis populations.

This project focused on the discharge navigator to address the reduction of 30-day unplanned readmission rates for the HF and sepsis populations to meet the goals of the top quartile for like hospitals and the cost avoidance for these readmissions while enhancing the TOC and reducing gaps in the discharge process.

Review of Literature/Literature Search Strategy

Methods

An electronic search was performed that limited to English language articles with available abstracts. This search was conducted on Medline, CINAHL and Google Scholar. The keywords used in the search strategy included "nursing," "discharge navigator," "readmissions." Because of the limited articles that met the inclusion criteria, selected articles reference lists were also reviewed for potentially relevant studies.

The initial search identified 12,100 potential articles. The author reviewed the title, abstract and article. 12,087 articles were excluded for the following reasons: (a) did not include readmissions; (b) was not an original study; (c) did not including nursing; (d) did not include discharges; or (e) did not specify transition of care. Thirteen articles (n = 13) met the inclusion criteria of (a) discharge; (b) transition of care; (c) navigator, coaches, educators; (d) English language; (e) all levels of quality rankings on *Evidence-Based Nursing Care Guidelines* (Ackley, Swan, Ladwig & Tucker, 2008). Six additional studies were identified from the reference lists found in the search criteria.

Outcomes

The main outcome for the literature review was to determine the best practices for reducing readmission with the use of a nursing discharge navigator. Secondary outcomes

included themes of how to improve the transition of care from acute care to home and closing the gaps in the discharge process for high-risk readmission patients.

Results

Readmissions and nursing discharge navigator. Of the articles meeting the inclusion criteria, six articles (n = 6) studied the relationship between discharge navigators and readmission rates (Randomized control studies (RCS), n = 2; retrospective study, n = 1; descriptive study, quasi experiment, n =1; prospective, nonrandomized cohort study, n = 1 and descriptive, nonexperimental study n =1).

The discharge navigator, coach and or educator has a relationship on the reduction of 30-day unplanned readmissions. Six articles studied this relationship on readmissions (n = 6). The retrospective study article (n = 1) results include a 29% reduction in 30-day readmissions with the use of a transition of care program that incorporates a navigator with a cost avoidance of $1.5 million over 2.5 years (Watkins, 2012). The descriptive, quasi-experiment study (n = 1) studied the use of a nurse discharge navigator, along with a pharmacist for medication reconciliation, that reduced readmissions by 17.6% (DiPalo, Patel, Assafin, & Pina, 2017). Additionally, the prospective, nonrandomized cohort study (n = 1) and RCS (n = 1) concluded the intervention of a pharmacist in the discharge process has decreased 30-day unplanned readmissions (Al-Rashed, Wright, Roebuck, Sunter, & Chrystyn, 2002; Pal, Babbott, & Wilkinson, 2013). Whereas, the descriptive, nonexperimental study (n = 1) a social worker navigator-based model geared towards elderly defined greater than 65 years old, decreased readmissions by 61% (Watkins, Hall & Kring, 2012). Lastly, one of the RCS articles (n = 1) noted no statistical difference with 30-day readmission rates with a navigator compared to a control group. However,

there was a mark statistical difference with patient greater than 60 years old by 4.1% decrease [95% CI: 8.0%-0.2%] in readmissions (Balaban, et. al., 2015).

Among the inclusion articles, additional six articles were included from the reference lists (n = 6). Among these articles, four articles (n = 4; pilot quality improvement project, n = 1; 2 tier model, n = 1; and RCS, n = 2) analyzed the relationship between navigators and readmission rates.

The pilot quality improvement project (n = 1) decreased readmissions by 22.5% in 2012 and 21.8% in 2013; however, this reduction was not correlated to the transition coordinator (Baldonado, 2014). Additionally, the 2-tier model (n =1) using a risk assessment tool to identify high readmission patients and HF educator. This model was not an actual study but used the literature to support interventions (Manning, 2011). Furthermore, the RCS (n = 1) uses a nurse educator to perform discharge education along with follow up phone calls at 30, 90, and 180 days had fewer hospitalized day and deaths (n = 116, 4 and 19 days; P = 0.009) (Koelling, Johnson, Cody & Aaronson, 2005). The other RCS (n = 1) discusses the lower rehospitalizations at 30 days (8.3 vs 11.9, P = .048); 90 days (16.7 vs 22.5, P = .04) and 180 days (8.6 vs 13.9, P = .046) (Coleman, Parry, Chalmers & Min, 2006).

Best practices for discharge/transition of care. Of the articles that were included in this study from original search and reference lists, two articles (n = 2), scientific statement, (n = 1); best practices summary, (n = 1), examined the best practices for discharge and transition of care. One article (n = 1) on the scientific statement reviewed the literature and examined best practices on transition programs to improve transitions of care for HF patients and reduce 30-day readmissions (Albert, et. al., 2015).

This scientific statement is from the American Heart Association (AHA). The other article (n = 1) is a best practices summary on the transition of care (TOC) and reduction in readmissions (Dreyer, 2014).

Discussion

All the articles (*n* = 13) reviewed for this project explored the impact of the transition program, specialized navigators (like HF) and or discharge navigators that impact 30-day readmissions. Among these articles, one RCS (*n* = 1) examined the impact with one hour 1:1 education for HF with follow up phone calls impact days hospitalized and deaths (Koelling, et. al., 2015). Whereas, another RCS (*n* = 1), the authors' findings note there was not a statistical difference with the use of patient navigators on 30-day readmissions; however, there was a marked statistical difference with age groups of greater than 65 years old. In this RCS, the control group markedly higher sample size than the intervention group by *n* = 340 (Balaban, et. al., 2015). Lastly, the other RCS (n =1) explores the relationships between the transition coach and lower rehospitalizations along with lower costs with the intervention group (Colman, et. al., 2006).

Of equal importance, the quality improvement and pilot quality improvement projects (*n* = 2) studied the relationship of the navigator on the reduction of 30-day unplanned readmissions while improving the transition of the care process. These quality improvement projects used the HF population for the high-risk readmission patient (Baldanado, 2014; Monza, 2015).

Moreover, the two-tier model (*n* = 1) used a HF educator in conjunction with a risk assessment tool to identify patients that are high risk for readmissions. This model uses the literature to support interventions but there was no actual study performed. The

risk assessment tool was not tested or validated (Manning, 2011). A retrospective study (*n* = 1), the authors reported data for 2.5 years and noted the cost savings and reduction in 30-day unplanned readmissions with a transition program. The transition program closed gaps between discharge and weeks after (Watkins, 2012). However, this study did not include a sample size. These studies incorporated nursing into the navigator, coach and or educator role.

Nursing is not the only discipline noted for discharge navigator, coach and or educator. The descriptive study (*n* = 1) notes the team of nurse and pharmacist as navigator roles reduce 30-day unplanned readmissions. The pharmacist was able to lend expertise with medication education and reconciliation (DiPalo et. al., 2017). A prospective, nonrandomized cohort study (*n* = 1) and RCS (*n* = 1) investigated a pharmacist-based medication reconciliation and counseling sessions and their relationship on 30-day unplanned readmissions (Al-Rashed, et. al., 2002; Pal, et. al., 2013). A descriptive, nonexperimental study (*n* = 1) concluded in the findings a social worker navigator model that starts immediately after discharge. This model is able to link the resources needed within the home. However, this study notes social workers reviewing orders and medication reconciliations (Watkins, et. al., 2012).

Not only did this navigator, coach, educator roles and transition programs contribute to the reduction of 30-day unplanned readmissions, but many themes also arose from these articles to help improve the discharge/transition of the care process. An essential component in this discharge/transition process is comprehensive discharge planning for high-risk readmission patients.

Themes

The key theme that was noted in several articles is comprehensive discharge planning. This comprehensive discharge planning includes follow up telephone call and or appointments, education of disease management, education of medications, and assisting with the transition of care from acute care to home.

Follow up care is of great importance. Seven articles (*n* = 7) concluded the need for follow up visits, coordinating these follow up visits or by conducting telephone calls to help reduce readmissions (Albert, et. al., 2015; Balaban et al., 2015; DiPola et. al., 2017; Dreyer, 2014; Koelling et al., 2005; Manning, 2011; Monza, et. al., 2015). More specifically, Monza et. al. (2105) notes a 3-5 day follow up care after discharge for HF patients. Watkins (2012) adds descriptions of variables like transportation where the navigator can assist with closing the gaps after discharge and even weeks after discharge. Whereas, Koelling et. al. (2005) discuss follow up phone calls at 30, 90 and 180 days for HF patients. Balaban et. al. (2015) discuss coordinating follow up appointments and weekly outreach to patients. Follow up care is one aspect of comprehensive discharge planning.

