Using Mobile Integrated Healthcare to decrease readmission rates in patients with CHF: A cost Benefit Analysis

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Abstract

This project focused on decreasing 30-day readmission rates of Heart Failure patients in 451 bed, community hospital in northern New Jersey. The retrospective quantitative chart review was performed during the 2016 calendar year. The quality improvement project compared the 30-day readmission rates of heart failure patients that received usual care with those who were visited by Mobile Integrative Healthcare. Patients who received usual care received discharge instructions from a staff nurse before leaving the hospital. Discharge teaching includes education on follow-up appointments, activity, diet, and home medications. Mobile Integrative Healthcare is the provision of medical services to patients in their home by paramedics, nurses, and emergency medical technicians (National Association of Emergency Medical Technicians, 2017). The intervention group received a follow-up visit by the Mobile Integrative Healthcare team within two business days of discharge. A chi-square test was performed to determine the relationship between Mobile Integrative Healthcare visits and 30 day hospital readmission rates in heart failure patients. Heart Failure patients that were visited by the Mobile Integrative Healthcare (MIH) team were less likely to be readmitted to the hospital within 30 days of discharge, ($\chi 2$ (1, N = 132) = 29.21, p = .00, phi = -.49).

Keywords: Heart Failure, Mobile Integrative Healthcare, Preventing 30-day readmissions

Background and Significance

According to the Centers for Disease Control and Prevention (CDC) over 5.1 million Americans were being treated for heart failure in 2015 (CDC, 2018). In 2009 heart failure cost the American healthcare system 30.7 billion dollars (CDC, 2018). Section 3025 of the Affordable Care Act allowed the Centers for Medicare & Medicaid Services to begin reducing payments to hospitals with excess readmissions (Centers for Medicare & Medicaid Services, 2018). The Centers for Medicare and Medicaid Services defines readmission as an admission to a section of the hospital within 30 days of discharge from the same or another section of the hospital (Centers for Medicare & Medicaid Services, 2018). As per the 2012, the inpatient prospective payment system (IPPS) mandated that all hospitals establish a procedure to calculate the excess readmission ratio for heart failure patients that uses a risk adjustment method that is endorsed by the National Quality Forum (Centers for Medicare & Medicaid Services, 2018). The excess readmission ratio compares the hospital readmission rate for heart failure patients to the national average (Centers for Medicare & Medicaid Services, 2018).

In 2012, the Centers for Medicare & Medicaid Services began reducing payments to hospitals with increased readmissions for certain chronic conditions, such as heart failure (Centers for Medicare & Medicaid Services, 2018). In the first year the Centers for Medicare & Medicaid Services collected $280 million dollars from 2,213 hospitals who were all penalized for excessive readmission rates (McIlvennan, Eapen, & Allen, 2015). Over the years, the number of hospitals penalized for excessive readmission rates has increased; leading to less revenue for those reprimanded hospitals. In 2017, 79% of the nation's hospitals were penalized for excessive readmission rates (Demiralp, 2017). As a result, the Centers for Medicare & Medicaid Services received $528 million dollars from penalized hospitals in 2017 (Demiralp, 2017). Hospitals

across the nation are now looking to implement programs that will reduce their 30-day readmission rates of patients considered to be at risk for readmission by the Centers for Medicare & Medicaid Services.

In an effort to decrease the 30-day readmission rates of heart failure patients, a community hospital in northern New Jersey created the Mobile Integrated Healthcare team. Mobile Integrated Healthcare is the provision of medical services to patients in their home by paramedics, nurses, and emergency medical technicians (National Association of Emergency Medical Technicians, 2017). In 2014 the healthcare system created the Mobile Integrated Healthcare team as a cost-effective intervention aimed at the prevention of hospital readmissions. Although its original intent was prevention of hospital readmissions, the program has since been expanded to treat chronic diseases, provide post-discharge instructions and care to patients, and to refer patients to appropriate community services.

Although the service started 3 years ago, it has remained underutilized by the healthcare system. The service is free to all patients in the healthcare system. The patient nor the patient's insurance is never billed for the service. The hospital provides 100% of the funding for any patient that considered to be at risk for readmission. The Mobile Integrated Healthcare team consists of a nurse, emergency medical technician, and a paramedic. The team travels in a hybrid ambulance and visits patients in their homes within two business days of discharge. A hybrid ambulance has an ambulance crew that responds to emergency 911 calls, performs hospital to hospital transports, and performs Mobile Health visits. Since the team is dispatched based on provider, case manager, or social worker referrals, patients can continue to be treated by the team for days, weeks, or months after their discharge. The visit is need-based and can be canceled or rescheduled based on the patient's condition. The nurses providing the service are emergency

medical technicians or paramedics and are capable of transporting the patients to the emergency department if necessary. The nurses' can have 1 or two partners; either a paramedic, emergency medical technician, or both. If a patient needs to be transported to the hospital, the home visit is free, but the patient is billed separately for the transport. If the patient is not critically ill, nor were they treated for a heart failure exacerbation, the patient can refuse the transport, or obtain their own transportation to the hospital.

The team can be dispatched for possible heart failure exacerbations, possible COPD exacerbations, patient education, wound checks, home safety checks, discharge teaching, and medication reconciliation. After the nurse examines the patient, the nurse then speaks to the patient's provider over the phone. The patient's provider can be either a physician or a nurse practitioner that is caring for the patient. The nurse communicates their assessment of the patient to the provider. Based on the nurse's assessment of the patient, the provider can adjust their patient's medications and treat a heart failure exacerbation with intravenous furosemide in the patient's home. If the heart failure exacerbation was not resolved within the visit, the team can transport the patient to the hospital. Often the intravenous medication is enough to alleviate the patient's symptoms and the patient can remain at home and follow up with their provider as an outpatient.

