

Emphasizing and Increasing Cardiac Rehabilitation Referrals in an Outpatient Cardiology Clinic

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### Abstract

Heart disease is the second leading cause of death in NC. Cardiac rehabilitation (CR) is a class Ia recommendation for patients who have experienced a myocardial infarction (MI), percutaneous coronary intervention (PCI), or cardiac surgery. CR participation decreases morbidity and mortality in eligible patients. Despite this recommendation, referral rates remain suboptimal. The purpose of this DNP project was to increase referrals to CR from a cardiology clinic through provider education and use of a screening tool. Educational content was generated using materials from the Million Hearts® initiative and presented at staff meetings and via one-on-one education. A screening tool was used to identify patients in need of a CR referral. Four plan-do-study-act cycles were completed to improve project implementation. Referrals to CR ( $n=138$ ) increased by 43% over 10 weeks. Screening tool completion varied widely between weeks ( $M = 10.80$ ,  $SD = 10.33$ ). Diversity of referrals increased from mainly CABG and valve surgery patients to include more MI and PCI patients. Most providers were unaware that the consult to CR order from the inpatient setting did not transfer as a referral to the ambulatory setting. Therefore, providers assumed patients were referred at hospital discharge, when in fact they were not. Lack of an electronic referral from hospital discharge proved to be the biggest barrier to CR referrals. A CR nurse liaison and post-MI clinic would be most beneficial in standardizing and improving CR referrals.

*Key words:* cardiac rehabilitation, referral, myocardial infarction, quality improvement

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## **Chapter One: Overview of the Problem of Interest**

Heart disease is the second leading cause of death in North Carolina (Centers for Disease Control and Prevention [CDC], 2018). One in three deaths in the United States is related to cardiovascular disease (Million Hearts, n.d.). The United States spent \$100.9 billion on direct costs of heart disease from 2013 to 2014 (Benjamin et al., 2018). Hypertension, elevated cholesterol, smoking, poor diet, obesity, physical inactivity, excessive alcohol use, and diabetes contribute to the development of heart disease (Centers for Disease Control and Prevention [CDC], 2017). Cardiac rehabilitation (CR) is a class Ia recommendation for certain cardiovascular conditions including myocardial infarction (MI), heart surgery, and percutaneous coronary intervention (PCI) and a class IIa recommendation for heart failure (HF) (Ades et al., 2017; Smith et al., 2011; Yancy et al., 2013). Despite this recommendation, CR continues to be an underutilized resource.

The Centers for Disease Control and Prevention (CDC) and Centers for Medicare and Medicaid Services (CMS) extended the Million Hearts® initiative to prevent one million cardiovascular events by 2022. The Million Hearts® initiative set a national goal of 70% attendance in cardiac rehabilitation for eligible patients by 2022 (Wall, Stolp, Lucido, & Graff, 2018). This Doctor of Nursing (DNP) project will help support the Million Hearts® initiative by striving to increase referrals to cardiac rehabilitation for eligible patients.

### **Background Information**

Heart disease remains the leading cause of death in the United States. One in four Americans will die of heart disease each year. Sedentary lifestyle, obesity, diabetes, poor diet, and alcohol use are common risk factors for heart disease. Almost half of all Americans possess at least one of the mentioned risk factors (CDC, 2017). Heart disease encompasses many

conditions, including coronary artery disease, atrial fibrillation, hypertension, aortic conditions, valvular disease, cardiomyopathy, and HF.

Acute coronary syndrome (ACS), also known as a heart attack, is an interruption in the blood supply to the heart. As blood flow to the cardiac muscle is blocked, ischemia, chest pain, and myocardial cell death occur (American Heart Association [AHA], 2017). An MI occurs when ischemia causes death of myocardial tissue (American Heart Association [AHA], 2016). Fourteen percent of patients who experience an MI will die within the year of injury (Benjamin et al., 2018). Every 40 seconds, an American will have an MI (Benjamin et al., 2018).

While the heart can recover from an ischemic injury, recovery takes weeks, and the heart is often weakened after the damage (AHA, 2016). Patients typically have to undergo coronary artery bypass grafting (CABG) or percutaneous coronary interventions (PCI) to prevent the ischemic injury from reoccurring (National Heart Lung and Blood Institute [NHLBI], n.d.). These revascularization procedures must be accompanied by lifestyle changes to prevent future events. Such changes include physical activity, nutritious diet, weight loss, smoking cessation, and stress management to help manage the symptoms and improve quality of life (NHLBI, n.d.).

Heart failure, another subset of heart disease, is an impairment in the heart's ability to fill with or eject blood (Yancy et al., 2013). Manifestations may include dyspnea, fatigue, edema, and exercise intolerance (Yancy et al., 2013). These symptoms lead to a decrease in health-related quality of life due to decreased physical function and energy (Yancy et al., 2013). Heart failure with reduced ejection fraction (HFrEF) is defined as HF with an ejection fraction of less than 40%, whereas heart failure with preserved ejection fraction (HFpEF) is more difficult to define but does not encompass severe systolic dysfunction (Yancy et al., 2013). HF can be further classified based on its progression. The New York Heart Association classifies HF in

stages from I to IV, emphasizing physical ability and symptoms, whereas the American College of Cardiology Foundation (ACCF) and the American Heart Association (AHA) classify HF based on the structural component of the disease (Yancy et al., 2013).

Between 2011 and 2014, an estimated 6.5 million Americans were living with HF (Benjamin et al., 2018). This number is expected to rise by 46% from 2012 to 2030, increasing the prevalence of HF to over eight million people (Benjamin et al., 2018). Americans have a 20% lifetime chance of developing HF over the age of 40 (Yancy et al., 2013). The mortality rate approaches 50% within five years of diagnosis (Yancey et al., 2013). In 2012, approximately 30.7 billion dollars were spent on HF, with 68% of this attributed direct health care costs (Benjamin et al., 2018). If HF rates continue to rise, costs could increase to 69.7 billion dollars annually by 2030 (Benjamin et al., 2018).

Cardiac rehabilitation is a class I recommendation for patients with an ST-elevation myocardial infarction (STEMI) and non-ST elevation myocardial infarction (NSTEMI) (Amsterdam et al., 2014; Antman et al., 2007). CR provides education, risk factor modification, supervised exercise, and lifestyle modification to improve cardiac function. All patients should have a CR referral by the first outpatient visit following an MI (Amsterdam et al., 2014; Antman et al., 2007). Cardiac rehabilitation is also a class IIa recommendation for heart failure treatment; it reduces mortality and hospitalizations related to heart failure while improving the patient's health-related quality of life and functional capacity. (Yancy et al., 2013). CR programs use multidisciplinary teams to not only supervise exercise but also to enhance quality of life and provide psychosocial support, nutritional counseling, and risk factor modification (Menezes et al., 2014). CR can reduce mortality by 13 to 24% over three years (Ades et al., 2017). Data from the National Cardiovascular Disease Registry showed that between 2007 and 2012, CR referrals

increased from 72.9% to 80.7% for patients after STEMI/NSTEMI admission (Benjamin et al., 2018). However, an analysis of Medicare claims determined only 13.9% of patients enroll in CR after an MI (Benjamin et al., 2018). Furthermore, the referral rate for CR for HF patients is only 10% (Golwala et al., 2015). Despite evidence and availability of CR programs, CR remains an underutilized resource.

Medicare provides reimbursement for CR after patients experience an MI, CABG, heart valve surgery, PCI, or transplant (Centers for Medicare and Medicaid Services [CMS], 2014). In 2014, CMS began to cover cardiac rehabilitation for patients with HFrEF (McMahon, Ades, & Thompson, 2017). However, Medicare only approves coverage for patients with an ejection fraction less than 35%, with NYHA class II to IV HF, who have been optimally controlled for six weeks (CMS, 2014). This leaves a coverage gap for the patients who have HFrEF with an EF greater than 35% but less than 40%.