Another essential aspect to comprehensive discharge planning includes education on the disease, disease management, and medications. Six articles (*n* = 6) findings support the importance of education with patients, caregivers and family members of the disease process, management and medication education (Albert, et. al., 2015; Balaban et. al., 2015; DiPola, et. al, 2017; Dreyer, 2014; Koelling, et. al., 2005; Manning, 2011). DiPola et. al. (2017) examined the nurse's role as discharge navigator for disease education and management with the added layer of a pharmacist to perform medication

education and reconciliation. Both Pal, et. al. (2013) and Al-Rashed et. al. (2002) examined a pharmacist-based discharge navigator adds to medication reconciliation, reduction of polypharmacy, problem medications with an increased in medication knowledge and compliance reduces readmissions.

Whereas, Balaban et. al. (2015) investigated patient navigators which are nursing based that prepare patients for discharge, educate on medication management, symptom management and communication with primary care. Albert et. al. (2015) concluded that education, self-management, weight monitoring, sodium restriction, dietary advice, exercise recommendations, medication review and social support benefited HF patients. Dreyer (2014) examined best practices in medication reconciliation, education using the "teach back" method, and open communication between providers. Manning (2011) instituted a HF expert nurse educator for intensive 1:1 education for HF patients. Koelling et. al. (2005) concluded the benefit of one hour 1:1 teaching session with a nurse educator for HF. Several authors note education as a key factor to help with the reduction of 30-day unplanned readmissions.

Furthermore, comprehensive discharge planning includes assistance with the transition of care. This assistance may include assessments of transportation needs, home environment needs, medication needs, coordination of care and other variables. One retrospective study (n = 1) analyzed the variables like transportation needs and coordination of care to assist with the reduction of 30-day readmissions (Watkins, 2012). Whereas, a quality improvement project (n =1) concluded the coordination of care by connecting with the patient in both acute care and home, as well as, connecting with home health services for the HF population (Monza, et. al., 2015). In addition, a

descriptive, nonexperimental study (*n* = 1) the social worker transition model links community resources for patients. These resources include light housekeeping, meals, and arranging transportation (Watkins, et. al., 2012). This part of the discharge/transition of care process is an essential component to aid patient needs in the home environment.

Finally, the discharge process for these complex, high-risk readmission patients is a multifaceted, comprehensive process. All articles (*n* = 13) note a "navigator", "coach", and or "educator" for the transition of care from acute care to home with key themes of comprehensive discharge planning. Seven articles (*n* = 7) discuss these interventions specifically for HF high-risk readmission patients. Interestingly, there is a gap in the literature for the diagnosis of sepsis. No articles identified sepsis diagnosis in any of the discussion (*n* = 0). As noted above, HF and sepsis diagnoses are high-risk patients for readmissions because they account for the largest percentage of unplanned readmissions within 30 days (Mayr, et. al., 2017; Shah et. al., 2018; Chang, Tseng & Shapiro, 2015). Furthermore, research is needed in the area regarding best practices with the sepsis diagnosis and the transition of care.

Summary

The literature review for this project yielded thirteen articles (*n* = 13) that met the inclusion criteria. Of these 13 articles, 3 are different healthcare disciples (*n* = 3) including two pharmacists and one social worker model. One article (*n* = 1) discusses the team approach of nursing and pharmacy. Further research is warranted on the use of a multidisciplinary approach to reducing 30-day unplanned readmissions. Seven articles (*n* = 7) are specific to the HF population. Six articles (*n* = 6) discuss high risk patients for unplanned 30-day readmissions. There is a gap in the literature because there were no

articles that specifically discussed the sepsis population and the transition of care. However, the sepsis population is considered a high-risk population for unplanned 30-day readmissions. The septic population of patients' needs special attention to reduce the risk of readmissions. The key themes were the discussion of a "navigator", "coach", and or "educator" for the transition of care along with comprehensive discharge planning for these high-risk readmission patients.

Conclusion

The literature review supports the concept of discharge navigator. These high risk, complex patients require more one on one time for disease and medication education, the transition from acute care and follow up. HF and sepsis are noted as the leading diagnosis for unplanned 30-day readmissions. The literature supports best practices geared towards the HF population. However, further research is needed for best practices for the sepsis population, as well as, using a multidisciplinary model. The discharge navigator for these populations can generate a comprehensive discharge plan, coordinate follow up care, provide intensive education and improve the transition from acute care to home.

Aim

The primary aim of this discharge navigator project was to reduce 30-day readmissions for the HF and sepsis populations to meet the goals of the top quartile for like hospitals. The secondary aim was to improve the transition of care by creating a comprehensive discharge plan, coordinating follow up, and providing intensive disease and medication education along with the cost avoidance for preventable readmissions.

Theoretical Model

The theoretical model used for this project is a midrange descriptive theory called the Integrated Theory of Health Behavior Change (ITHBC). According to Ryan (2009), personal behaviors cause more than 50% of illnesses. Accountability of the day to day management of chronic illnesses falls on the patient and family. However, these persons are not prepared or equipped to assume this responsibility that leads to repeated readmissions to acute care facilities and unscheduled use of outpatient services (Ryan, 2009). These are key indicators these patients need more help.

The ITHBC is a blending of multiple theories and empirical studies for a new midrange, descriptive theory. This theory is based on the assumption that changes in behavior are a dynamic, iterative process (Ryan, 2009). Person-centered interventions versus standardized interventions are more effective in facilitating changes in health behaviors. These patient-centered interventions are directed to increase knowledge and beliefs, self-regulatory skills and abilities, along with social help. A person is more likely to be engaged and accept the recommended behavior changes if there is information provided about disease management. These patients are more likely to develop self-regulation abilities, experience positive social support and help (Ryan, 2009). The person will see the short-term effects of health behavior changes and this will reinforce the long-term effects of improved health.

The ITHBC theory was used in this project as patient-centered interventions. The discharge navigator assessed the needs of the patient and family and their knowledge and beliefs; then developed an individualized plan for each patient. The discharge navigator also assessed the self-regulation skill and ability; provided influence and support to the

patient and family with social facilitation. The patient and family were encouraged to engage in self-management behaviors to manage their chronic illness on a daily basis, which in turn improves their overall health status (See Figure 1).

The other model that was used in this study is the plan, do, study, act (PDSA). The PDSA model is made up of complex interventions that are comprised of interdependent steps and key principles to form the application. It is necessary to understand the method applied to interrupt the results and the outcomes with the PDSA model (Taylor, et. al., 2014). The logical notions of this model are the use of a small-scale approach to testing the interventions. This approach allows for rapid assessment and provides the flexibility to adapt changes according to the feedback. The small scales approach also allows for testers the flexibility to act and learn; minimize risk to patients, organization, and resources that allows for key stakeholders to engage in the project (Taylor, et. al., 2014).

The planning portion of this model included a systematic review of the literature and a pilot study. The do portion included a pilot project of the discharge navigator that was tested on a small scale (n = 15) for a three-month period. This pilot project allowed for rapid evaluation and process improvement for this project. The planning portion allowed the investigator to identify a gap in the literature with the best practices for the sepsis population and the interdisciplinary approach for these high-risk patients. The study portion allowed the investigator to evaluate the inclusion criteria. The biggest change from the pilot project to the current project was to the inclusion criteria and the collaborative efforts with pharmacy. The final portion of this project was implemented spring 2019 (See Figure 2).

Methodology

Study Design

The discharge navigator, which was the lead investigator, identified participants with the inclusion criteria at-risk patient(s) or received a consult from integrated case managers, patient care coordinators and or social services for discharge services. The consent was obtained by the second investigator from the participant for the discharge navigator services (See Figure 3). At this time, the discharge ticket was explained and given to the participant to review. The purpose of the discharge ticket was to evaluate essential components for discharge to home with the participant that included transportation, medication issues, work issues, home environment and support (See Figure 4). The discharge navigator had the initial visit with the participant within 24 – 48 hours, including weekends, explained the role, established a rapport, reviewed the discharge ticket and performed the medication adherence questionnaire (MAQ). The discharge navigator rounded on the participant until discharge. The discharge navigator assessed learning style, provided support for the participant once discharged and addresses any needs last minute concerns. The discharge navigator focused on education and resources for the participant until seen by the primary care provider (PCP). The pharmacy was consulted for any MAQ questions that were answered “yes” or the discharge navigator felt a pharmacy consult was warranted. The MAQs were on the discharge ticket and entered in the electronic health record (EHR). The EHR generated a pharmacy consult. If a consult was warranted for the participant, the discharge navigator contacted the transition of care (TOC) pharmacist. Participants were given resources and numbers for any issues that arose before his or her follow up appointment. All the

discharge information was compiled and placed in the TOC binder and the participant was instructed on how to use the binder which was already in use at the project location. The discharge navigator also connected participants with community services such as continuum case management (CCM). Prior to discharge, the discharge navigator reviewed key education points, ensured proper medication supply and administration, reinforced follow up appointments and addressed any last-minute concerns from the participant.

The discharge navigator performed a call back 24-48 hours post discharge of the participant (See Figure 5&6). The call back used an evidence-based step by step toolkit from *Project RED* from the Agency for Healthcare Research and Quality (AHRQ).