Nurses have always been involved in homecare and discharge teaching. Mobile Integrative Healthcare is an emerging program that allows nurses to expand their role and provide prehospital care. Homecare nurses can only attend a patient in their home if they have already left the hospital, there is an order from a physician, their insurance has approved a finite amount of visits, and they are providing a skilled task that a home health aide is not licensed to perform (Medicare.gov, 2018). Nurses involved in Mobile Integrative Healthcare do not need a

physician's order to examine patients in their home. These nurses obtain clients through referrals from physicians, nurse practitioners, social workers, and case managers that are involved in the patients' care. They typically see patients that did not qualify, or whose insurance company has denied homecare services. These nurses intervene before emergency services are called and help to reduce readmissions by bringing the emergency department to their home. Since the service is free, nurses can decide how many visits the patient needs. If the patient's condition requires multiple visits in one day, that is allowed.

For example, a Mobile Integrative Healthcare nurse treated a patient in their home for heart failure. The team was originally dispatched to the patient's home to review his discharge instructions. Once there, the patient was found to have shortness of breath with exertion, increased peripheral edema, increase in weight gain, and to have crackles present at the lung bases. The nurse spoke with the patient's provider, communicated their assessment, and obtained an order for intravenous furosemide. The nurse followed up with the patient later in the day. The patient's shortness of breath was alleviated and the crackles were no longer auscultated. The team prevented a transport to the hospital and a readmission. This example contrasts greatly with how homecare nurses manage patients at home in rapid atrial fibrillation.

If a homecare nurse had found the patient in heart failure exacerbation, the nurse would have called emergency services. Upon arrival, the paramedics would have treated and the emergency medical technicians would have transported the patient to the hospital; which would have led to a readmission. The patient would have received a bill from the homecare nurse, the paramedics, the emergency medical technicians, and the hospital. By treating the patient in their home, the Mobile Integrated Healthcare nurse saved the patient thousands of dollars while being able to prevent a hospital readmission.

Community Paramedicine is similar to Mobile Integrative Healthcare in several aspects. The goals of Community Paramedicine are to monitor patients at risk for hospital readmission, manage chronic diseases, increase compliance with medication regimes, and decrease the occurrence of non-emergent 911 calls (Pearson & Shaler, 2017). The difference is that nurses do not travel with the paramedics to the patient's home. The paramedics are able to communicate with physicians and treat the patients in their homes without a nurse being present.

Problem Statement

The excessive readmission rates of heart failure patients to the hospital resulted in a loss of income for the hospital. The loss of reimbursement from Medicare prompted the hospital to create the Mobile Integrated Healthcare team. The Mobile Integrated Healthcare team was created to reduce the number of patients that are being readmitted to the hospital. The purpose of this project is to examine how effective the Mobile Integrated Healthcare team is at preventing the 30-day readmission rates of heart failure patients. The clinical question is does a visitation from the Mobile Integrated Healthcare team reduce the hospital readmission rates of heart failure patients?

Needs Assessment

Since 2012 the Centers for Medicare and Medicaid have been reducing their payments to hospitals with increased 30-day readmission rates for high risk patients (Centers for Medicare & Medicaid Services, 2018). During the first year, hospitals received a 1% penalty for excessive readmission rates. The Centers for Medicare & Medicaid increased the penalty to 2% the second year and 3% the third year (Demiralp, 2017). Every year there after the rate has remained the same, but the patients considered to be at risk for readmission has expanded. The Centers for

Medicare & Medicaid now consider heart failure, pneumonia, COPD, AMI, TKA/THA, and CABG patients all at high risk for readmission (Demiralp, 2017). In 2017, penalized hospitals returned 3% of their reimbursement to the Centers for Medicare & Medicaid for excessive readmissions (Demiralp, 2017). As a direct result of the Centers for Medicare & Medicaid penalties, hospitals now have a financial incentive to reduce excessive readmission rates.

The Medicare penalties created a financial incentive for a community hospital in northern New Jersey to reduce their readmission rates of heart failure patients. In 2016 the healthcare system treated 2,278 people for heart failure in both the inpatient and outpatient settings. The average length of stay of a heart failure admission was 5.43 days in 2016. During the 2016 fiscal year the hospital paid Medicare $351,300 in penalties due to excessive heart failure readmissions. The lost income prompted the hospital to implement an intervention that would reduce the number of heart failure patients that were being readmitted to the hospital. The thought was that if the heart failure exacerbations were treated at home, it would eliminate the need to readmit the heart failure patients to the hospital.

Objectives and Aims

The goal of this project is to evaluate if the Mobile Integrative Healthcare team is effective at reducing hospital readmissions. This project has two objectives. The first is to explain what Mobile Integrative Healthcare is and to explore its effectiveness through a comparison of heart failure readmission rates. The second is to disseminate the results of this project to nurses, doctors, and nurse practitioners who care for heart failure patients.

Review of the literature

A systematic literature review was performed through CINAHL. Terms searched were heart failure, prevention of hospital readmissions, and Mobile Integrative Healthcare. Of the 262 studies, only 10 were included. Only articles that were peer reviewed, written in the English language, and available in full text through Rutgers University were included. To review the articles please see the evidence table in Appendix I.

Research by Jerant, Azari, and Nesbitt (2001) found that both telecare and follow-up telephone calls are equally effective at reducing the readmission rates of heart failure patients (Jerant, Azari, & Nesbitt, 2001). Telecare may not offer any more benefit and is less cost effective than phone calls.

Whereas Jerant et al. (2001) focused on additional interventions to decrease excessive readmissions of heart failure patients; Lee et al. (2016) found that the timing of the post-discharge follow-up was more important than the type of follow-up.