A review of the literature identifies several barriers to CR referral and enrollment. Patients of higher socioeconomic status, those with insurance, men, persons younger than 70 years old, and those without comorbidities are more likely to be referred for CR (Chernomordik et al., 2017; Golwala et al., 2015; Viana et al., 2018). Geographical location to a CR center, patient motivational factors, clinical indication, and belief of benefit are factors influencing physician referral practices (Ghisi, Polyzotis, Oh, Pakosh, & Grace, 2013). Increasing provider awareness about the indications for CR and barriers to referral could increase uptake and enrollment in CR.

### **Significance of Clinical Problem**

The American College of Cardiologists (ACC) and AHA have implemented performance and quality measures for CR (Thomas et al., 2018). Performance measures specific to the

outpatient setting include referring all eligible patients to CR who have not yet been referred. If the patient refuses the referral, the attempt and education regarding CR must be documented in order to meet the measure (Thomas et al., 2018). Cardiac rehabilitation may be a class IIa recommendation for HFrEF; however, exercise training is a class I recommendation for HFrEF patients. An additional outpatient performance measure was created to refer patients with HFrEF to an exercise-based program, most often CR (Thomas et al., 2018). Care coordination via follow up on patient enrollment and adherence has been identified as a quality measure for which providers should aim to achieve (Thomas et al., 2018).

The Million Hearts® initiative has set a goal of preventing one million cardiac events by 2022. The initiative, which was renewed in 2017, seeks to include interventions to increase CR referral and attendance based on guideline recommendations for CR and its ability to decrease mortality and morbidity while increasing quality of life for cardiac patients (Ades et al., 2017). A goal set by the Million Hearts® initiative of increasing CR participation from a national average of 20% to 70% is only possible if quality improvement efforts are focused on improving CR processes.

### **Question Guiding Inquiry (PICO)**

A cardiac rehabilitation program in eastern North Carolina is partnered with a Level I trauma center and outpatient cardiology clinic. Cardiac rehabilitation referrals were entered from the inpatient setting, but patients often forgot about the referral or never enrolled in the program. This cardiology clinic identified a need to reintroduce and reinforce CR referrals in the outpatient clinic setting. The director of CR was interested in increasing provider education and addressing barriers to referral to increase CR referrals for eligible patients.

**Population.** This project worked with outpatient cardiology providers to increase referrals to CR from the outpatient setting. One known barrier to CR participation is lack of referral (Dahhan et al., 2015; Golwala et al., 2015; Resurrección et al., 2017; Viana et al., 2018; Virani et al., 2015). Additionally, the strength of provider affirmation of CR is predictive of CR enrollment (Andrew, Natarajan, & Schwalm, 2015; Karmali et al., 2015). An intervention targeted towards outpatient cardiology providers would be beneficial in increasing CR referrals.

**Intervention.** An information session was presented to cardiology providers and medical assistants at a monthly staff meeting. The sessions informed providers of the current statistics for referrals at this clinic, indications for CR, benefits of CR, and suggestions for addressing common barriers to referral. Biweekly meetings and additional one-on-one education were provided. Educational content was generated using materials from the Million Hearts® initiative. Following the education, medical assistants were expected to provide patients with a CR screening tool. Providers were expected to educate and refer all eligible patients who had not yet been referred to CR.

**Comparison.** This clinic did not track referrals to CR. Data were collected for 13 weeks before implementation to obtain the baseline referral rate and patterns for this clinic. Pre- and post-intervention referral rates were compared. The outpatient cardiology clinic desired to see a 10% increase in CR referrals for eligible patients.

**Outcome(s).** Three outcomes were identified for this project. (1) Clinic providers participated in the staff meeting and individual education about CR statistics, indications, and referrals; (2) Clinic providers increased CR referrals for eligible patients in a ten-week period; (3) Medical assistants and cardiology providers used a screening tool to identify patients in need of CR referral.

**Summary**

Heart disease impacts a large portion of the United States population. It is a leading cause of hospitalizations, morbidity, and mortality. The AHA and ACC have guidelines and recommendations for patients with HF or ACS, which include CR. Unfortunately, referral and enrollment rates remain low. Several barriers to CR referral and enrollment have been identified, including poor geographic location, unknown indication, lack of insurance, lack of perceived benefit, gender bias, and absence of provider referrals. As our health care system moves more towards quality care, providers must be following the recommendations and referring patients to CR. This DNP project aimed to increase provider awareness about the barriers and indications for CR to increase CR referrals for all eligible patients.

Cardiology providers at an eastern North Carolina cardiology clinic participated in a staff meeting and individualized education to learn more about CR significance and importance. The educational session utilized resources from the Million Hearts® initiative to address the indications and benefit of CR and address the provider-identified barriers. Pre- and post-intervention rates of referral were compared. The intent was to increase CR referrals by 10% over ten weeks.

## Chapter Two: Review of the Literature

A comprehensive literature review was conducted to evaluate CR referral practices and barriers to referral and attendance. Evidence was critically evaluated and ranked based on quality and levels of evidence. Findings were compared to current AHA and ACC guidelines. This literature was used to confirm the need to increase CR referrals and to examine the best practice for doing so.

### Literature Appraisal Methodology

**Sampling strategies.** A literature review was implemented and remained on-going using the Cumulative Index of Nursing and Allied Health (CINAHL) and PubMed databases. MeSH (Medical Subject Headings) terms included cardiac rehabilitation, referral and consultation, and ambulatory care facilities. Search terms included cardiac rehabilitation, referral, heart failure, heart disease, acute coronary syndrome, provider perceptions, and process. Results were limited to a five-year period, full-text, and peer-reviewed articles. AHA and ACC guidelines were also reviewed. In addition, a manual review of citations in pertinent articles was conducted for additional literature. This search yielded 270 articles. After reviewing titles, abstracts, full text, and removing duplicates, 58 articles were reviewed in full. Thirty-five of those articles remained pertinent to this project and were used for the literature synthesis (see literature search flow map in Appendix A). New articles are being delivered via email from PubMed on a weekly basis.

**Evaluation criteria.** Articles that discussed CR referrals, CR enrollment, associated barriers, and strategies for improving referrals were included. ACC/AHA guidelines were included. Excluded articles included those that were not in the English language, did not have full text available, or were unrelated to Medicare-approved conditions for CR. Additionally,

articles that were specific to other conditions, such as sleep apnea, metabolic syndrome, chronic obstructive pulmonary disease, and kidney disease were excluded.

Articles were analyzed using the Melnyk Seven Levels of Evidence Model. This model ranks evidence from level I to VII (Melnyk & Fineout-Overholt, 2011). Level I evidence is composed of systematic reviews of randomized control trials or clinical guidelines based on randomized control trials, whereas level VII evidence is from expert committees or opinions (Melnyk & Fineout-Overholt, 2011). Lower level rankings typically have stronger recommendations for practice (Melnyk & Fineout-Overholt, 2011); however, lower level evidence can make strong recommendations if the evidence is consistent across multiple studies (Melnyk & Fineout-Overholt, 2011). The articles from this literature review were analyzed and compiled into a literature matrix (see the literature matrix in Appendix B.)

### **Literature Review Findings**

Five systematic reviews and meta-analyses were included. The majority of the articles were evaluated as level-six evidence, discussing observational or descriptive statistics and current referral and enrollment practices. A few single randomized control trials were found. However, randomized control trials are challenging to perform due to the dynamic nature of CR.

Cardiovascular disease is the leading cause of death in the United States (Benjamin et al., 2018). By 2035, 45.1% of the population is expected to have some form of heart disease, which will attribute to 748.7 billion dollars in direct medical costs (Benjamin et al., 2018). Heart disease is the second leading cause of death in North Carolina (CDC, 2018). Cardiac rehabilitation is a class Ia recommendation for patients after an MI, CABG, PCI, or heart surgery (Ades et al., 2017; Smith et al., 2011). Exercise training is a class Ia recommendation for patients with HF, while CR is a class IIa recommendation (Yancy et al., 2013). Despite these

recommendations, only 13.9% and 31% of Medicare beneficiaries enroll in CR after a MI or CABG, respectively (Benjamin et al., 2018).