If the participant was seen by a system primary care provider, the participant was educated on receiving a call from the integrated care nurse. The participant was reminded to be available for this call and have medications ready to review. The discharge navigator gave the participant the number for the integrated care nurse if issues arise prior to the phone call.

Study Sample

Participants identified for this project had the diagnosis of HF and or sepsis with either the index diagnosis or readmission diagnosis. The participant was identified as a high risk for readmission per the HOSPITAL score and/or if the discharge navigator services would be deferential for the transition of care. The participants selected for this project were admitted to the project's hospital with the following inclusion criteria:

- 55 years of age and older
- English as a primary language

- HOSPITAL score 5 or greater
- discharged to home with or without home health agency
- diagnosis with heart failure and or sepsis
- and/or consultation from integrated case management, patient care coordinators, social services

A prospective cohort design project was implemented in a 238-bed community hospital located in central Virginia serving a seven-county area with a population of approximately 218,000. This project encompassed the care provided in the acute care setting and the transition to home or home health. The primary investigator assumed the role of discharge navigator. The discharge navigator worked collaboratively with the pharmacy. The pharmacy provided the expertise role in the transition of care process for medication reconciliation and education. Referrals and/or consultations were made to the discharge navigator from case management, social services, nurses, physicians and/or patient care coordinators. Eligible patients were consented to this project upon identification for services.

Ethical Considerations

The investigator did not perceive more than minimal risks in the involvement of this project; that is, no risk beyond the risk of everyday life. The benefit to the participant is the reduction of readmission to the hospital, which can lead to increase length of stay, risk of developing complications like hospital-acquired infection(s), increased testing, diagnostics, and procedures, increase in medication use, increase cost, increase stress from hospitalizations, and increased morbidity and mortality (Polster, 2015; Mayr, et. al., 2017).

Confidentiality. Only the investigators had access to any identifiable information. Identifiable hard copy information was stored in a locked cabinet in a locked office with one of the investigators having access. Identifiable electronic information was stored on one computer that is password protected. All hard copy information was destroyed at the conclusion of the study. Electronic data will be destroyed within 5 years.

Information and Consent Form. The participants had full disclosure of the role of the discharge navigator project. This information includes purpose, the benefit to the patient, minimal risks, and use of information after the completion of the project. Participation in the project was voluntary. None of the participants withdrew from the project. Consent was obtained by the investigator that is not in the role of discharge navigator. There was not any deceptive information within the project.

Sources of Data

The measurements were collected from Crimson Continuum of Care system from the Advisory Board and was used to track and compare outcome measures. The data is the same data CMS collects and tracks including exclusions. The intervention began in January and end on April 12th, 2019. Data collection continued to be reviewed until May 30th, 2019 in order to capture 30-day readmissions. The secondary investigator had access to this system. This system is currently in use and data is used by the hospital system to track 30-day readmissions. The cost of HF and sepsis readmissions hospital stay is from the same system. Other data comes from the healthcare system itself.

Implementation

The discharge navigator, which was the lead investigator, identified participants with the inclusion criteria at-risk patient(s) and or received a consult from integrated case

managers, patient care coordinators and or social services for discharge services. The consent was obtained from the participant by the secondary investigator for the discharge navigator services. At this time, the discharge ticket was explained and given to the participant to review. The purpose of the discharge ticket was to evaluate essential components for discharge to home with the participant that included transportation, medication issues, work issues, home environment and support. The discharge navigator had the initial visit with the participant within 24 – 48 hours, including weekends, explained the role, established a rapport, reviewed the discharge ticket and performed the MAQ. The discharge navigator rounded on the patient until discharge. The discharge navigator assessed learning style, support for the participant once discharged and any needs not addressed previously. The discharge navigator focused on education and resources for the participant until seen by the primary care provider (PCP). The discharge navigator filled out the MAQ in the electronic health record (EHR). The EHR generated a pharmacy consult for any MAQ questions that were answered "yes." The discharge navigator consulted the transition of care (TOC) pharmacist as needed. Participants were given resources and numbers for any issues that arose before his or her follow up appointment. All the discharge information was compiled and placed in the TOC binder and the participant was instructed on how to use the binder. The TOC binder was already in use at the facility. The discharge navigator also connected patients with community services such as continuum case management (CCM). Prior to discharge, the discharge navigator reviewed key education points, ensured proper medication supply and administration, reinforced follow up appointments and addressed any last-minute concerns.

The discharge navigator performed a follow up phone call with the participants within 24-48 hours post discharge. The participants are aware of this phone call during the first visit and at discharge. If the participant was seen by a system PCP, the participant was educated on receiving a call from the integrated care management's (ICM) nurse with 72-96 hours of discharge. The participants were reminded to be available for this call and have medications ready to review. The discharge navigator gave the participant the number for the PCP's ICM nurse if issues arose prior to the phone call.

Data Analysis

Quantitative Data Analysis

The investigator tracked each participant for 30 days after discharge, as well as, used readmission rates in months prior to the invention, during the intervention and after the intervention. The statistical analysis was performed by using the IBM SPSS Statistics version 25. The descriptive statistical analyses for this project included the following: age, gender, HOSPITAL score, multi patient visit (MVP), MAQ with pharmacy consult, participant visits, time spent, and follow up phone call. The readmission data was extracted from the healthcare system's database. A comparison of proportions calculator was used to compare data points from Medcalc statistical software.

Results

Participant Characteristics

Forty-one patients identified met the inclusion criteria for this project. Twenty-eight consented to participate in this project $n = 28$ (68.29%). No participants withdrew from this project. Of the 28 participants ($n = 28$), the mean age was 72.28 (SD 11.27389)

with more females 57.1% compared to males 42.9%. Out of the 28 participants (*n* = 28), the mean HOSPITAL score was 5.42 (SD 2.20149) with 39.3% classified as MVPs. Twenty-four participants (*n* = 24) had the diagnosis of heart failure. In those 24 participants, 4 participants had a new diagnosis of heart failure. Four of the participants (*n* = 4) had the diagnosis of sepsis (See Tables 7,8,9 &12).

Pharmacy Collaboration

Out of the 28 participants (*n* = 28), 8 participants had a pharmacy consult that was generated by the MAQ and one consult generated by the discharge navigator. Twenty of the participants did not need a pharmacy consult (See Table 10).

Participant Visits/Time Spent

The participant visits averaged 3.57 (SD 2.93672) with an average time spent 56.96 minutes (SD 25.4710). The most participant visit was twelve and the maximum time spent with a participant was 120 minutes (See Table 13 & 14 and Figure 7).

Follow Up Phone Call

A follow up phone call to the participants was completed 82.1% of the time. The other 17.9% of the time the Discharge Navigator was not able to do a follow up phone call (See Table 11 and Figure 6).

Readmission Results

Out of the 28 participants, 7 were readmitted within 30 days of discharge. Six of the participants had the diagnosis of HF and one had the diagnosis of sepsis within the project. Of the 7 that returned to the project facility, 2 of the participants returned with the same diagnosis of HF. Of the 2 participants that were readmitted for HF, one participant followed up with the primary care provider (PCP) 5 days after discharge and

was readmitted within 8 days of discharge. The one readmission within the project diagnosed with sepsis returned with sepsis from stage IV pressure injury. The other six participants that were readmitted to the project facility had different diagnosis than HF and or sepsis. One readmission had the diagnosis of allergic reaction to a medication. One readmission had the diagnoses of acute kidney injury on chronic kidney injury and abdominal pain. One readmission had the diagnosis of rectal bleeding while on anticoagulation. One readmission had the diagnosis of Atrial Fibrillation with rapid ventricular response (RVR) that required electrophysiology studies, ablation and pacemaker insertion. None of the participants with the new diagnosis of HF were readmitted within 30 days after discharge (See Table 5 & 6).

Readmission rates compared to the top quartile. HF was the chosen population to compare to the top quartile measurement because a majority (80%) of patients identified for this project had a HF diagnosis. The readmission rates for HF during the project implementation period steadily decreased from January of 2019 to April 2019 (24.05%, 20%, 19.75% and 11.11%); however, there was an increase in readmission rates after the project ended in May (22.97%) and June (26.03%) of 2019. The project facility was below the top quartile for like hospitals (16.24%) during the month of April (11.11%). The same steady decrease during implementation of the pilot study can be seen as well (See Figure 8 & Table15).

The statistical analysis was performed using a comparison of proportions calculator. The average of HF readmissions 3 months prior to the project implementation was compared to the HF average of readmissions during and at completion of the project. The difference was 9.52% with a Chi-squared of 5.461 (p = 0.0194) (See Table 16). The

other analysis using the comparison of proportions calculator measured the HF readmission rate the month prior to the implementation of the project to the month at completion of the project. The difference was 16.09% with a Chi-square 5.423 (p = 0.0199) (See Table 17). These results are significant; however, with a small sample size and not enough data points to infer the discharge navigator's role was the significance behind the results.