Lee et al. (2016) found that patient contact within 1 week of discharge whether it be a phone call, or an appointment with a physician, decreased the readmission rates of heart failure patients (Lee et al., 2016). Patients were either followed up with a phone call performed by a nurse or pharmacist, or had a clinic visit with their physician. It was interesting that the timing of the intervention was more important than the type of intervention. As other studies such as the one performed by Jerant et al. (2001) found that certain types of interventions were more effective than others.

Ong et al. (2016) performed a randomized controlled trial that examined the effectiveness of remote telemonitoring on reducing readmission rates and the quality of life in heart failure

patients (Ong et al., 2016). Ong et al. (2016) found that although telemonitoring did not affect the readmission rates of heart failure patients, it may improve their quality of life.

Melton et al. (2012) found that follow-up telephone calls reduced excessive readmission rates for patients that were considered high risk by the Centers for Medicare & Medicaid (Melton et al., 2012). Melton et al. (2012) study included high-risk patients but it did not limit their study to only heart failure patients.

Copeland et al. (2010) was in direct contrast with Melton et al. (2012) as they found that post discharge telephone calls did not affect the readmission rates of heart failure patients. This conflicting data may be due to the differences in studies the researchers chose to use. Copeland et al. (2010) performed a randomized prospective trial at a single site, with a sample size of 438 patients that consisted of only heart failure patients (Copeland et al., 2010).

Melton et al. (2012) performed a randomized prospective trial on a sample of 3,988 patients that included patients whose diagnoses were related to heart, gastrointestinal, and respiratory causes spread across 48 states (Melton et al., 2012).

Naylor et al. (2004) found that a transitional care program directed and executed by nurse practitioners, that consisted of an APN home visit within 24 hours of discharge, reduced the total number of readmissions, and increased the length of time between discharge and readmission or discharge and death (Naylor et al., 2004).

A systematic review of 26 randomized controlled trials found that transitional care interventions are associated with a decreased amount of hospital readmissions (Verhaegh et al., 2014). The same systematic review found that interventions that included a home visit by a nurse or APN, care coordination by a nurse or APN, and communication between the hospital and the

primary care provider had the greatest effect on decreasing 30-day readmission rates (Verhaegh et al., 2014).

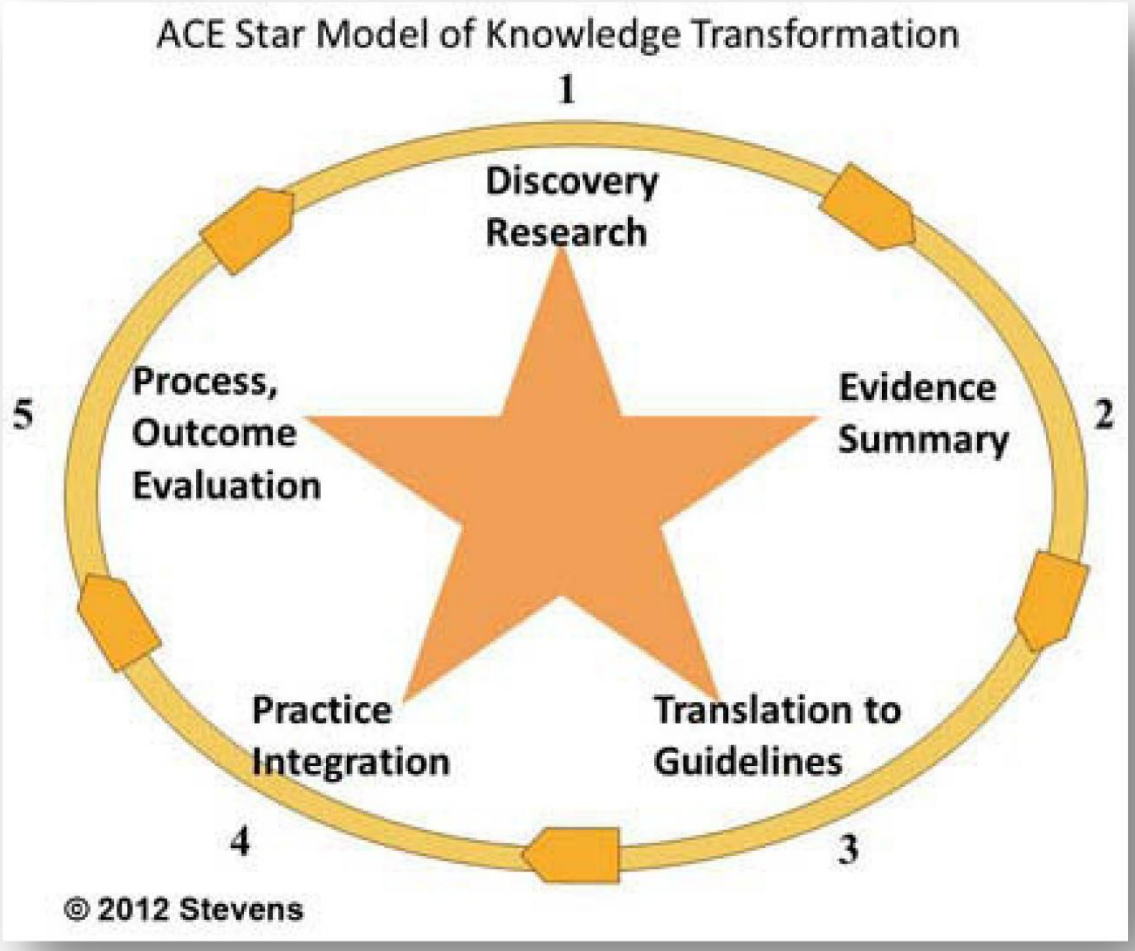
The studies included in this literature reviewed all aimed at reducing heart failure hospital readmissions. Various interventions were used as a means to reduce hospital readmissions of heart failure patients. Some of those interventions included telemonitoring, telecare, and home visits by either a nurse or an advanced practice nurse. This quality improvement is unique in that it deployed a nurse, emergency medical technician, and a paramedic to patients' homes. The project also treated heart failure exacerbations within the home; whereas the other studies did not resolve heart failure exacerbations.