Cardiac rehabilitation provides many benefits for its participants. In addition to improving exercise capacity, CR programs address nutrition, psychosocial, and cardiovascular disease risk factors (Menezes et al., 2014). Participation in CR decreased depressive symptoms in HF patients by 40% (Menezes et al., 2014). A cohort study over 23 years determined patients who experienced a MI and participated in CR had a one-year mortality risk of 1.8%, as compared to 20.5% for those patients who did not enroll in CR (Dunlay, Pack, Thomas, Killian, & Roger, 2014). Furthermore, a systematic review of exercise-based rehabilitation for HF concluded that participation in exercise-based CR decreased heart failure hospitalizations by 39% and increased healthcare-related quality of life (Taylor et al., 2014).

**Gender.** While guidelines for CR referral did not discriminate among demographic factors, the literature identified disparities amongst gender and age. One study compared CR referral, completion rates, and mortality. The results showed that 31.1% of eligible women were referred to CR, as compared to 42.2% of eligible men (Colbert et al., 2015). Similarly, Golwala et al. (2015) evaluated the “Get with the Guidelines” registry and identified women as less likely to be referred. Women who completed CR in the Colbert et al. (2015) study had a higher risk reduction than men who also participated in CR. In contrast, Gee, Viera, Miller, and Tolleson-Rinehart (2014) measured the metabolic equivalents (METs) achieved during exercise before and after CR for men and women. These authors found that men improved their baseline METs more than women (Gee, Viera, Miller, & Tolleson-Rinehart, 2014). A systematic review and meta-analysis concluded that the mean enrollment rates for men and women were 38.5% and 45%, respectively (Samayoa et al., 2014).

**Age.** Age is also a factor in CR referrals. Older adults are less likely to be referred. A comparative study between regions in Portugal determined the odds of CR referral decreased by 5% for every year of age (Viana et al., 2018). When examining trends in CR referrals in Israel over a seven-year period, Chernomordik et al. (2017) determined a significant decrease in referral rates for older adults. The average age of adults who did not get a CR referral was 64.8 years ( $SD = 13$ ). Of adults who received a CR referral, the average age was 61.2 years ( $SD = 12$ ). Furthermore, after reviewing historical trends for CR referral for patients with HF, Golwala et al. (2015) identified adults 70 years and younger were more likely to be referred to CR. Schopfer & Forman (2015) discussed the benefits of CR for older adults. Benefits include mortality reduction, increase in exercise capacity, improvement in quality of life, reduced incidence of depression, and slowing of age-related cognitive decline (Schopfer & Forman, 2015).

The ACC/AHA Task Force on Performance Measures developed performance measures and quality measures specific to CR (Thomas et al., 2018). These measures served to improve the outcomes of care for patients who experienced a cardiac event (Thomas et al., 2018). The basis of this DNP project relied on one performance measure: all eligible outpatients who have not yet engaged in a CR program need a referral (Thomas et al., 2018). However, most clinic practices are not actively monitoring referral rates from outpatient settings. Pack et al. (2015) identified a gap in outpatient CR referral monitoring. Outpatient clinics were least likely to monitor referral rates and have a systematic referral approach (Pack et al., 2015). Furthermore, very few CR program administrators were able to report data on CR referrals from the outpatient setting (Pack et al., 2015).

Cardiac rehabilitation enrollment begins with a referral. Therefore, one must ensure referrals are being made before addressing enrollment concerns. Provider knowledge of CR

benefits and indications influence referral practices. Dahhan et al. (2015) found 35% of cardiology providers did not know CR was a class Ia recommendation for patients after a PCI. In a survey of 258 cardiologists in India, only 3.9% of participants could answer all four questions correctly regarding cardiovascular disease (CVD) and CR (Ghisi, Contractor, Abhyankar, Syed, & Grace, 2018). Questions assessed degree of recommendation for CR, safety of exercise in patients with HF, risk reduction associated with CR, and target hemoglobin A1C for patients with cardiac disease (Ghisi et al., 2018). About 50% of the providers only referred 20-30% of eligible patients (Ghisi et al., 2018). The most commonly reported reason for non-referral was patient disinterest (Ghisi et al., 2018). Other reported barriers to CR referral included absence of insurance, patient unawareness of CR, and belief that CR should be addressed in the outpatient clinic (Dahhan et al., 2015). A systematic review identified physician referral to CR as a strong predictor of enrollment (Ghisi et al., 2013). Furthermore, the strength of a provider's recommendation and endorsement was the strongest predictor of CR enrollment (Ghisi et al., 2013). Nonetheless, if providers are unaware of the indications and benefits of CR, they will be less likely to refer eligible patients.

**Level of intervention.** Interventions to increase CR referrals can be made at the patient, provider, or health systems level. Health system design has a lasting effect on CR referrals and enrollment. Standardization of CR referral processes can expand referrals. The utilization of electronic referral from both the inpatient and outpatient settings can increase CR referral dramatically. Massachusetts General Hospital implemented an electronic referral process and noted an increase in CR referral from the pre- to post-intervention periods, from 48 referrals per month to 80 referrals per month (Pirruccello et al., 2017). The Million Hearts® initiative created a CR change package that discusses interventions at the system level to influence CR referral

(Wall et al., 2018). Some of the mentioned interventions included CR referral order sets, adding CR to hospital discharge checklists, developing a standardized process for referral, and utilizing electronic health records to automate referrals for eligible diagnoses (Wall et al., 2018).

Furthermore, Giuliano et al. (2017) discussed continuity of care across the health care system for patients eligible for CR. These authors noted the importance of information transfer amongst providers at various levels of care (Giuliano et al., 2017). Management of CR referrals is essential for continuity of care. Timely referral processing and easy access to CR contributes to patient participation (Giuliano et al., 2017). Patient acceptance of CR referral can be increased through patient-centered care, early initiation of CR referral via electronic records, strong physician endorsement, and staff knowledge of patient-perceived barriers (Giuliano et al., 2017).

Provider-specific factors related to CR referral include knowledge of indications, perceived benefits of CR, referral practices, and referral processes. Dahhan et al. (2015) implemented provider education on the benefits and indications of CR. The lecture focused on benefits for CR, current local referral statistics, national statistics, and common barriers to referral and participation (Dahhan et al., 2015). Additionally, providers completed a questionnaire that assessed knowledge and referral practices among providers. The questionnaire identified provider bias and poor understanding of CR's benefits as major barriers to referral (Dahhan et al., 2015). Bias and lack of awareness can be addressed through education (Dahhan et al., 2015).

Patients require support to pursue CR enrollment after referral. Patients report a lack of motivation, absence of social support, work conflicts, distance to CR center, lack of referral, and adverse health system experiences as barriers to CR participation (Resurrección et al., 2017). Fear of the unknown, an overload of information in the inpatient setting, and lack of

individualization are additional reasons for nonattendance found in a qualitative study of CR eligible patients (Fletcher & McBurney, 2016). Patients with heart failure, comorbidities, MI without procedural intervention, current smokers, and the uninsured are less likely to enroll in CR (Turk-Adawi, Oldridge, Tarima, Stason, & Shepard, 2014). Additionally, some patients believe the underlying cardiac issue is fixed after a surgical or percutaneous intervention (Gallagher et al., 2016). Many of the reported barriers can be addressed via the patient-provider relationship.

### **Limitations of Literature Review Process**

This literature review presents several limitations. Very few articles discussed CR referral from strictly the outpatient setting. Evidence discussing specific referral practices may not be generalizable to the local population. The majority of these studies were specific to the area in which they were implemented. Furthermore, some studies examined referral practices and CR participation in other countries, which may have health care systems different than the United States. In 2014, Medicare approved reimbursement for CR for patients with HFrEF (McMahon et al., 2017). There is limited data on CR referral for HF patients as compared to patients who have ACS.

### **Discussion**

**Conclusion of findings.** The guidelines and recommendations for CR referral are not consistently being implemented and enforced. There is a lack of knowledge regarding the indications for CR among health care providers. This directly influences referral rates and patient perceptions regarding the benefits of CR. Furthermore, providers have biases that prevent universal referral for all eligible patients. Women, patients over the age of 65, those with lower socioeconomic status, comorbidities, and no insurance are less likely to be referred to CR.