Cost Avoidance

The cost avoidance for this project was analyzed by using the healthcare system's database. According to the healthcare system's database, the cost for HF admissions is $9,383.00 per admission. The cost avoidance for this project was analyzed by using the healthcare system's database average cost. The cost for HF admissions is $9,383.00 per readmission. A pre and during readmission data analysis was complied. The 3-month HF readmissions pre project implementation was 51($478,533.00). The HF readmissions during the 3-month project implementation were 38 ($356,554.00). The difference is $121,979.00 multiplied by 4 is $487,916.00. Compounding the salary of the discharge navigator with benefits ($82,600.00) for a potential cost avoidance ($405,316.00) if sustainability of the results continues (See Table 5).

Discussion

HF readmissions are the highest diagnosis within the project facility. Of the 41 patients that met the inclusion criteria for this project, 80% (33/41) were diagnosed with HF and 20% (8/41) with sepsis. Of the consented participants, 86% (24/28) with HR and 14% (4/28) with sepsis diagnoses. Many of the sepsis patients identified for this project did not consent to participate in the project for reasons unknown to the investigators. A

gap in the literature was identified related to discharge planning and education for the sepsis population. More research is warranted for comprehensive discharge planning for the sepsis population.

The HF diagnosis was also found in the sepsis population. The HF diagnosis was also found in the sepsis population (7/41). Sepsis treatment puts the HF patient at an even higher risk for unplanned 30-day readmission without careful monitoring of volume overload during the sepsis admission. The discharge navigator can assist the interdisciplinary team with a comprehensive plan to minimize the risk of volume overload and the risk of readmission.

Within the participant characteristics, more women consented to be in this project versus men. However, when meeting with the male population, a spouse or significant other was present for the initial consult and teaching. Only two males identified did not have a significant other. Both of these participants had family support, required more visits and time spent educating. Out of the females that participated in the project, one had a son present for the education.

One participant was below the inclusion age of 55 years old and was a consult by the Integrated Care Management (ICM) team. This participant was 47 years old with a new diagnosis of HF. The ICM team felt this participant required a comprehensive discharge plan and intense education.

The Multi Visit Patient was analyzed as a subpopulation in the descriptive statistics. According to Boutwell (2019), MVP status is defined as patients that were admitted four of more times in one year. An MVP in the project's facility was defined as 3 or more admissions in one year. The combination of the knowledge gained from the

project facility incorporated new initiatives centered around the MVP patient. The two initiatives of motivational interviewing and developing a comprehensive discharge plan with community resources were utilized by the discharge navigator. The work of this project partnered with the focus MVP initiatives believed to positively influence the readmission rate.

A key interdisciplinary piece of this project incorporated pharmacy into the transition of care, comprehensive discharge planning and education. The discharge navigator would review the discharge ticket with the participant. Key medication questions on the discharge ticket were matched to the MAQ questionnaire in the healthcare system's EHR. The discharge navigator would complete the MAQ. If any question on the MAQ was answered yes, the EHR generated a consult with pharmacy. A pharmacist would see the participant to discuss medications. The pharmacists also could perform a cost analysis on medications. The discharge navigator also could request a pharmacy consult if the participant needed in depth medication education, review medications for polypharmacy, and or cost analysis. Eight of the participants had a pharmacy consult and one of these participants was an unplanned 30-day readmission. A key interdisciplinary piece of this project incorporated pharmacy into the transition of care with the review medication, cost, education, and polypharmacy. Eight (8/28) of the participants had a pharmacy consult and one participant was a 30-day readmission. One sepsis participant was a pharmacy consult generated by the discharge navigator for antibiotic medication costs. Pharmacy contacted the PCP for antibiotic change that the participant could afford. All of these circumstances are noted in the literature as causes for unplanned 30-day readmissions.

The number of participant visits and time spent varied. Two of the participants had an increased length of stay (LOS) due to complications which required many visits and increasing the time spent with these participants. The increased LOS also increased the average visits. The average time spent with the participants was 56.96 minutes. The minutes spent with the participants meets the best practice noted in the literature for education time.

The follow up phone call was performed 82.1% of the time. The participants were informed of the follow up phone call. The discharge navigator's caller identification, and reviewed the participants contact information for accuracy. The participants were also informed of the healthcare system's PCP patient care coordinator's phone call. Messages were left if no answer. Not one participant called the discharge navigator back if a message was left.

A challenge was noted when calling participants on a Friday afternoon. If the participant was having some weight gain and increased shortness of breath, the discharge navigator would encourage the participant to call the PCP right after because of the limited access on the weekends. The discharge navigator did not have resources to connect to cardiology services or provide any instruction on diuretic therapy. Attempts were made by the discharge navigator to contact the patient care coordinators (PCC) at the PCP's office of the circumstances. This gap is a limitation to the project. Ideally, the discharge navigator would have contacts and resources to guide the participants in these matters.

A follow up phone call was not performed 17.9% of the time. The contact information for the participant was nonfunctioning or a voice message was left for the

participant to call the discharge navigator back. No phone calls were received by the discharge navigator from voice messages.

Out of the seven that were 30-day readmissions within the project, three participants returned with the same diagnosis of sepsis and heart failure. Two of the heart failure participants returned within 30-days of discharge. One of the participants did see the PCP 5 days after discharge, attempted to call the PCP and returned to the facility 8 days after discharge. The sepsis 30-day readmission returned to the facility with sepsis with the source of a stage IV pressure injury from care at home. The other four participants readmitted within 30-days had a different diagnosis than the sepsis and HF diagnosis.

The discharge navigator was able to connect participants to outpatient healthcare services that are already occurring. The continuum care managers (CCM) for the HF population was a service from the healthcare system. The discharge navigator would connect the HF participants with the CCM team for continued support at home.

The readmission rates for HF during the project implementation period decreased from January of 2019 to April 2019; however, there was an increase in readmission rates after the project ended in May and June of 2019. At the project end time in April 2019, the readmission rates were 11.11% which fell below the top ten quartile of like hospitals which was 16. 24%. The readmission rates continued to rise after the project's end. The statistical analysis was also significant when comparing the pre month of December 2018 to the end month of April 2019 and the average months prior to implementation to the implementation months. The investigators can infer that the discharge navigator had an impact on readmission rates. However, the statistical analysis cannot confirm that the

project was the only impact to the readmission rates even with the statistical significance. There are too many factors that would need to be considered. For example, the same HF patients may have been readmitted at different time periods and not considered a 30-day readmission. Further research is warranted for more data points for comparison.

The potential cost avoidance for this project is confounding. The sustainability of the reduction of HF readmissions will impact the potential total cost avoidance. The salary of the discharge navigator can be supported by the potential cost avoidance. Of note, the cost avoidance numbers are conservative numbers. The cost avoidance did not calculate any CMS penalties for high readmission rates.

The discharge navigator project added to the body of knowledge for comprehensive discharge planning, coordination and education is needed for these populations that have a great deal of medical complexity. The cost avoidance alone would be able to support the discharge navigator role along with a team if need be to perform follow up phone calls after discharge. This team does not require licensed personnel. Targeting these high-risk populations of HF can not only assist the patients and families in day to day management of this chronic illness, reduce admissions to the hospital but empower the patient and family leading to an increased quality of life and patient satisfaction.

For the sepsis population, further research is warranted to assist these medically complex patients transition to home with best practices. The sepsis population requires a comprehensive discharge plan and follow up care to minimize readmissions and complications.

Implications for Leaders

The medical complexity of the HF and sepsis population is growing. These populations need a comprehensive discharge assessment, plan, and education to aid in the transition from the acute care environment to home. The discharge navigator can be an integral part of the interdisciplinary team. Healthcare leaders need innovative ideas to help reduce unplanned 30-day readmissions. A reduction in the HF and sepsis populations will aid in the overall unplanned 30-day readmissions. Not only can the discharge navigator improve the transition in care but increase patient satisfaction by giving the time and support needed for these complex patients. The findings from this project support the need for a discharge navigator for these complex populations. The best practice of using a "navigator, coach or educator" is supported within the literature. A gap was noted in the literature for the sepsis population on best practices for the transition of care which further research is warranted. The discharge navigator utilizing the conceptual framework of Integrated Theory of Health Behavior Change (ITHBC) can generate a comprehensive discharge plan, coordinate follow up care, provide intensive education and improve the transition from acute care to home.

Limitations

This project had several limitations. The sample size and time spent of 3 months are limits to this project. One investigator was the discharge navigator with limited access and resources within the facility and community. The participants in this project needed to be consented to participate. High risk patients would not need consent and would be part of the hospitalization if the discharge navigator role was implemented within the facility. There are limited resources for the project discharge navigator. The biggest issue

was the weekend when PCP offices were not opened. Many of the PCPs referred the patient to the emergency room instead of an office visit. The facility had a diuretic outpatient protocol that was approved during the project and not incorporated since the methodology of the project was already designed. Lastly, the discharge navigator had difficulties connecting with the PCP offices and cardiology offices to assist the participants.