Theoretical Framework

The theoretical framework that guided the proposal and DNP project was the ACE Star Model of Knowledge Transformation. The ACE Star Model of Knowledge Transformation helps nurses decipher, absorb, and apply evidence based research to healthcare delivery. The ACE Star Model of Knowledge Transformation places the nurse's current knowledge base at the center. The framework helps the nurse organize and apply research while sequentially undergoing the 5 stages of knowledge transformation (Stevens, 2013).

The ACE Star Model of Knowledge Transformation was created to help the nurse decipher and apply research to their clinical practice. When the model is applied to knowledge transformation the nurse sequentially moves through five steps. They are research discovery, summary of the evidence, translation of the evidence to guidelines, integration of research into clinical practice, and outcome evaluation of the new clinical process (Stevens, 2013). During research discovery, the researcher searches for evidence based literature on their topic. It was

during stage one of the star theory that article search engines were utilized to find peer reviewed, evidence based literature on interventions that reduced heart failure readmissions. In stage two of the ACE star model, the researcher created a table of evidence and performed a literature review. During stage three a proposal for a quality improvement project was created and approved by the Institutional Review Board. During stage 4 of the star theory, the researcher collected and analyzed the data. It was during the fifth stage that the researcher determined the effectiveness of the Mobile Integrative Healthcare team. The results of the project were then disseminated through the university through a poster and power point presentation.



(Anne Arundel Medical Center, 2018)

Methodology

The project design is a quantitative quality improvement project. The method includes a retrospective chart review and statistical analysis. Heart failure patients' charts were reviewed during the 2016 calendar year. Heart failure patients' charts were reviewed regardless of whether or not they were readmitted within 30 days of discharge from the hospital. A chi-square test was performed to determine the relationship between Mobile Integrative Healthcare visits and 30 day hospital readmission rates in heart failure patients. The ICD 10 code of I50* for Heart Failure and the ICD 9 code 428* was used to identify the charts of interest. Patient gender, race, age, insurance status, marital status, and presence of comorbidities were the demographics that were collected. The average costs of both a Mobile Integrative Healthcare visit and a heart failure admission were compared. The Mobile Integrative Healthcare visits were considered cost effective if they reduced hospital readmissions and were more affordable than a hospital readmission.

Setting

The project occurred in a small community hospital that serves 440,000 people annually in northern New Jersey ([redacted]). The Mobile Integrative Healthcare team was dispatched to patient homes in Bergen and Passaic counties in northern New Jersey. The hospital is a 451 bed facility that treated 70,500 people in the Emergency Department during 2017 [redacted]). The hospital is located in a suburban area with people of mixed socioeconomic class. The healthcare system treated 2,278 people for heart failure in both the inpatient and outpatient setting in 2016 [redacted]).

Study Population

Charts were selected based on ICD 10 and ICD 9 codes. The ICD 10 code for HF is I50* and the ICD 9 code is 428.* Charts were included if they had an ICD 10 code of I50* or an ICD 9 code of 428* during the year 2016. Charts were eligible for the study if they had a diagnosis of heart failure. Patients were eligible even if they had multiple co-morbidities or no insurance. The control consisted of patients who received usual care. Usual care was defined as heart failure patients who received discharge teaching from a registered nurse before leaving the hospital. Discharge teaching includes education on follow- up appointments, activity, diet, and home medications. The heart failure patients who had received the intervention received a home visit from the MIH team within two business days of hospital discharge.

Study Interventions

This quality improvement project was a retrospective chart review with no real time interventions. All interventions were completed before the start of the project.

Outcome Measures

The patient demographics that was gathered included patient gender, race, age, insurance status, marital status, and the presence of comorbidities. Since the Mobile Integrated Healthcare team only travels to Bergen and Passaic Counties in New Jersey, all subjects lived in either Bergen or Passaic County. The charts were identified by the ICD 10 code I50* or ICD 9 code 428.* A data collection tool was created to assist with the data collection process (Appendix IV). A chi-square test was performed to determine the relationship between Mobile Integrative Healthcare visits and 30 day hospital readmission rates in heart failure patients. Results were considered significant if $p < 0.05$.

Benefits/Risks

There were no physical, psychological, economic risk, or harm to the subjects. It was a chart review that did not collect any identifying patient information. No patients were registered or participated in this study. There was no direct interaction with patients, nor was identifying patient information collected or stored. There was no risk to participants' privacy or confidentiality.

Subject Recruitment

No subjects were recruited for this project. The project only reviewed the de-identified medical records of heart failure patients.

Consent Procedure

Informed consent was waived as there was no risk to participants.

Subject Costs and Compensation

The costs of the study were minimal. Zero dollars were spent while the data analysis was performed.

Project Timeline

The project was completed by January 2019. The hospital's Institutional Review Board approved the quality improvement project in November of 2017. A copy of the site's IRB is included in Appendix II. Rutgers Institutional Review Board approved the study in July of 2018. A copy of Rutgers IRB approval is included in Appendix III. Data collection was completed in October of 2018. A copy of the data collection tool is included in Appendix IV. A copy of the project timeline is included in Appendix V.

Resources Needed/Economic Considerations

No resources or economic considerations were needed for this project. Costs were not incurred during this project.

Evaluation Plans

Data Maintenance/Security

In order to ensure the confidentiality and privacy of patients, the charts used in this study were de-identified and numbered sequentially. No identifying patient information was used in this study. Data was stored on an unencrypted flash drive that only the investigator had access to. Data was stored on an unencrypted electronic repository at SSB 1135 Bergen St, Newark, NJ.

Data Analysis

The quality improvement project used statistics of central tendency to determine how likely the association occurred by chance. Pearson's chi-square test was used to analyze the data. Results were significant if $p < 0.05$.