Additionally, patients who have undergone a CABG are more likely than HF patients to receive a CR referral.

There are gaps in the literature as to why these disparities exist. It has been identified that referring providers do not follow a typical referral pattern. Providers consistently follow other recommended guidelines, such as prescribing aspirin and beta-blockers for patients with HF or a history of a MI (Aragam et al., 2015; Golwala et al., 2015; Virani et al., 2015). However, providers are inconsistent with CR referrals. The implementation of CR performance measures was intended to quantify the quality of care delivered and distinguish areas where quality could be improved (Thomas et al., 2018). One may assume there is a lack of standardization of the CR referral practice that prevents providers from following the guidelines.

Several interventions have been identified to increase CR referrals and patient participation. This literature search identified a need for patient support regarding CR decisions. Provider endorsement is a strong factor in patient participation in CR. Still, providers have varying beliefs on the benefits and indications of CR. Standardized electronic referrals have been proven to increase CR referrals (Pirruccello et al., 2017; Gallagher et al., 2016; Wall et al., 2018). Additionally, provider education and awareness of CR referral indications and barriers could increase referrals. This knowledge could equip providers with the evidence and skills necessary to endorse patient participation (Chernomordik et al., 2017; Dahhan et al., 2015; Ghisi et al., 2018). Once providers have a strong endorsement and baseline knowledge of CR, one may consider the use of a CR support nurse. This has been proven to increase referrals by helping providers identify and educate patients eligible for referral (Frechette, Conley, Tang, & Welch, 2019; Karmali et al., 2015; Ko et al., 2018).

**Advantages and disadvantages of findings.** Literature identified that provider beliefs and perceptions influence CR referrals and further impact patient enrollment. Not all providers are aware of the indications for referral. Additionally, there is a lack of standardization in referral practices. Therefore, provider education must be implemented to highlight the benefits, current referral statistics, indications, performance measures, and barriers to CR referral. Lecture-type education has been used to target a large number of providers at one time, ensuring they all receive the same information. Furthermore, the proposed intervention will highlight CR performance measures, which if addressed by the providers after education, can increase quality scores and reimbursement.

The articles which reported the need for increased referrals typically included a multi-step process to increase referrals. Most interventions assessed baseline knowledge and referral patterns, implemented some form of educational intervention, and then proceeded to implement a standardized referral process. Most of these efforts to increase referrals did not occur in the outpatient setting. Additionally, the literature highly supports the implementation of electronic referrals. However, due to limitations in the information technology departments of this project site, implementation of a completely electronic referral is not feasible at this time. Provider preferences and bias influence CR referral. While education can increase awareness and inform providers of guidelines and recommendations, education may be limited in its ability to change provider preferences if other barriers are not identified and discussed.

**Utilization of findings in practice change.** While this project site was unable to implement electronic referrals, they did have a standardized process for CR referral. Provider education was given during a staff meeting at which all providers were expected to attend. The education presentation highlighted the indications, benefits, barriers, and current referral rates for

CR as compared to the national average. Dahhan et al. (2015) implemented similar education via a lecture at a cardiology conference. After the education and implementation of a standardized referral practice, Dahhan et al. (2015) saw a referral rate increased to over 88.9%. The standardized process for referral, as identified by the project site and local CR agency, was highlighted and explained during the presentation. Education was reinforced at weekly to biweekly visits to the project site. Highlighting the standardized referral process, provider education, and frequent reinforcement was effective in increasing CR referrals.

### **Summary**

The Million Hearts® initiative set a goal of increasing CR attendance from a national rate of 20% to 70% with the hopes of preventing one million cardiac-related deaths by the year 2022 (Ades et al., 2017). Healthy People 2020 set a goal to treat cardiovascular risk factors, prevent repeated cardiovascular events, and improve health and quality of life through prevention and treatment measures (U.S. Department of Health and Human Services, 2014). Additionally, the Triple Aim strives to improve population health, increase patient satisfaction, and reduce costs.

Cardiac rehabilitation is a tertiary prevention program that has been proven to reduce hospital readmissions, morbidity, and mortality, thus improving the health of populations and reducing costs. CR improves the patient's quality of life and teaches and empowers patients to engage in healthy lifestyle change. Discussing CR with patients can improve communication and increase patient satisfaction. Patients cannot reap the benefits of CR if a referral is not made. Therefore, this quality improvement project will increase provider awareness and knowledge of CR with a projected outcome of increased referrals and improved CR performance measures.

### **Chapter Three: Theory and Concept Model for Evidence-based Practice**

Concept definitions, theory, and practice models provide the foundation for a quality improvement project. This chapter defines the concepts of knowledge, referral, and barriers as related to cardiac rehabilitation. Diffusions of innovation theory explains why CR referrals are not ordered by every provider, at every opportunity. Lastly, the plan, do, study, act (PDSA) model provides a framework for continuous quality improvement, which will be used throughout this project.

#### **Concept Analysis**

**Knowledge.** Knowledge is an understanding and awareness gained through experience. Knowledge influences provider decisions, especially the decision to discuss and refer patients to CR. Ghisi et al. (2018) identified that providers who scored higher on a questionnaire of knowledge on CR were more likely to refer patients to CR. Additionally, providers with more knowledge emphasized the importance discussing CR with patients (Ghisi et al., 2018). Knowledge is acquired through practice, education, and personal experiences. Health care providers who consistently work in cardiology settings possess more significant knowledge of CR guidelines and recommendations (Andrew et al., 2015). One may assume that knowledge comes with familiarity and proficiency. When looking at knowledge within the concept of CR referrals, personal experience, bias, traditional practice, education, indications, values, and beliefs contribute to the knowledge of health care providers.

**Referral.** A referral is an order entered by a health care provider for services or opinions of another health care specialty. Referrals act as the gatekeeper of health care services. Giuliano et al. (2017) describe referrals in terms of continuity of care, requiring the exchange of patient information between health care providers. Referrals are a form of communication between one

health care service and another. Patients should be included in informed decision-making regarding referrals (Giuliano et al., 2017). Ades et al. (2017) discuss three components of a referral. These include a medical order, a discussion between the health care provider and patient regarding the means and purpose of referral, and acknowledgment of the referral by the receiving service (Ades et al., 2017). CR referrals should be initiated by a health care provider and thoroughly discussed with the patient. Once the referral is made, the patient should expect to be contacted by the CR program to schedule an initial evaluation and enroll. The referral is the connecting link between health care services.

**Barriers.** An understanding of the concept barriers is necessary for addressing gaps in CR referrals. A barrier is any obstacle that prevents someone from engaging in a task. Within the context of this project, barriers are anything that makes implementing referrals to CR more difficult or anything that prevents providers from entering a referral. Barriers may stem from the patient, provider, or organization. For example, a barrier at the patient level may be a geographical distance from the CR center (Ghisi et al., 2013). Omission of the patient-provider discussion regarding CR benefits is another barrier to referral (Schopfer & Forman, 2015). Providers report patient disinterest as a top barrier to referral (Ghisi et al., 2018). A patient's insurance coverage is an additional potential barrier, as some providers are reluctant to refer based on the patient's insurance status (Dahhan et al., 2015). Once barriers to CR referral are discussed and removed, the organization should note an increase in referrals. Therefore, barriers to CR referral must be understood and addressed in order to increase referrals.

### **Theoretical Framework**

**Diffusion of Innovation.** Cardiac rehabilitation is not a new intervention or recommendation. Despite the proven benefits, health care providers do not refer patients

appropriately. This dilemma can be explained through Roger's Diffusion of Innovation Theory. Everett Rogers developed the Diffusion of Innovations (DOI) Theory in the 1960s to explain how new ideas are adopted over time throughout a social structure (Rogers, 1995). The decision to adopt or disregard new ideas can be explained through the four concepts of this theory: innovation, communication channels, time, and social systems (Rogers, 1995).