Appendix

Table 1 HOSPITAL Score

Criteria	Score if positive
Hemoglobin < 12 g/dl	1
Discharge from Oncology Service	2
Low serum sodium level < 135 mEq/L	1
Procedure during hospital stay (any ICD-9 coded)	1
Index admission type: urgent or emergent (non elective)	1
Number of hospital admissions during the previous year:	
0-1	0
2-5	2
>5	5
Length of stay 5 days or greater	2

Table 2 Diagnosis of Participants – Pilot Study

Index Diagnosis			**30 Day Readmission Diagnosis**		
Number	Percentage	Diagnosis	Number	Percentage	Diagnosis
9	60%	Heart Failure	6	40%	Heart Failure
4	26.7%	Cardiac Related	5	33%	Referral
2	13.3%	Non Cardiac – Septic Arthritis, diarrhea	2	13%	Cardiac Related
			2	13%	Non Cardiac – Metabolic Encephalopathy, urinary retention

Table 3 Readmission Breakdown – Pilot Study

Number of Participants and HOSPITAL score (HS)	**Index Diagnosis**	**Readmission Diagnosis**	**Readmission diagnosis after Discharge Navigator and number of days returned**
1 **HS - 7**	Heart Failure (HF)	N/A referral to DN pilot	Followed by VA services – A fib on Xarelto – ABD assessed by DN prior to discharge due to use of iron. Pt readmitted next day for mesenteric clot – transferred to tertiary hospital – does not count in readmission scores
1 **HS - 6**	Syncope/Collapse H/O HF	Heart Failure - syncope	Autonomic neuropathy from DM causing orthostatic hypotension. Discharged for 8 days. Followed procedure of calling primary provider twice before being readmitted.

1 **HS - 8**	Tricuspid Valve Repair – h/o HF	Redo of tricuspid valve	Long LOS (> 30 days), Septic shock from surgical site infection. Discharged and readmitted within 2 days for ascites
1 **HS - 7**	HF	AKI HF	Pt readmitted 3 days after discharge for HF
1 **HS - 5**	HF	Referral to DN pilot	Readmitted 5 days after discharge for worsening HF – new diagnosis of Amyloidosis – discharged home to hospice
1 **HS – 9**	HF	HF	Readmitted to another hospital 2 days after discharge. Does not count in readmission scores

Table 4 Cost Avoidance – Pilot Study

Participants	**Results**	**Cost Avoidance**
n = 25 Identified	*n* = 6 returned	National average costs
n = 15 participated	*n* = 5 to original hospital n = 1 to different hospital	HF readmission costs - $9,051.00
n = 14 with heart failure	*n* = 2 did not count per CMS exclusion criteria	*n* = 9 non admitted $81,459.00 *n* = 11 total $99,561.00 Annual projection $398,244.00

Table 5 Project Results

Participants	Results	Cost Avoidance
n = 41 identified	*n* = 7 returned	Crimson average costs
n = 28 participated	*n* = 6 with HF diagnosis *n* = 1 sepsis	HF costs - $9,383.00 Sepsis costs- $9,780.00
n = 24 with HF (4 with new diagnosis HF) *n* = 4 with sepsis diagnosis	*n* = 2 HF diagnosis returned with diagnosis of HF	Comparison 3 months pre and during: Pre: 51 = $478,533.00 During: 38 = $356,554.00 Difference of $121,979.00
Avg. Salary of RN $70,000.00 Benefits added $12,600.00 ---------- Total for RN $82,600.00		
Potential Total Cost Avoidance: $405,316.00		

Table 6 Readmission Breakdown Project

Initial diagnosis	**Readmission Diagnosis**
Heart Failure	allergic reaction to Ceftin (started due to Pneumonia)
Heart Failure	HF and Lung mass found on CT – transferred to ANOVA
UTI/sepsis	Sacral IV wound – sons caring for pt. at home
Heart Failure	AKI/CKD/ABD pain
Heart Failure	Rectal bleeding on Eliquis
Heart Failure	for A Fib with RVR needed ablation and pacer – medications did not work
All 4 of the new heart failure diagnosis were not readmitted	

Table 7 Descriptive Statistics Age

	N	Minimum	Maximum	Mean	Std. Deviation
Age	28	47.00	89.00	72.2857	11.27389
Valid N (listwise)	28				

Table 8 Descriptive Statistics Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	male	12	42.9	42.9	42.9
	female	16	57.1	57.1	100.0
	Total	28	100.0	100.0	

Table 9 Descriptive Statistics Multi Visit Patient

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no	17	60.7	60.7	60.7
	yes	11	39.3	39.3	100.0
	Total	28	100.0	100.0	

Table 10 Descriptive Statistics Pharmacy Consult

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no	20	71.4	71.4	71.4
	yes	8	28.6	28.6	100.0
	Total	28	100.0	100.0	

Table 11 Descriptive Statistics Follow Up Call

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	23	82.1	82.1	82.1
	other	5	17.9	17.9	100.0
	Total	28	100.0	100.0	

Table 12 Descriptive Statistics HOSPITAL Score

	N	Minimum	Maximum	Mean	Std. Deviation
HS	28	1.00	10.00	5.4286	2.20149
Valid N (listwise)	28				

Table 13 Descriptive Statistics Minutes Spent

	N	Minimum	Maximum	Mean	Std. Deviation
MS	28	15.00	120.00	56.9643	25.47109
Valid N	28				

Table 14 Descriptive Statistics Participant Visits

	N	Minimum	Maximum	Mean	Std. Deviation
PV	28	.00	12.00	3.5714	2.93672
Valid N	28				

Table 15 Heart Failure Readmission and Admissions by Month

CHF 30 Day w/Excludes (Any APR-DRG) by Month

CMS Condition Description	Month	% 30 Day Readmits w/Excludes (Any APR-DRG) (IP)	% 30 Day Readmits w/Excludes (Any APR-DRG) (IP) - Numerator	% 30 Day Readmits w/Excludes (Any APR-DRG) (IP) - Denominator	% 30 Day Readmits w/Excludes (Any APR-DRG) (IP) - Comparison
Heart Failure	Mar-18	18.42%	14	76	16.39%
	Apr-18	20.69%	12	58	15.94%
	May-18	21.25%	17	80	16.46%
	Jun-18	21.33%	16	75	16.33%
	Jul-18	14.52%	9	62	16.19%
	Aug-18	20.00%	12	60	16.63%
	Sep-18	23.08%	15	65	16.42%
	Oct-18	16.05%	13	81	16.14%
	Nov-18	28.57%	18	63	16.09%
	Dec-18	27.40%	20	73	16.42%
	Jan-19	24.05%	19	79	16.34%
	Feb-19	20.34%	12	59	16.41%
	Mar-19	20.00%	16	80	16.08%
	Apr-19	11.29%	7	62	16.22%
	May-19	22.97%	17	74	16.47%
	Jun-19	26.03%	19	73	16.57%

Table 16 Pre Post Month Heart Failure Comparison

Results

Difference	16.09 %
95% CI	2.5760% to 28.5953%
Chi-squared	5.423
DF	1
Significance level	P = 0.0199

Table 17 Project Average Heart Failure Before and After Comparison

Results

Difference	9.52 %
95% CI	1.5410% to 17.2966%
Chi-squared	5.461
DF	1
Significance level	P = 0.0194