Findings

A chi-square test was performed to determine the relationship between Mobile Integrative Healthcare visits and 30 day hospital readmission rates in heart failure patients. Heart Failure patients that were visited by the Mobile Integrative Healthcare (MIH) team were less likely to be readmitted to the hospital within 30 days of discharge, ($\chi 2$ (1, N = 132) = 29.21, p = .00, *phi* = -.49). The sample size consisted of 132 heart failure patients; 66 patients were examined by MIH and 66 patients were not examined by MIH. Heart failure patients that weren't visited by MIH were 30.3% likely to be readmitted to the hospital within 30 days of discharge.

Heart failure patients that were examined by MIH were 6.8% likely to be readmitted to the hospital within 30 days of discharge. The average age was 82 years old. The majority of the patients were insured by Medicare. Please see the attached data tables in appendix VI.

Recommendations and Discussion

Economic/Cost Benefit

The hospital allocated $ 78, 239 for MIH visits in 2016. Approximately 280 MIH visits occurred during 2016. Each MIH visit cost the healthcare system about $280. The patients nor their insurance were billed for the service. The cost of the MIH visit included supplies, employee wages, and vehicle maintenance. The hospital billed Medicare $7,990.00 for every heart failure admission. Medicare only reimbursed the hospital with $7,976.00 per heart failure admission. Although the hospital billed Medicare $ 7,990.00, the actual cost of the visit is significantly higher because that cost did not include overhead charges. Examples of overhead charges are the cost of food, food preparation, hospital security, utilities, and hospital maintenance.

Impact on Healthcare Quality and Safety

Patients who were readmitted to the hospital were at an increased risk for higher mortality rates, poorer prognosis, functional decline, and adverse advents. Heart failure patients are often advanced in age. The average age in this study was 82 years old. All 162 patients that were included in this study had a diagnosis of heart failure. By treating and preventing hospital readmissions, the MIH team may have prevented hospital associated adverse events, functional decline, and reduced mortality rates in heart failure patients.

Hospitalizations put the elderly at risk for hospital-acquired infections, injuries related to falls, adverse drug reactions, development of pressure ulcers, physical decline, and delirium (Hughes, 2008). Bed rest and inactivity are risks for patients in the hospital and impact the elderly's functional status. While hospitalized, elderly patients experience a decline in their ability to complete their activities of daily living. Hughes stated that functional decline occurred as early as 48 hours of hospitalization (Hughes, 2008). As a direct result of their functional decline during their hospital stay, elderly patients will often need to be discharged to a rehab facility or to a skilled nursing facility. If their functional status does not improve while at the extended care facility, these patients may never be able to care for themselves as they had before their hospital stay. By preventing readmissions to the hospital, the MIH team allowed the elderly patients to maintain their current functional status and to continue to live in their homes.

Heart failure patients that are readmitted to the hospital have a higher mortality rate and poorer prognosis than heart failure patients who are treated as outpatients. In a study done by Wang, Gallagher, Sze, Hales, & Tofler (2017) they found that heart failure patients who had >2 readmissions within a year of their initial hospitalization had twice the mortality rate of those patients who did not (Wang, Gallagher, Sze, Hales, & Tofler, 2017). Another study that was completed in China found that heart failure patients that were readmitted to the hospital also had a significantly higher mortality rate than those patients that were managed outside of the hospital (Tung, Chou, Liu, Hsieh, Wu, Lin, Wen, & Chu, 2016).

Policy Implications

In other parts of the country, Mobile Integrated Healthcare is already being used to decrease hospital readmissions and visits to the Emergency Department. In Louisiana paramedics

involved with the (EBRP) Emergency Medical Services' Mobile Integrated Health program strive to reduce non-emergency visits to the emergency department, lower hospital readmission rates, and improve patient outcomes by evaluating and treating patients in their homes (Healthy BR, 2018). In Fort Worth, Texas paramedics and nurses are involved in MedStar's mobile healthcare programs. The goal of their program is to reduce hospital readmissions and non-emergency department visits through medical evaluations, education, and aligning patients with the appropriate resources to treat their medical needs (MedStar Mobile Healthcare, 2018).

In Ridgewood, New Jersey a small community hospital started Mobile Integrative Healthcare to decrease hospital readmission rates. This program is the first of its kind in New Jersey. Since its innovation, other hospitals have developed similar programs that utilize paramedics and nurses to evaluate, educate, and align patients with the appropriate resources to treat their medical conditions.

In the state of New Jersey, there are currently several barriers preventing the program from being implemented throughout the state. Two of the main barriers are NJ legislation and funding for the programs. Currently paramedics and emergency medical technicians are licensed in pairs; not individually as nurses are. The state also dictates what tasks paramedics and emergency medical technicians can perform. The state also inspects and licenses all emergency vehicles and dictates what medical supplies/equipment needs to be present on each vehicle.

Nurses in the state of New Jersey are licensed individually and the state law does not specify what tasks a nurse can do. For example in order for an emergency medical technician to be able to administer a certain medication such as nitroglycerin, the state must approve and put into law exactly how much, under what clinical parameters, and what route that medication can

be administered. For example if a patient is experiencing chest pain, an emergency medical technician can only assist in administering a patient's own nitroglycerin. Emergency medical technicians do not carry, nor can they administer nitroglycerin, if the patient does not already have the medication (New Jersey Department of Health Office of Emergency Medical Services, 2015).

If a patient is experiencing chest pain paramedics can only administer 0.4 mg nitroglycerin sublingually every 5 minutes while the patient's systolic blood pressure is greater or equal to 100 mmHg (NJ.gov, 2013). Until New Jersey state law changes, paramedics are not allowed to change the dose, route, or clinical parameters under which the medication can be given. Whereas a nurse can administer any medication, in any specific amount via any specific route, as long as there is an order from an independently licensed practitioner, the facility supplies the medication, and it is under the nurse's scope of practice. Should the independently licensed practitioner change the dose, route, or clinical parameters the state law does not have to change before the nurse can administer the medication.