An innovation is any new idea or object relative to a person's knowledge (Rogers, 1995). What could have been created many years ago is still innovation to a person if the concept is perceived as new by that person (Rogers, 1995). Additionally, innovations possess five attributes that contribute to the decision to adopt or disregard an innovation. These attributes include relative advantage, compatibility, complexity, trialability, and observability (Rogers, 1995). Cardiac rehabilitation is the innovation specific to this DNP project.

Communication channels are the avenues by which the information is spread (Rogers, 1995). There are two types of communication channels: mass media and interpersonal channels. Mass media generates awareness about an idea or innovation through radio, television, newspapers, or the internet (Rogers, 1995). Mass media reaches a large number of people in a small amount of time. In contrast, interpersonal communication diffuses ideas through face-to-face interaction between two or more individuals (Rogers, 1995). Interpersonal communication is a more persuasive method because people make connections over common traits and interests (Rogers, 1995). The innovation of CR will be communicated using mostly interpersonal channels. Mass media may be used to keep the topic at the forefront of providers' minds and to provide cues for patient inquiry.

Time can be measured by the period it takes for an innovation to progress from knowledge to a practice decision (Rogers, 1995). This occurs through an innovation-decision

process. First, providers become aware of the innovation, which is CR in this project. Though the project intervention focused on education and increasing awareness, providers are persuaded to refer patients. Providers then must make the decision to refer and follow through with implementing the referral. Confirmation occurs as the provider seeks reinforcement for following through with the referral. At the end of the innovation-decision process, a person either adopts or rejects an innovation (Rogers, 1995). Furthermore, people are categorized based on the time it takes for them to adopt or decline in innovation. Categories include innovators, early adopters, early majority, late majority, or laggards (Rogers, 1995).

Social systems, the final concept of the diffusion of innovations theory, are defined as groups of people with similar interests working together for a common goal (Rogers, 1995). The group of health care providers and patients at the project site, as well as CR employees, represent the social system for this DNP project. The social system has a social hierarchy which preserves order for day to day functioning (Rogers, 1995). Social norms may act as a barrier to the diffusion of innovations, as there may be resistance to an idea that goes against the norm (Rogers, 1995) (see Appendix C for a model of Roger's DOI applied to CR referrals).

The diffusion of innovation theory has been used to evaluate the uptake of antibiotic stewardship guidelines after general surgery (Rizan, Phee, Boardman, & Khera, 2017). While the change in practice in this project was not statistically significant, the authors could see a trend geared towards guideline recommendations (Rizan et al., 2017). The absence of statistical significance can be explained by the diffusion of innovations theory, as the adoption of the new guidelines did not reach the critical mass necessary to change the norm of the social structure within the time frame of the project (Rizan et al., 2017).

**Application to practice change.** Cardiac rehabilitation is not a new concept. However, it may be classified as an innovation for providers who do not consistently refer patients to CR. CR is a tertiary prevention program that provides education, risk factor modification, supervised exercise, and lifestyle modification to improve cardiac function and prevent repeat cardiac events (Menezes et al., 2014). Innovations have various attributes including relative advantage, compatibility, complexity, trialability, and observability, that make an intervention more appealing (Rogers, 1995). One must convey these attributes when discussing CR with health care providers.

When presenting an informational session about CR, one must highlight the relative advantage, or what makes CR better than the current intervention (Rogers, 1995). Cardiac rehabilitation is a class Ia recommendation for patients who have experienced a MI or undergone CABG or PCI procedures (Ades et al., 2017; Smith et al., 2011). CR is also a class IIa recommendation for patients with HFrEF (Yancy et al., 2013). This is not to say other guideline recommendations should not be followed; however, CR should be prescribed in addition to medications in order to reduce mortality, morbidity, and readmissions (Ades et al., 2017; Benjamin et al., 2018; Yancy et al., 2013). Compatibility of an innovation is defined as the ability for a new method to assimilate with the current values and goals of an organization or culture (Rogers, 1995). CR is compatible with the goal of improving cardiovascular health for patients. The complexity is related to the ease of use and understanding of an innovation (Rogers, 1995). The educational session will aim to outline the referral process to make referring patients to CR easier for providers. Innovations must be observable, having visible and easily seen results (Rogers, 1995). CR has been demonstrated to not only reduce cardiac-related morbidity and mortality but also to improve health care quality life for patients with CVD (Ades

et al., 2017; Menezes et al., 2014; Yancey et al., 2013). Cardiology providers will most likely expect to see their patients have improved health status after emphasizing the importance of the referral and participation in the program.

Despite the evidence and innovative properties of CR, cardiology providers have not entirely adopted CR referral in everyday practice. This can be explained through adopter categories as described by DOI theory. Innovators are the first to launch an innovation by bringing a new idea into a social system (Rogers, 1995). This author can be considered the innovator of this DNP project, as emphasizing CR referrals is brought into light of this cardiology practice.

Early adopters possess the quality of respect (Rogers, 1995). They are integrated members of the practice setting and usually are in leadership positions (Rogers, 1995). The nurse manager of the practice site, CR referral coordinators, and the director of the CR program care early adopters for this project.

The early majority makes up about one-third of a social system (Rogers, 1995). This type of person is more willing to adopt an innovation but rarely holds a leadership position (Rogers, 1995). The early majority are deliberate in the way they approach innovations (Rogers, 1995). The providers that consistently refer their patients to CR may be considered the early majority in this intervention.

This project intervention will aim to target the late majority and laggards. These people can be described as skeptical or traditional, respectively. For the late majority, peer pressure and system norms must be in favor of the intervention before adoption is considered (Rogers, 1995). Laggards tend to do things the way they have always done (Rogers, 1995). Therefore, the goal of this education session will be to highlight guidelines, evidenced-based practice, benefits, and

outcomes of CR to persuade the late majority and laggards to get on board with emphasizing and implementing CR referrals.

### **Evidence-Based Practice Change Model**

**Plan, Do, Study, Act.** The PDSA model is a structured process for implementing continuous quality improvement. This model focuses on small-scale change that gradually increases with each cycle (Reed & Card, 2016). Each cycle provides experimental learning, focusing on one change per cycle, which allows the team to know if the intervention produced the desired result (Reed & Card, 2016). The subsequent PDSA cycles build on lessons learned in previous cycles (Reed & Card, 2016).

The process starts by defining a problem, identifying contributing factors, identifying criteria for success, and engaging key stakeholders (Reed, & Card, 2016). The first PDSA cycle begins with planning an intervention and data collection plan (Reed & Card, 2016). The plan should include the who, what, where, when, why, and how of the project (Reed & Card, 2016). One must identify the necessary steps to implementing the intervention, including the population to work with and the time limit (Agency for Healthcare Research and Quality, 2015). In the next phase, the intervention is carried out, and data collection begins. The team must document problems and unexpected observations during the implementation phase (Institute for Healthcare Improvement [IHI], n.d.).

The study phase, consisting of data analysis, begins after a brief intervention period. The results are compared to the proposed goal and outcomes identified in the planning stage (IHI, n.d.). During this stage, it is essential to maintain open communication with key stakeholders to communicate what has been learned (Reed & Card, 2016). Lastly, after reflecting on lessons learned, the team must act. Response to the act stage could consist of implementing the

intervention on a larger scale, redefining the problem, or beginning a new PDSA cycle focusing on one of the barriers or limitations identified in the implementation phase (Reed & Card, 2016).

The PDSA cycle is an iterative process, where one change cycle builds upon the previous.

Therefore, the process is not completed until a plan is set in place for the next cycle.

**Application to practice change.** There are multiple interventions necessary to achieve a 70% participation rate for cardiac rehabilitation. The first step of this process begins with increasing referrals. The PDSA model is appropriate for CR quality improvement due to its focus on continuous quality improvement and small-scale change.

The key stakeholders in this project include this DNP student, CR referral coordinators, cardiology providers, the director of the CR program, medical assistants, and the nurse manager. This author identified the problem of decreased referrals. The DNP project team set a goal to increase CR referrals. Several interventions were identified, including electronic referral, provider education, and CR nurse liaison support (Ades et al., 2017). Based on the current state of this project site, the team decided increasing provider education and awareness would be the best first step. The experimental learning process of the PSDA model allowed for subsequent cycles to focus on the other identified interventions.