Figure 1 Integrated Theory of Health Behavior Change

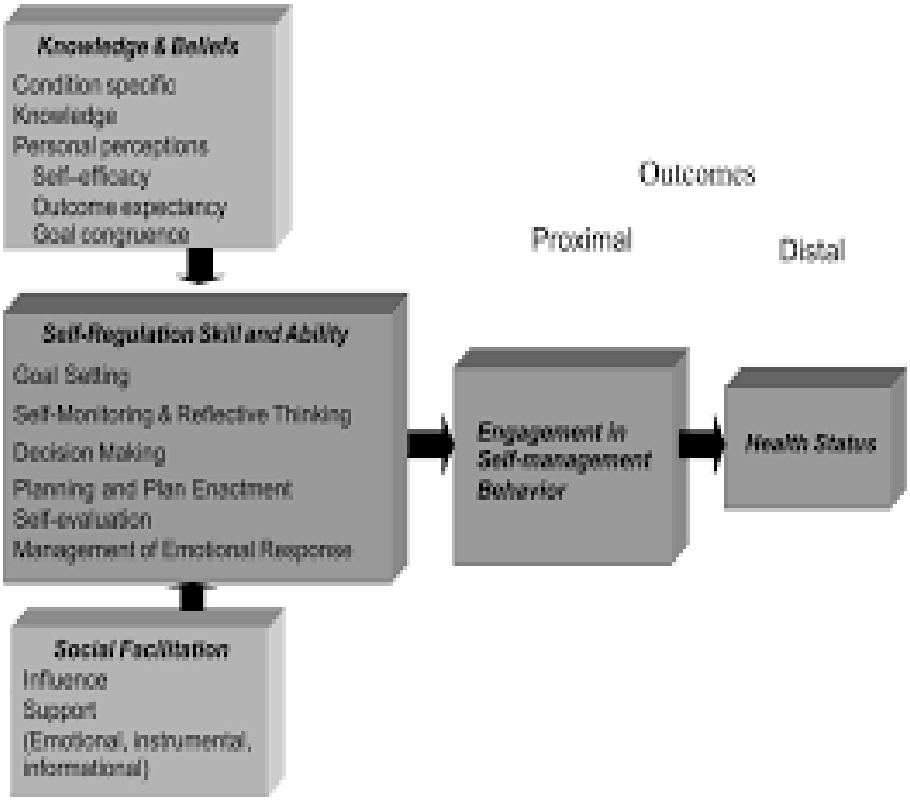


Figure 2 PDSA Model

Figure 3 Discharge Ticket

Discharge Ticket		
Answer the following questions to the best of your ability	**Yes**	**No**
Who will be taking me home? Person's name		
Am I able to do all things I need to do at home? (cook, clean, wash self, laundry, shop for food and medication, use stairs any assistive devices – walker, oxygen, shower chair)		
Is there someone to care for me at home? (cook, clean, laundry, shop for food and medications, take you to doctor appointments)		
Did I bring any of my medications from home to the hospital?		
Do I know how to take my medications?		
Can I afford my medications?		
Will my medications be at home when I get there?		
Do I need a sick note?		
Do I know when to see the doctor after leaving the hospital? Date and time:		
Will someone be calling to check on me after leaving the hospital?		
Do I have a scale at home?		
Please review with your discharge navigator to assist you with your needs.		

Figure 4 Consent

Informed Consent Form

Page 1 of 2

Identification of Project	Discharge Navigator Project
Statement of Age of Subject	I state that I am over 18 years of age, in good physical health, and wish to participate in this program of research being conducted by Karen Weeks and Debbie Kile.
Purpose	The purpose of this research is to measure the effectiveness of the discharge navigator on the reduction of 30-day readmissions
Procedures	The discharge navigator will meet with you, your family and care providers to assist you on your discharge needs. This may include looking at your medications, teaching you about your medications, and helping you to be ready to take care of yourself at home. A pharmacist may review your medications with you. The discharge navigator will call you 1-2 days after you leave the hospital to see how you are doing at home.
Confidentiality	All the information collected in this study is confidential to the extent permitted by law. I understand that the data I provide may be grouped with data others provide for reporting and presentation and that my name will not be used.
Risks	The risks involved in this research are no more than everyday life risks
Benefits	The potential benefits of this research are to minimize readmissions and complications that arise from readmissions
Freedom to withdraw or ask questions	I understand that I am free to ask questions or withdraw from participation at any time and without penalty.
Medical Care	Medical Care is not provided. Sentara RMH Medical Center does not provide any medical or hospitalization insurance for participants in this research or any compensation for any injury sustained as a result of my participation in this research.
Contact Information	If you have any questions about your rights as a research subject or wish to report a research-related injury, contact: Betsy Early, Pharm.D., MBA Sentara RMH Medical Center Institutional Review Board 2010 Health Campus Drive Harrisonburg, VA 22801 Phone number 540-689-2368 If you have questions about this particular study, contact: Karen Weeks Phone number 908-319-8467 Initials:_____

Subject Information	Subject Name: _____ Subject signature: _____ Date signed: _____

Figure 5 Contact Sheet

Contact Sheet

If possible, pull information from patient's medical record. Confirm correct information with patient. Identify the best time of day or days to reach the patient and other contacts.

Patient Name: _____

OK to send letter (Y / N)

Address
Street _____ Apt # _____

City, State _____ ZIP Code _____

Email address _____

Preferred spoken language: _____

Interpreter needed? (Y/N) _____

Preferred phone number: __ **home** __ **cell phone** __ **work**

Home Phone: ( ) _____ OK to leave message? (Y/N) _____

Best time to call: _____

Cell Phone: ( ) _____ OK to leave message? (Y/N) _____

Best time to call: _____

Work Phone: ( ) _____ OK to leave message? (Y/N) _____

Best time to call: _____

Contacts

Name of Contact 1: _____

Relationship: _____
Caregiver? (Y/N) __
Proxy? (Y/N) __
Designated to receive follow-up phone call? (Y/N) __
Notes: _____

_____

Preferred spoken language: _____

Interpreter needed? (Y/N) _____

Preferred phone number: __ home __ cell phone __ work

Home Phone: ( ) _____ OK to leave message? (Y/N) _____

Best time to call: _____

Cell Phone: ( ) _____ OK to leave message? (Y/N) _____

Best time to call: _____

Work Phone: ( ) _____ OK to leave message? (Y/N) _____

Best time to call: _____

Contacts

Name of Contact 2: _____

Relationship: _____
Caregiver? (Y/N) __
Proxy? (Y/N) __
Designated to receive follow-up phone call? (Y/N) __
Notes: _____

_____

Preferred spoken language: _____

Interpreter needed? (Y/N) _____

Preferred phone number: __ **home** __ **cell phone** __ **work**

Home Phone: ( ) _____ OK to leave message? (Y/N) _____

Best time to call: _____

Cell Phone: ( ) _____ OK to leave message? (Y/N) _____

Best time to call: _____

Work Phone: ( ) _____ OK to leave message? (Y/N) _____

Best time to call: _____

Figure 6 Post Discharge Follow Up

Postdischarge Follow-up Phone Call Documentation Form

Patient name: _____
Caregiver(s) name(s): _____
Relationship to patient: _____
Notes: _____
Discharge date: _____
Principal discharge diagnosis: _____
Interpreter needed? Y N Language/Dialect: _____

Prior to phone call:

Review:

- Health history
- Medicine lists for consistency
- Medicine list for appropriate dosing, drug-drug and drug-food interactions, and major side effects
- Contact sheet
- DE notes
- Discharge summary and AHCP

Call Completed: Y N
With whom (patient, caregiver, both): _____

Number of hours between discharge and phone call: _____
Consultations (if any) made prior to phone call:

- ❑ None
- ❑ Called MD
- ❑ Called DE
- ❑ Called outpatient pharmacy
- ❑ Other: _____

If any consultations, note to whom you spoke, regarding what, and with what outcome:

_____
_____

Phone Call Attempts

Patient/Proxy

Phone Call #1: Date & Time:_____ Reached: Yes/No

Phone Call #1: Date & Time:_____ Reached: Yes/No
If No (circle one): ans. machine/no answer/not home/declined to provide information/busy/other:
Phone Call #2: Date & Time:_____ Reached: Yes/No
If No (circle one): ans. machine/no answer/not home/declined to provide information/busy/other:
Phone Call #3: Date & Time:_____ Reached: Yes/No
If No (circle one): ans. machine/no answer/not home/declined to provide information/busy/other:
Phone Call #4: Date & Time:_____ Reached: Yes/No
If No (circle one): answ. machine/no answer/not home/declined to provide information /busy/other:
Phone Call #5: Date & Time:_____ Reached: Yes/No
If No (circle one): answ. machine/no answer/not home/declined to provide information/busy/other:
Phone Call #6: Date & Time:_____ Reached: Yes/No
If No (circle one): answ. machine/no answer/not home/declined to provide information/busy/other:

Alternate Contact 1

Alternate Contact 2

Phone Call #1: Date & Time:_____ Reached: Yes/No
If No (circle one): ans. machine/no answer/not home/declined to provide information/busy/other:
Phone Call #2: Date & Time:_____ Reached: Yes/No
If No (circle one): ans. machine/no answer/not home/declined to provide information/busy/other:
Phone Call #3: Date & Time:_____ Reached: Yes/No
If No (circle one): ans. machine/no answer/not home/declined to provide information/busy/other:
Phone Call #4: Date & Time:_____ Reached: Yes/No
If No (circle one): answ. machine/no answer/not home/declined to provide information /busy/other:
Phone Call #5: Date & Time:_____ Reached: Yes/No
If No (circle one): answ. machine/no answer/not home/declined to provide information/busy/other:
Phone Call #6: Date & Time:_____ Reached: Yes/No
If No (circle one): answ. machine/no answer/not home/declined to provide information/busy/other:

A. Diagnosis and Health Status

Ask patient about his or her diagnosis and comorbidities

- ❑ Patient confirmed understanding
- ❑ Further instruction was needed

If primary condition has worsened:

What, if any, actions had the patient taken?

- ❑ Returned to see his/her clinician (name): _____
- ❑ Called/contacted his/her clinician (name): _____
- ❑ Gone to the ER/urgent care (specify): _____
- ❑ Gone to another hospital/MD (name): _____
- ❑ Spoken with visiting nurse (name): _____
- ❑ Other: _____
- ❑ What, if any, recommendations, teaching, or interventions did you provide?