Funding for the programs is also a major barrier. Currently Mobile Integrative Healthcare programs are funded by hospitals. The state does not offer hospitals financial assistance in starting or maintaining a Mobile Integrative Healthcare program. The hospitals providing the funding also dictate what services the Mobile Integrative Healthcare program will perform. This practice prevents the other Mobile Integrative Healthcare programs from offering the same services. Without state funding, or state guidelines, each individual Mobile Integrative Healthcare program will continue to offer different services.

Translation

The Joint Commission is an independently, not for profit that accredits and certifies hospitals in the United States of America (The Joint Commission, 2018). In 2019, the Joint Commission will offer an advanced certification in heart failure (The Joint Commission, 2018). This certification is only available to medical centers that have an outpatient heart failure clinic and are participating in the American Heart Association's Get With the Guidelines: Heart Failure program (The Joint Commission, 2018). The American Heart Association's program focuses on reducing 30-day readmission rates of heart failure patients (American Heart Association, 2018).

Thanks to The Joint Commission, the Centers for Medicare and Medicaid (CMS), and the American Heart Association, medical centers across the country have an incentive to decrease their 30-day readmission rates of heart failure patients. Mobile Integrative Healthcare programs can help these facilities reduce their readmission rates of heart failure patients and gain this prestigious award. Mobile Integrative Healthcare visits have shown to be a cost effective means of reducing 30-day readmission rates of heart failure patients.

Of course there are barriers that will have to be abolished in order to implement more Mobile Integrative Healthcare programs. Some of the barriers are state and federal regulations and funding for the programs. If these barriers could be removed, more hospitals will be able to reduce their readmission rates of heart failure patients through Mobile Integrative Healthcare.

Dissemination

Since no subjects were recruited or participated in this study, no patients will have to be notified with the results of this study. The results of this study were presented to nursing supervisor of the Specialty Critical Care Unit and the director of the Mobile Intensive Care Unit.

The results will also be distributed to several hospital administrators through email and the hospital's intranet.

Professional Reporting

This study will be shared with the academic community through conferences, poster presentations, and articles. Abstracts for poster presentations have been submitted for The National Teaching Institute & Critical Care Exposition (NTI) and The New Jersey League of Nursing Convention (NJLN). Manuscripts will be submitted for possible publication through JACC: Heart Failure and Critical Care Nurse. Both journals publish articles that are peer reviewed and evidence based.

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Appendices

Appendix I: Table of Evidence

Article #	Author & Date	Evidence Type	Sample, Sample Size, Setting	Study findings that help answer the EBP Question	Limitations	Evidence Level & Quality
1	Jerant, A., Azari, R., Nesbitt, T. (2001)	Randomized controlled trial	Sample: Heart Failure patients, Sample Size: 37 participants, Setting: University of California Davis Hospital	The results were insignificant, but the results trended towards reduced costs and readmission rates for CHF patients that were in the intervention groups.	Small sample size, insignificant results, p> 0.05.	I
2	Lee, K., Yang, J., Hernandez, A., Steimle, A., Go, A. 2016	Nested matched case-control study.	Sample: Heart Failure patients, Sample Size:1584 cases, Setting:healthcare system in California	Patients who had a clinic visit within 7 days of discharge had lower 30 day readmission rates than patients with no follow-up and those followed-up with phone calls.	Treatment selection bias, differences in disease severity amongst sample.	II

3	Ong,M.K., Romano, P.S., Edgington, S., Aronow, H.U., Auerbach, A.D., Black, J.T., & … Sadeghi, B. 2016	Randomized controlled study.	Sample: Heart failure patients, Sample Size: 1437 patients, Setting: 6 medical centers in California	Telemonitoring and telephone calls did not reduce readmission rates or mortality. It may have improved the quality of life in some patients.	Large population from multiple medical centers.	I
4	Melton, L. D., Foreman, C., Scott, E., Mcginnis, M., & Cousins, M. 2012	Randomized prospective trial.	Sample: high risk readmission patients, Sample Size: 3,988 patients, Setting: patients that shared health insurance from 48 states	The results showed that prioritized post discharge phone calls have the potential to reduce readmission rates, increase outpatient physician visits, and encourage patients to fill their prescriptions sooner than discharged patients receiving usual care.	Large population from various medical centers across 48 states	II

5	Copeland, L., Berg, B., Johnson, D., & Bauer, R. 2010	Randomized prospective trial.	Sample: Heart failure patients, Sample size: 438 patients, Setting: patients were all treated at the Veterans Health Administration	Patients in the intervention group had better compliance with weight monitoring and performing prescribed exercise. Congestive heart failure costs and overall costs were higher in the intervention group.	Patients were all being treated at the Veterans Health Administration. It did not affect readmission rates.	II
6	Gheorghiade, M., Vaduganathan, M., Fonarow, G., & Bonow, R. 2013	Non-research	n/a	Recommendations to reduce heart failure readmissions	Not a research study	V A
7	Naylor, M., Brooten, D., Campbell, R., Maislin, G., McCauley, K.,	Randomized controlled trial	Sample: Heart failure patients, Sample size: 239 patients, Setting: 6 Philadelphia hospitals	APN home visits to heart failure patients increased the length of time between hospital discharge and readmission,	Patients were only taken from the Philadelphia area.	I