The project outcomes were utilized to create a data collection tool. The referral coordinators at the project site collected data on patient age, gender, and diagnosis for patients referred to CR prior to and after the intervention. Additionally, medical assistants were responsible for providing the patient with a CR screening tool. This DNP student was available during the implementation and analysis phase to document and address barriers to screening and implementing CR referrals. Data were analyzed to determine if CR referrals increased after the

educational intervention. A discussion took place amongst key stakeholders to review the effectiveness of the intervention and address gaps in the plan.

Lastly, a decision will be made to determine the next PDSA cycle. One possibility is that referrals increase, but patient participation does not. The team would then examine barriers to participation. If referrals do not increase, the next phase of the PDSA cycle should focus on addressing local barriers to CR referral. The PDSA model was chosen for this DNP project because of the many barriers and factors associated with CR. This model allows the project team to focus on one aspect of CR referral for each improvement cycle. This will allow the team to identify the most efficient and effective method to increase CR referral and participation (see Appendix D for a PDSA worksheet).

### **Summary**

Referral to CR, or lack thereof, can be examined through the lens of three concepts: knowledge, referral, and barriers. Knowledge utilizes learned information and personal experience to make decisions, while barriers are factors that prevent a provider from referring all eligible patients to CR. Lastly, referrals are a connection between health care services, which connect and contribute to the patient's plan of care.

Roger's DOI theory provides the foundation for this DNP project. CR referral is an innovation that must diffuse through the practice setting before being accepted as the standard and expectation for the specified practice. Provider-focused education will serve as a communication channel to reach the late majority and laggards to influence the adoption of CR referrals.

Lastly, this DNP project will be implemented utilizing the PDSA model. The educational intervention will be planned in collaboration with key stakeholders. As the implementation

occurs, this author will track referrals and document any barriers to referral. After analyzing and distributing the results, the project team will decide on the next avenue of improvement. This project site has multiple opportunities for improvement to achieve 70% participation in CR; thus, by utilizing the diffusions of innovation theory and iterative PDSA cycles, change is expected to occur.

## **Chapter Four: Pre-implementation Plan**

A clearly defined purpose and plan are essential to a successful quality improvement project. This chapter discusses the purpose of this project, readiness for change, interdisciplinary teams, and the process for project approval. Plans for data collection, analysis, and data security are also outlined. The information in this chapter provides the foundation for project implementation.

### **Project Purpose**

The purpose of this DNP project was to increase cardiac rehabilitation referrals at an outpatient cardiology clinic. This project aligned with ACC/AHA performance and quality measures, which stated CR is an indicated therapy for patients with stable angina, NSTEMI, STEMI, percutaneous coronary intervention (PCI), cardiac surgery, or heart failure with reduced ejection fraction. The Million Hearts® initiative, in collaboration with the Centers for Disease Control and Prevention, set a goal to increase CR participation from 20% to 70%. Referrals must be placed for CR participation to rise, and participation in CR must be encouraged. Therefore, this project aimed to increase cardiac rehabilitation referrals through provider education and screening for eligibility.

### **Project Management**

**Organizational readiness for change.** The director of cardiac rehabilitation was approached to determine areas for improvement related to cardiac rehabilitation. Referrals, endorsement, and continuity were identified as three areas needing improvement. The nursing administrator of clinical operations at the project site was contacted to determine the need and feasibility of a project related to CR referrals. The project site champion and the DNP student

identified that education and increasing awareness of CR were necessary for providers to increase referrals.

Previous improvement efforts in this clinic focused on CR referrals for cardiac surgery patients. The cardiology department did not have a standardized process in place for CR referrals. Therefore, referral coordinators, nurse managers, and the administrator of clinical operations fully endorsed the project idea to increase referrals to CR for patients in a cardiology clinic. The project idea was pitched to providers at the project site who expressed interest and support in increasing CR referrals.

**Interprofessional collaboration.** Collaboration among many different departments was essential for the success of this project. Team members included the project site champion, nursing administrator of clinical operations, referral coordinators, health care providers, medical assistants (MA), and this DNP student.

The project champion was also the director of the CR program and provided knowledge, education, and facts related to the CR program. She served as the contact for any CR-related questions and policies. The nursing administrator of clinical operations granted permission to use the cardiology clinic as the project site. The nursing administrator dispersed communications about the CR quality improvement project to appropriate staff members. Health care providers and MAs participated in CR education at a monthly staff meeting. MAs provided patients with the screening tool to complete during triage for appointments at the project site. The referral coordinators collected data using the data collection tool created by this DNP student.

The DNP project faculty mentor helped navigate the dynamics between the cardiology clinic and the CR program. She collaborated with the DNP student to develop the project goals and outcomes to meet all of the requirements for the project.

**Risk management assessment.** During the planning phase of this DNP project, the DNP student completed a strengths, weaknesses, opportunities, and threats (SWOT) analysis for this QI project.

**Strengths.** Several strengths of this project were identified. First, there was strong support for CR in the literature. The Million Hearts® initiative published numerous resources available for use in health care provider education. The project site and the local CR program had a collaborative relationship. Furthermore, the DNP project faculty mentor was a former health care provider at the project site. Her connection with the nursing administrator of clinical operations, health care providers, and medical assistants potentially increased the likelihood of team participation. The nursing administrator of clinical operations and the project site champion were in full support of increasing CR referrals. Lastly, CR referral rate is an ACC/AHA performance measure that could impact pay-for-performance reimbursement systems in the future.

**Weaknesses.** The project site did not have a formal system of tracking referrals. Therefore, determining the degree of change was difficult. Additionally, not all providers were willing or available to attend the staff meeting or individualized educational sessions due to lack of interest, busy patient schedules, and other obligations. This DNP project was geared towards the late majority and laggards, as defined in Roger's diffusion of innovations theory. These groups of people may not have been receptive to emphasizing CR with patients within the timeframe of this project.

**Opportunities.** There are many different opportunities related to this QI project. Once CR is put at the forefront of providers' minds, other opportunities may arise. The surgical department within this institution previously implemented CR improvement efforts; thus, the surgical

department could serve as a model for future quality improvement for the cardiology department. The rapport built with the MAs and CR staff could lead to the development of a CR nurse liaison position for cardiology, which would help providers enter referrals and discuss CR with patients.

**Threats.** Biases of the health care providers may act as a threat to this project, as providers may not see a need to change their practice for CR referrals. Health care providers may have too much content to cover during appointments, leaving limited time available for CR discussion. Furthermore, nurse practitioners need a physician co-signature for CR referral, which could also limit referral rates. Lastly, if referrals significantly increase, the CR program could reach full capacity, and patients would have to postpone CR participation.

**Organizational approval process.** The DNP project faculty mentor was essential in obtaining the project site, as she was a former provider at the project site. This student approached the DNP project faculty mentor for contacts for a project related to CR. The student connected with the director of the CR program, who became the project champion. Together the DNP project faculty mentor, student, and the project champion met to discuss areas of improvement for cardiac rehabilitation. The decision was made to implement a project to increase referrals at a cardiology clinic.

The DNP project faculty mentor introduced the student to the nursing administrator of clinical operations at the project site. The project was well received by the administrative staff. The project champion was affiliated with the local hospital system, while the project data and implementation occurred in a university-owned cardiology clinic. Thus, the project site approval was obtained from the nursing administrator of clinical operations at the project site (see a letter of approval in Appendix E). The DNP student was responsible for communication between the project champion and the nursing administrator of clinical operations at the project site.

**Information technology.** Microsoft PowerPoint® was utilized to present CR education. Data for this project was collected from the electronic health record (EHR), EPIC®. The CR referral coordinators extracted data from the EHR at the time of CR referral and entered the data into Microsoft Excel® using the CR Referral Data Collection Tool (see Appendix F for this tool). Data were analyzed using descriptive statistics in Microsoft Excel®. Lastly, email served as first-line communication between the project's key stakeholders.