If new problem since discharge:

Had the patient:

- ❑ Contacted or seen clinician? (name): _____
- ❑ Gone to the ER/urgent care? (specify):_____
- ❑ Gone to another hospital/MD? (name): _____
- ❑ Spoken with visiting nurse? (name):_____
- ❑ Other?:_____

Following the conversation about the current state of the patient's medical status:

What recommendations did you make?

- ❑ Advised to call clinician (name): _____
- ❑ Advised to go to the ED
- ❑ Advised to call DE (name):_____
- ❑ Advised to call specialist physician (name):_____
- ❑ Other: _____

What follow-up actions did you take?

- ❑ Called clinician and called patient/caregiver back
- ❑ Called DE and called patient/caregiver back
- ❑ Other:

B. Medicines
Document any medicines patient is taking that are **NOT** on AHCP and discharge summary:

_____
___

Document **problems** with medicines that are on the AHCP and discharge summary (e.g., has not obtained, is not taking correctly, has concerns, including side effects):

Medicine 1: _____
Problem: _____

- ❑ Intentional nonadherence
- ❑ Inadvertent nonadherence
- ❑ System/provider error

What recommendation did you make to the patient/caregiver?

- ❑ No change needed in discharge plan as it relates to the drug therapy
- ❑ Educated patient/caregiver on proper administration, what to do about side effects, etc.
- ❑ Advised to call PCP
- ❑ Advised to go to the ED
- ❑ Advised to call DE

- ❑ Advised to call specialist physician
- ❑ Other: _____

What follow-up action did you take?

- ❑ Called hospital physician and called patient/caregiver back
- ❑ Called DE and called patient/caregiver back
- ❑ Called outpatient pharmacy and called patient/caregiver back
- ❑ Other: _____

Medicine 2:_____
Problem: _____

- ❑ Intentional nonadherence
- ❑ Inadvertent nonadherence
- ❑ System/provider error

What recommendation did you make to the patient/caregiver?

- ❑ No change needed in discharge plan as it relates to the drug therapy
- ❑ Educated patient/caregiver on proper administration, what to do about side effects, etc.
- ❑ Advised to call PCP
- ❑ Advised to go to the ED
- ❑ Advised to call DE
- ❑ Advised to call specialist physician
- ❑ Other: _____

What follow-up action did you take?

- ❑ Called hospital physician and called patient/caregiver back
- ❑ Called DE and called patient/caregiver back
- ❑ Called outpatient pharmacy and called patient/caregiver back
- ❑ Other: _____

Medicine 3:_____
Problem: _____

- ❑ Intentional nonadherence
- ❑ Inadvertent nonadherence
- ❑ System/provider error

What recommendation did you make to the patient/caregiver?

- ❑ No change needed in discharge plan as it relates to the drug therapy
- ❑ Educated patient/caregiver on proper administration, what to do about side effects, etc.
- ❑ Advised to call PCP
- ❑ Advised to go to the ED
- ❑ Advised to call DE
- ❑ Advised to call specialist physician
- ❑ Other: _____

What follow-up action did you take?

- ❑ Called hospital physician and called patient/caregiver back
- ❑ Called DE and called patient/caregiver back
- ❑ Called outpatient pharmacy and called patient/caregiver back
- ❑ Other: _____

Figure 7 Minutes Spent

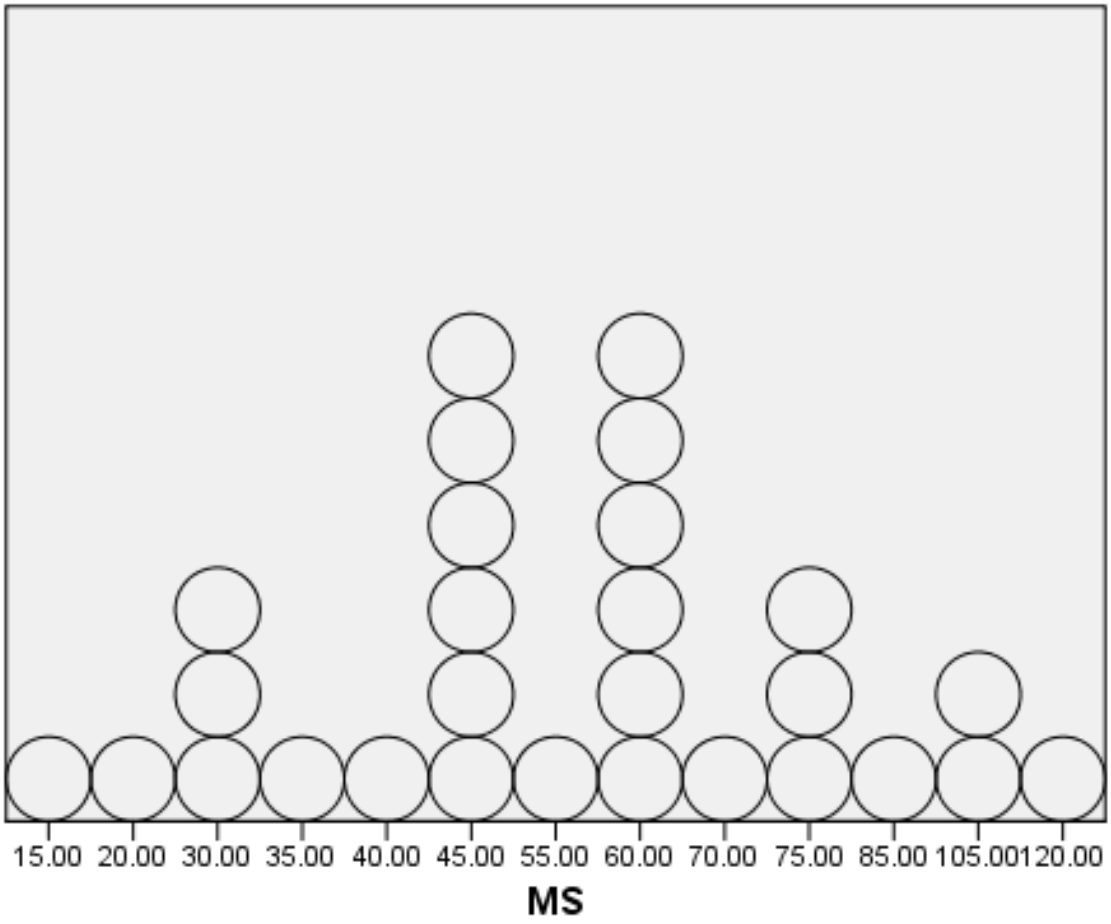
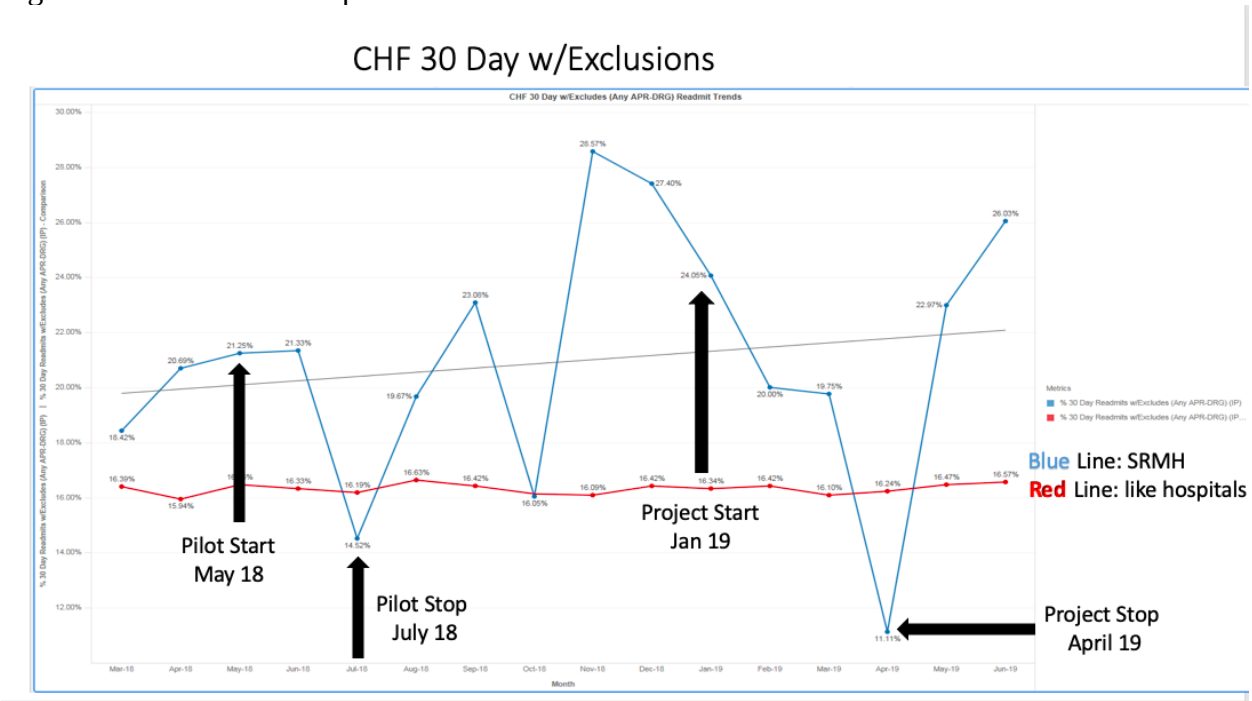