	& Schwartz, J. 2004			reduced total number of readmissions.		
8	Verhaegh, K. J., MacNeil-Vroomen, J. L., Eslami, S., Geerlings, S. E., de Rooij, S. E., & Buurman, B. M. 2014	Systematic Review of RCT	Sample: Randomized controlled trials, Sample size: 26 RCT's, Setting: Meta-analysis from articles pulled from PubMed MEDLINE, EMBASE, the Cochrane Library, and CINAHL	Transitional care interventions are associated with reduced readmissions in chronically ill patients. A home visit within 3 days of discharge by a RN or APN and communication between the RN and physician or APN and physician reduced readmissions.	Differences in studies. Differences in results reported amongst studies.	
9	Vedel, I., & Khanassov, V. 2015	Systematic review and meta-analysis of RCT	Sample: Randomized controlled trials, Sample size: 41 RCT's, Setting: Meta-analysis	Transitional care interventions reduced emergency department visits for heart failure patients.	Differences in studies. Differences in results reported amongst studies.	II

10	Ziaeian, B., & Fonarow, G. C. 2016	Non-research	N/a	Heart failure patients are more likely to have a shorter length of stay and increased readmission rates.	Not a research study.	V

Appendix II: Site IRB Approval

WIRB
Global Leader | Proven Expert

November 8, 2017

Kathryn Michelotti, RN
The Valley Hospital
223 N Van Dien Ave.
Attn: Research Department 1 Linwood Ave
Ridgewood, New Jersey 07652

Dear Ms. Michelotti:

SUBJECT: IRB EXEMPTION—REGULATORY OPINION
Protocol Title: Preventing 30-day Readmission Rates of Heart Failure Patients through the Utilization of the Mobile Integrated Healthcare Team
Investigator: Kathryn Michelotti, RN

This letter is in response to your request for an exempt review determination of the above-referenced research project. Western Institutional Review Board's (WIRB's) IRB Affairs Department reviewed the exemption criteria under 45 CFR §46.101(b)(4), which states that the following category of research is exempt from the requirements of 45 CFR 46:

> "Research, involving the collection or study of existing data, documents, records, pathological specimens, if these sources are publicly available or if the information is recorded by the investigator in such a manner that subjects cannot be identified, directly or through identifiers linked to the subjects."

The above-referenced research project meets the conditions for exemption under 45 CFR 46.101(b)(4). All of the data is in existence as of October 20, 2017 and the information will be recorded in such a manner that subjects cannot be identified, directly or through identifiers linked to the subjects. You have also confirmed that the results of this study will not be submitted to the Food and Drug Administration (FDA) for marketing approval.

This exemption determination can apply to multiple sites, but it does not apply to any institution that has an institutional policy of requiring an entity other than WIRB (such as an internal IRB) to make exemption determinations. WIRB cannot provide an

Western Institutional Review Board®
1019 39th Avenue SE Suite 120 | Puyallup, WA 98374-2115
Office: (360) 252-2500 | **Fax:** (360) 252-2498 | **www.wirb.com**

exemption that overrides the jurisdiction of a local IRB or other institutional mechanism for determining exemptions. You are responsible for ensuring that each site to which this exemption applies can and will accept WIRB's exemption decision.

WIRB does not impose an expiration date on its IRB exemption determinations. Please note that any future changes to the project may affect its exempt status, and you may want to contact WIRB about the effect these changes may have on the exemption status before implementing them.

If you have questions, please contact WIRB Regulatory Affairs at 360-252-2500, or e-mail RegulatoryAffairs@wirb.com.

AI:tb
B4-Exemption-Michelotti (11-08-2017)
cc: Avery Freed, The Valley Hospital, Inc.
WIRB Accounting
WIRB Work Order # 1-1042396-1

Appendix III: Rutgers IRB Approval

Rutgers University eIRB: Study Approved

eIRB@ored.rutgers.edu Jul 5, 2018, 9:31 AM
to kamienma, me, ajanuary

Arts & Sciences IRB - New Brunswick
335 George Street
Suite 3100, 3rd Floor
New Brunswick, NJ 08901
Phone: 732-235-2866

Health Sciences IRB - New Brunswick/Piscataway
335 George Street
Suite 3100, 3rd Floor
New Brunswick, NJ 08901
Phone: 732-235-9806

Health Sciences IRB - Newark
65 Bergen Street
Suite 511, 5th Floor
Newark, NJ 07107
Phone: 973-972-3608

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[redacted]	[redacted]	[redacted]	[redacted]
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[redacted]	[redacted]	[redacted]	[redacted]

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[redacted]	[redacted]	[redacted]	[redacted]

[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

[redacted]	[redacted]	[redacted]	[redacted] approval - Exempt

*** Study Performance Sites:**

Rutgers University - School of Nursing

[redacted]

ALL APPROVED INVESTIGATOR(S) MUST COMPLY WITH THE FOLLOWING:

1. Conduct the research in accordance with the protocol, applicable laws and regulations, and the principles of research ethics as set forth in the Belmont Report.

2. **Continuing Review:** Approval is valid until the protocol expiration date shown above. To avoid lapses in approval, submit a continuation application at least eight weeks before the study expiration date.

3. **Expiration of IRB Approval:** If IRB approval expires, effective the date of expiration and until the continuing review approval is issued: **All research activities must stop unless the IRB finds that it is in the best interest of individual subjects to continue. (This determination shall be based on a separate written request from the PI to the IRB.) No new subjects may be enrolled and no samples/charts/surveys may be collected, reviewed, and/or analyzed.**

4. **Amendments/Modifications/Revisions**: If you wish to change any aspect of this study, including but not limited to, study procedures, consent form(s), investigators, advertisements, the protocol document, investigator drug brochure, or accrual goals, you are required to obtain IRB review and approval prior to implementation of these changes unless necessary to eliminate apparent immediate hazards to subjects.