### **Cost Analysis of Materials Needed for Project**

There were a few costs associated with this DNP project. Travel expenses accounted for the majority of the costs. The budget included 400 copies of the CR Screening Tool. The DNP student provided *Smashed Waffles* for the staff meeting and cookies for the fellows meeting. Travel to and from the project site was calculated using the standard reimbursement cost of \$0.54 per mile. These costs were minimal compared to the cost of rehospitalization related to a repeat cardiac event. The educational PowerPoint presentation was created by this DNP student, preventing the need to purchase informational brochures or presentations. The referral coordinators agreed to collect data; thus, the project did not have to budget for data collection costs.

It was estimated that CR could prevent 87,000 hospitalizations in the first year after CR participation (Ades et al., 2017). An average hospital stay following a PCI was 3.1 days and costed an average of \$18,931 (Cowper et al., 2019). This DNP project could potentially prevent two people from having a repeat event; thus, saving close to \$40,000 (see Appendix G for a copy of this budget).

### **Plans for Institutional Review Board Approval**

East Carolina University was affiliated with the project site, and thus the project site and university IRB requirements were the same. A letter of approval was obtained from the nursing administrator of clinical operations. The DNP student completed an IRB quality improvement/program evaluation self-certification tool. This form encompassed a description of the QI project and eight yes-or-no questions used to address the intent of the project. DNP project faculty mentor reviewed the self-certification tool for accuracy and completeness. The DNP student uploaded responses into the East Carolina University Self-Certification Tool Qualtrics survey. This project was deemed quality improvement, and thus did not require IRB approval.

### **Plan for Project Evaluation**

**Demographics.** Basic demographics related to CR referrals were collected on the CR Referral Data Collection Tool. Data included the patient's age, gender, and diagnosis used for the referral. If a patient was over 89 years old, they were recorded as 89+ to protect patient confidentiality. Age was reported as a mean with standard deviation and range. Gender and ICD-10 codes were reported as modes and proportions to determine if any disparities between genders or diagnoses existed. This data was presented using tables and graphical representations (See Appendices K-N).

The medical assistants pre-screened all patients for CR eligibility at the beginning of each appointment by asking the patient to complete the CR Screening Tool. This tool assessed if the patient was eligible for CR, had been referred, or had attended CR. The provider reviewed the completed screening tool and discussed CR with appropriate patients to encourage attendance. Providers entered a referral for all patients who qualified for CR and had not yet received a

referral. This tool was used alongside the CR Referral Data Collection tool to assess an increase in referrals.

**Outcome measurement.** The primary outcome of this DNP project was to increase referrals to cardiac rehabilitation from an outpatient cardiology clinic. Compliance with the CR screening tool and provider participation in education sessions were two project measures. The project site did not have baseline data on CR referral rates. Thus, the desired degree of change was set to be a 10% increase.

**Evaluation tool.** The referral coordinator completed the CR Referral Data Collection Tool within Microsoft Excel®. The tool documented the date of referral, the age of the patient referred, patient gender, and referring diagnosis. Reports were sent to the DNP student via encrypted email at bi-weekly intervals (see Appendix G for this tool).

A CR eligibility screening tool was given to the patient by the medical assistants to determine if the patient was eligible for CR (see Appendix H for the CR Screening Tool). This DNP student collected the screening tools on a biweekly basis. The CR Screening Tool assessed the number of patients eligible for CR referral, the number of patients previously referred to CR, and the number of patients who needed a CR referral. Data from the CR Screening Tool was entered into the CR Screening Compliance data collection tool (see Appendix I).

**Data analysis.** This DNP student compared the number of CR referrals from three months before and ten weeks after the education and implementation of the CR screening tool. This student tracked trends in age, gender, and referring diagnoses. Data were analyzed to determine if reinforcement was necessary for provider compliance. The number of patients referred to CR should have correlated with the number of CR screening tools indicating a need for referral. Ideally, every eligible patient should have had an order for CR.

The ACC/AHA identified performance measures related to CR; all eligible patients who have not yet been referred to CR should be referred. If the patient refuses the referral, the attempt to refer and education regarding CR must be documented (Thomas et al., 2018). The screening tool and referral data collection tools helped track compliance with this performance measure. At the end of the first two-week period, a PDSA cycle evaluated if the screening process and the CR Referral Data Collection Tool accurately captured the desired outcome.

***Data management.*** Data was collected and recorded in Excel® spreadsheets. The completed CR screening tools were kept at the nurse's station at the project site, and this DNP student collected the screening tools on a biweekly basis. Data from the screening tools were entered into the CR Screening Compliance spreadsheet. The paper tools were stored in a folder and shredded upon completion of the project. Referral coordinators entered data regarding referrals into the CR Referral Data Collection Tool. No personal health information was collected. On a biweekly basis, the Excel® spreadsheets were electronically mailed to this DNP student via secure attachments. Only this DNP student and the referral coordinators had access to this data.

### **Summary**

The purpose of this DNP project was to encourage cardiology providers to emphasize and increase cardiac rehabilitation referrals for all eligible patients. A multidisciplinary team consisting of this DNP student, the nursing administrator of clinical operations, cardiology providers, medical assistants, and referral coordinators were vital to the success of this project. The project plan was reviewed and deemed to be quality improvement. Screening tools identified patients in need of a CR referral. Data were analyzed to determine if provider education and patient screening were effective methods for increasing referrals.

## **Chapter Five: Implementation Process**

This chapter outlines the details of the DNP project implementation. It provides an overview of the project setting, participants, and the recruitment process. The blueprint for implementation is outlined. Variations from the plan are discussed at length.

### **Setting**

This DNP project took place at an outpatient cardiology clinic affiliated with an academic institution in eastern North Carolina. The clinic provided care to patients with all types of cardiovascular disease including coronary artery disease, myocardial infarctions, percutaneous coronary interventions, blood clots, rhythm disturbances, aneurysms, strokes, hypertension, heart failure, and valvular disorders. Payment options at this clinic consisted of most commercial insurances, Medicare, NC Medicaid, and self-pay. Clinic administration was interested in increasing referrals to CR to improve cardiovascular outcomes, decrease morbidity and mortality from cardiovascular disease, and increase health-related quality of life.

### **Participants**

This project targeted health care providers and medical assistants. Health care providers working directly with cardiology patients included attending physicians, fellows, and nurse practitioners. These health care professionals referred patients to CR. Key participants included medical assistants working directly with the cardiology providers, as they were responsible for handing the patient the CR Screening Tool to assess referral and attendance to CR. Clinic administration served as supporters of this project by providing staff with updates and reminders to use the CR Screening Tool. A decision was made not to exclude cardiac surgery providers from the project; however, they were not the main focus because the surgical division of this clinic has already implemented a standardized CR referral process.

**Recruitment**

The DNP faculty mentor introduced the DNP student to the director of CR and the nursing administrator of clinical operations at the project site. This team discussed project plans and goals. The nursing administrator of clinical operations introduced the project to staff at an all-provider section meeting. Participants were recruited through a convenience sample via availability at a mandatory staff meeting. However, when no health care providers showed up at the meeting, the DNP student switched to individual recruitment with weekly visits at the project site. Additionally, the DNP student contacted the chief cardiology fellow to schedule a meeting with all of the fellows to ensure as many people received the education as possible. Nurse practitioners, though not included in general provider staff meetings, were recruited individually with face-to-face interaction. All participants were employees of the organization.

The referral coordinator at the project site agreed to gather data related to all of the referrals to CR from the clinic. The DNP student emailed her to confirm her willingness to participate and to provide the data collection tool.

The participants' feelings were unknown. However, this DNP student speculated participants might be reluctant to engage in the QI project due to the time constraints of patient appointments. Many cardiologists assumed the CR referral protocol was initiated post-procedure from the inpatient setting. Therefore, cardiologists were not frequently asking about and referring patients to CR from the outpatient clinic. Medical assistants demonstrated interest in the project at the staff meeting. The MAs appreciated the fact that the CR Screening Tool did not add to their workload. Furthermore, the MAs did not realize CR was something they needed to help the providers remember. The CR Screening Tool served as an instrument to spark discussion between the patient, MAs, and the provider regarding CR.