Figure 8 Heart Failure Graph in Months



References

Ackley, B., Swan, B., Ladwig, G. & Tucker, S. (2008). Levels of evidence. *Evidence-based Nursing Care Guidelines: Medical Surgical Interventions.* St. Louis, MO: Mosby Elsevier

Albert, N., Barnason, S., Deswal, A., Hernandez, A., Kociol, R., Lee, E.,…Williams, C. (2015). Transition of care in heart failure: A scientific statement from the American heart association. *Circulation Heart Failure, 8,* 384-409. doi: 10.1161/HHF.0000000000000006

Al-Rashed, S., Wright, D., Roebuck, N., Sunter, W. & Chrystyn, H. (2002). The value of inpatient pharmaceutical counselling to elderly patients prior to discharge. *Journal of Clinical Pharmacology, 54,* 657-664.

Balaban, R., Galbraith, A., Burns, M., Vialle-Valentin, C., Larochelle, M. & Ross-Degnan, D. (2015). A patient navigator intervention to reduce hospital readmissions among high risk safety-net patients: A randomized control trial. *Journal of General Internal Medicine, 30*(7*),* 907-915.

Baldonado, A. (2014). Pilot study: Avoiding readmissions of heart failure patients across the transitions of care. *SJSU ScholarWorks.* Retrieved from http://scholarworks.sjsu.edu/etd_doctoral

Boutwell, A. (2019). Improving care for multi visit patients: An introduction to the MVP method. Retrieved from https://www.healthierhere.org/wpcontent/uploads/2019/08/MVP-Method Webinar.pdf

Cantrell, S. (2017). Stopping sepsis in its tracks. *Healthcare purchasing news.* Retrieved from: https://www.hpnonline.com/stopping-sepsis-in-its-tracks/

Casey, T. (2017). Readmissions for acute MI, heart failure are expensive, lead to long hospital stays. *Cardiovascular Business Strategies in Economics, Practice & Technology*. Retrieved from https://www.cardiovascularbusiness.com/topics/healthcare-economics-policy/readmissions-acute -mi-heart-failure-are-expensive-lead-long

Chang, D., Tseng, C., & Shapiro, M. (2015). Rehospitalizations following sepsis: Common and costly. *Critical Care Medicine, 43*(10), 2085-2093.

Coleman, E., Parry, C., Chalmers, S. & Min, S. (2006). The care transitions intervention: Results of a randomized control trial. *Archives of Internal Medicine, 166*(17), 1822-1828.

DiPalo, K., Patel, K., Assafin, M. & Pina, I. (2017). Implementation of a patient navigator program to reduce 30-day heart failure readmission rate. *Progress in Cardiovascular Diseases, 60*(2), 259-266.

Diplock, G., Ward, J., Stewart, S., Scuffham, P., Stewart, P., Reeve, C., Davidson, L. & Maguire, G. (2017). The Alice Springs hospital readmission prevention project (ASHRAPP): A randomized control trial. *BioMed Central Health Services Research, 17*(153). doi: 10.1186/s12913-017-2077-7

Donze, J., Williams, M., Robinson, E., Zmilichman, E., Aujesky, D., Vasilevskis, E., Kripalani, S., Metlay, J., Wallington, T., Fletcher, G., Auerbach, A. & Schnipper, J. (2016). International validity of the hospital score to predict 30-day potentially avoidable hospital readmissions. *JAMA Internal Medicine, 175*(4), 496-502. doi: 10.1001/jamainternmed.2015.8462

Dreyer, T. (2014). Care transitions: Best practices and evidence based programs. *Home Healthcare Now, 32*(5), 309-316.

Goodwin, A., Rice, D., Simpson, K. & Ford, D. (2015). Frequency, cost and risk factors of readmissions among severe sepsis survivors. *Critical Care Medicine, 43*(4), 738-746. doi: 10.1097/CCM.0000000000000859

Kilgore, M., Patel, H., Kielhorn, A., Maya, J. & Sharma, P. (2017). Economic burden of hospitalizations of Medicare beneficiaries with heart failure. *Risk Management Healthcare Policy, 10,* 63-70. doi: 10.2147/RMHP.S130341

Koelling, T., Johnson, M., Cody, R. & Aaronson, K. (2005). Discharge education improves clinical outcomes in patients with chronic heart failure. *Circulation, 111*(2), 179. doi: 10.1161/01.CIR.0000151811.53450.B8

Kripalani, S., Theobald, C., Anctil, B. & Vasilevskis, E. (2014). Reducing hospital readmissions: Current strategies and future directions. *Annual Review of Medicine, 65,* 471-485. doi: 10.1146/annurev-med-022613-090415

Manderson, B., McMurray, J., Piraino, E. & Stolee, P. (2012). Navigation roles support chronically ill older adults through healthcare transitions: A systematic review of the literature. *Health & Social Care in the Community, 20*(2), 113-127. doi: 10.1111/j.1365-2524.2011.01032.x

Manning, S. (2011). Bridging the gap between hospital and home: A new model of care for reducing readmission rates in chronic heart failure. *The Journal of Cardiovascular Nursing, 26*(5), 368-378. doi: 10.1097/JCN.0b013e318202b15c

Markley, J., Andow, V., Sabharwal, K., Wang, Z., Fennell, E. & Dusek, R. (2013). A project to reengineer discharges reduces 30 day readmission rates. *The American Journal of Nursing, 113*(7), 55-64.

Mayr, F., Talisa, V., Balakumar, V., Chang, C., Fine, M. & Yende, S. (2017). Proportion and cost of unplanned 30 day readmission after sepsis compared with other medical conditions. *The Journal of American Medical Association, 317*(5), 530-531.

Monza, K., Harris, D. & Shaw, C. (2015). The role of the nurse navigator in the management of the heart failure patient. *Critical Care Nursing Clinics of North America, 27,* 537-549. doi: 10.1016/j.cnc.2015.07.010

Nurse. Org. (2018). Highest paying states for Registered Nurses. Retrieved from https://nurse.org/articles/highest-paying-states-for-registered-nurses/

Pal, A., Babbott, S. & Wilkinson, S. (2013). Can the targeted use of a discharge pharmacist significantly decrease 30-day readmissions? *Hospital Pharmacy, 48*(5), 380-388.

Polster, D. (2015). Patient discharge information: Tools for success. *Nursing2015,* 42-49.

Robinson, R. & Hudali, T. (2017). The HOSPITAL score and LACE index as predictors of 30 day readmission in a retrospective study at a university-affiliated community hospital. *Peer Journal.* doi: 10.7717/peerj.3137.

Ryan, P. (2009). Integrated theory of health behavior change: Background and intervention development. *Clinical Nurse Specialist, 23*(3), 161-172. doi: 10.1097/NUR.0b013e3181a42373

Schell, W. (2014). A review: Discharge navigator and its effect on heart failure readmissions. *Professional Case Management, 19*(5), 224-234. doi: 10.1097/NCM.0000000000000040

Shah, M., Patel, B., Tripathi, B., Agarwal, M., Patnaik, S., Ram, P., Patil, S., Shin, J. & Jorde, U. (2018). Hospital mortality and thirty day readmission among patients with non acute myocardial infarction related cardiogenic shock. *International Journal of Cardiology, 270,* 60-67. doi: 10.1016/j.ijcard.2018.06.036

Taylor, M., McNicholas, C., Nicolay, C., Darzi, A., Bell, D. & Reed, J. (2013). Systematic review of the application of the plan-do-study-act method to improve quality in healthcare. *BMJ Quality & Safety, 23,* 290-298. doi: 10.1136/bmjqs-2013-001862

United Health Foundation. (2018). Hospital readmissions in United States in 2018. Retrieved from https://www.americashealthrankings.org/explore/senior/measure/hospital_readmissions_sr/state/ALL

United Health Foundation. (2018). Hospital readmissions in 2018. Retrieved from https://www.americashealthrankings.org/explore/senior/measure/hospital_readmissions_sr/state/ALL

Watkins, L. (2012). An evidence-based strategy for transitioning patients from the hospital to the Community. *North Carolina Medical Journal, 73*(1), 48-50.

Watkins, L., Hall, C. & Kring, D. (2012). Hospital to home: A transition program for frail older adults. *Professional Case Management, 17(3),* 117-123.