5. **Unanticipated Problems**: Unanticipated problems involving risk to subjects or others must be reported to the IRB Office (45 CFR 46, 21 CFR 312, 812) as required, in the appropriate time as specified in the attachment online at: https://orra.rutgers.edu/hspp

6. **Protocol Deviations and Violations**: Deviations from/violations of the approved study protocol must be reported to the IRB Office (45 CFR 46, 21 CFR 312, 812) as required, in the appropriate time as specified in the attachment online at: https://orra.rutgers.edu/hspp

7. **Consent/Assent**: The IRB has reviewed and approved the consent and/or assent process, waiver and/or alteration described in this protocol as required by 45 CFR 46 and 21 CFR 50, 56, (if FDA regulated research). Only the versions of the documents included in the approved process may be used to document informed consent and/or assent of study subjects; each subject must receive a copy of the approved form(s); and a copy of each signed form must be filed in a secure place in the subject's medical/patient/research record.

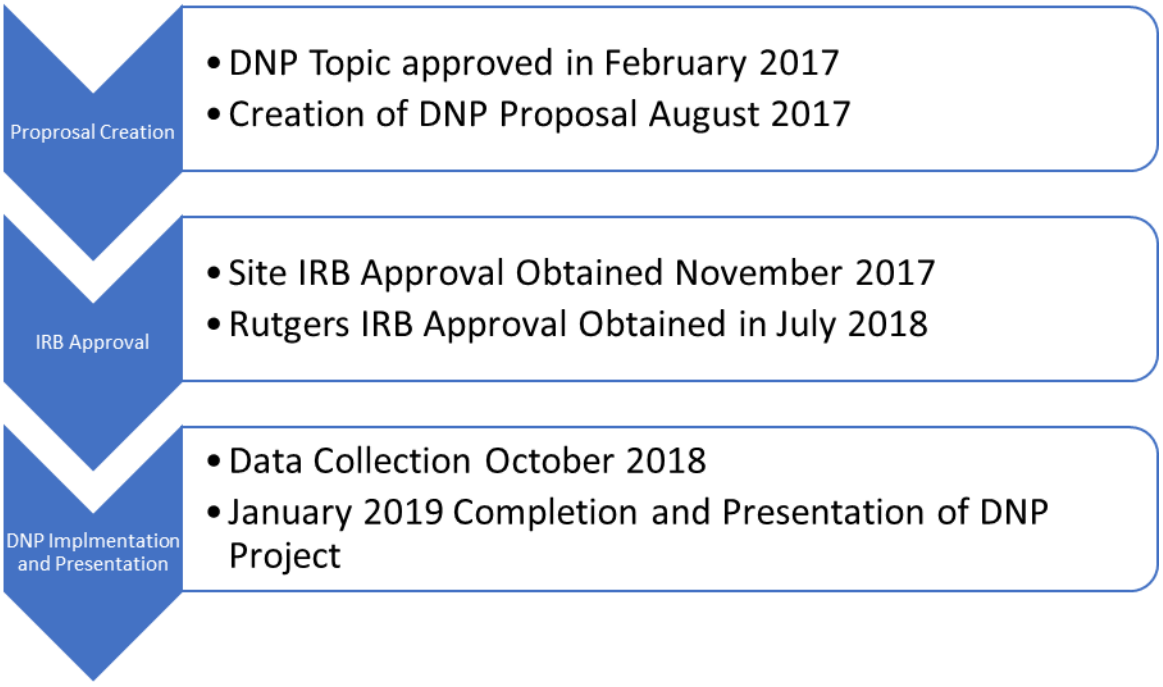
8. **Completion of Study:** Notify the IRB when your study has been stopped for any reason. Neither study closure by the sponsor or the investigator removes the obligation for submission of timely continuing review application or final report.

9. The Investigator(s) did not participate in the review, discussion, or vote of this protocol.

Appendix IV: Data Collection Tool

									Patient Demographics										
		Age		Race		Gender	Presence of multiple co-morbities				Insurance status				Martial Status				
1																			
2																			
									Heart Failure Patients										
		Readmitted in 30 days yes or no											Visited by Mobile health yes or no						
1																			
2																			
									Finances										
Cost of each Heart Failure Admission to the Hospita as of 2016																			
Cost of each Mobile Integrated Healthcare Visit to the Hospita as of 2016																			
Valley excess readmission ratio for Heart Failure patients for 2016																			
Valley Hospital Money lost in 2016 (aka given back to Medicare/Medicaid) due to excess readmissions													vs money lost in 2017 due to readmissions						
									Totals										
Total number of Heart failure patients treated at Valley in 2016																			
Total number of Heart failure patients treated by Mobile Integrative Healthcare 2016																			

Appendix V: Timeline



Appendix VI: Data Analysis

MIH Visit (yes or no) * Readmitted to Hospital within 30 days of Discharge (yes or no) Crosstabulation

			Readmitted to Hospital within 30 days of Discharge (yes or no)		
			yes	no	Total
MIH Visit (yes or no)	yes	Count	9	57	66
		% within MIH Visit (yes or no)	13.6%	86.4%	100.0%
		% within Readmitted to Hospital within 30 days of Discharge (yes or no)	18.4%	68.7%	50.0%
		% of Total	6.8%	43.2%	50.0%
	no	Count	40	26	66
		% within MIH Visit (yes or no)	60.6%	39.4%	100.0%
		% within Readmitted to Hospital within 30 days of Discharge (yes or no)	81.6%	31.3%	50.0%
		% of Total	30.3%	19.7%	50.0%
Total		Count	49	83	132
		% within MIH Visit (yes or no)	37.1%	62.9%	100.0%
		% within Readmitted to Hospital within 30 days of Discharge (yes or no)	100.0%	100.0%	100.0%
		% of Total	37.1%	62.9%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	31.191[a]	1	.000		
Continuity Correction[b]	29.211	1	.000		
Likelihood Ratio	33.054	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	30.954	1	.000		
N of Valid Cases	132				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 24.50.

b. Computed only for a 2x2 table

Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	-.486	.000
	Cramer's V	.486	.000
N of Valid Cases		132	