### **Implementation Process**

The implementation process took place beginning on June 4, 2019, and concluded on November 8, 2019. The implementation process consisted of three phases – pre-education data collection, provider education, and post-education data collection.

**Pre-education data collection.** The pre-education data collection phase took place from June 4, 2019, through August 30, 2019. The CR Data Collection Tool was electronically mailed to the referral coordinator at the project site. Each referral processed by the referral coordinators was simultaneously entered into the data collection tool spreadsheet created by the DNP student. The pre-implementation data was electronically mailed to the DNP student monthly. A brief analysis of the data was completed before the next phase to provide clinic-specific data to the providers. Data analysis for pre-implementation included the number of referrals processed, the average age of patients, and the most common diagnoses.

**Provider education.** The second stage of implementation included provider education. This DNP student presented a Microsoft PowerPoint® presentation to all health care providers and medical assistants at a staff meeting on August 29, 2019. The PowerPoint® was created using materials from the Million Hearts® Initiative, evidence-based guidelines, and local community CR resources. The PowerPoint® reviewed indications for CR, national statistics, benefits, barriers, local CR facilities, and an overview of the project (see Appendix J). Two representatives from the local CR program were present at the staff meeting to answer any questions from the staff. The staff meeting was adjourned with a question and answer session to clarify any uncertainties about the QI project or CR. A sign-in sheet was included at the staff meeting to identify the roles and number of people who attended the formal presentation. The DNP student also scheduled a meeting with the cardiology fellows to provide them with the

same PowerPoint® and educational materials. Any cardiology providers who were not able to attend the staff meeting received education on an individual basis. Snacks were provided at both the staff meeting and fellows meeting.

**Post-education surveillance.** Following the staff meeting, the medical assistants in the cardiology department provided each patient with a CR Screening Tool during triage. The patient completed the screening tool while waiting to be seen by the provider. The provider reviewed the CR Screening Tool during the appointment. If a patient identified they had a condition eligible for CR and never had a referral or was unsure, the provider entered a referral to CR. To enter a referral, the provider placed a “referral to cardiac rehabilitation” order in the electronic health record. From there, the order went to the referral coordinators at the project site. The referral coordinators found the geographic location closest to the patient’s home and contacted the referral coordinator at that CR facility. That CR facility faxed a form back to the clinic. The clinic placed the form in a folder for the provider to sign. Once the provider signed the form, the patient’s CR orders were complete, and the patient could start the CR program.

The CR Screening Tools were placed in a folder at the nurse’s station after the appointment. The CR referral coordinators received the referral and entered it into the CR Data Collection Tool. The CR Data Collection Tool was emailed to the DNP student via email at biweekly intervals. Additionally, the DNP student collected the CR Screening Tools from the project site weekly. Data was entered into the CR Screening Tool Compliance spreadsheet. Data was analyzed at weekly or biweekly intervals to determine the effectiveness of the education and process flow. A bar chart served as the method for tracking progress. The DNP student collaborated with the project champion to evaluate PDSA cycles. Based on the results, the team decided to keep or modify implementation processes.

The project site goal was to increase the number of CR referrals from outpatient cardiology by 10% of the baseline over the ten-week implementation period. Additionally, the DNP student set a goal of receiving ten, correctly completed, CR Screening Tools per week. Ten or more CR Screening Tools were completed for five out of the ten weeks. Screening tool use decreased dramatically after week seven. Despite suboptimal completion of screening tools, CR referrals from the project site increased by 43% over the ten-week implementation period.

Chapter Six will discuss the results in more detail.

### **Plan Variation**

Only medical assistants attended the initial staff meeting on August 29, 2019. As a result, the DNP student individually targeted all of the attending providers. On weekly trips to the project site, the DNP student met with available cardiology providers to provide individualized education about CR indications, referral, and project purpose. Personalized instruction allowed the DNP student to address any questions and concerns related to the project or CR in general. It took about seven weeks to reach all of the cardiology providers. Additionally, the meeting with the cardiology fellows was rescheduled from September 27, 2019, to October 25, 2019, due to scheduling conflicts.

When educating the providers, this DNP student received resistance to CR referrals in the outpatient setting. One provider claimed there was a 100% referral rate to CR from the hospital. After further investigation, the project team discovered that the order from the hospital was a consult order, not a referral. The consult order satisfied registry coding, providing the illusion that providers finished the referral process. Information about the consult versus referral order was added to the education to ensure providers understood the discrepancy and its impact on patient care.

Furthermore, other providers focused on the cost of CR to patients and chose not to refer because they believed their patients could not afford CR. However, the DNP student highly encouraged providers to refer eligible patients based on established guidelines, not personal opinion. The CR program had funds and programs available to help patients pay for CR.

Key participants participated in the PDSA process. Medical assistants helped provide input on the best location for the screening tools. After realizing that the nurse's station was out of the way for most medical assistants, the DNP student moved the screening tools to the front desk. While at the front desk, the screening tools were numbered to track actual patient contact. However, the front desk staff failed to distribute the tools to patients at the check-in desk. Once identified that the tools were not reaching the patient, the team relocated the tools to the triage rooms where medical assistants could help patients fill out the tool and ensure it stayed with the patient to the provider exam room. Based on a recommendation from the referral coordinators, the CR Data Collection Tool was converted to a Google Doc and shared with the DNP student. The Google Doc provided up-to-date access to the referral data and simplified the process for the coordinators.

### **Summary**

An outpatient cardiology clinic agreed to partake in a QI project to increase referrals to CR. Health care providers and medical assistants participated in educational sessions about CR and the referral process. Medical assistants provided patients with a CR Screening Tool to allow for easy identification for patients in need of a referral. The referral coordinators tracked referrals to CR throughout the process. Variations to the plan included individualizing provider education, identifying the best place for CR screening tools, investigating a referral discrepancy, and moving the data collection tool to a more easily accessible format.

## Chapter Six: Evaluation of the Practice Change Initiative

A quality improvement project aimed at increasing referrals to cardiac rehabilitation was implemented over ten-weeks in Fall 2019. Interventions included provider education and the use of a cardiac rehabilitation screening tool to identify patients eligible for CR referral. The DNP student analyzed participation and referral rates to determine the impact of this practice change initiative. This chapter discusses participant demographics, outcomes, and findings of this project.

### Participant Demographics

The primary participants for this project included cardiology providers and medical assistants. The initial staff meeting was intended for cardiology providers. However, no providers attended the meeting. Twelve medical assistants (MA), one nurse manager, and the director of operations at the clinical site participated in the staff meeting. Providers received education via weekly trips to the project site. Seven attending physicians, six fellows, and three nurse practitioners received individualized education. Seven cardiology fellows attended a PowerPoint® presentation at week eight of implementation to summarize and reinforce project education (see Appendix K for demographic information). This presentation was initially scheduled for week two but had to be rescheduled due to prior commitments for the fellows. The DNP student collected an attendance sheet at the educational presentations. Individual contact was recorded in the DNP time log and reflective journals.

The referral coordinator also collected demographic information on the patients who received a CR referral. Of the 138 patients referred to CR, 65.22% ( $n = 90$ ) were men, while 34.78% ( $n = 48$ ) were women. The average age of patients was 64.28 years ( $SD = 11.53$ ).

**Intended Outcomes**

**Short-term outcomes.** This project intended to increase CR referrals for eligible patients by 10% from the baseline in ten-weeks. The project implemented a CR Screening Tool to help identify patients in need of a CR referral (see Appendix H). Additionally, cardiology providers received education on the purpose of CR, indications, barriers to referral, and the practice referral process. The project team set a goal of completing ten CR Screening Tools per week. Despite weekly follow up, the project team did not achieve the short-term outcome of ten completed CR Screening Tools per week.

**Intermediate outcomes.** The DNP student identified intermediate outcomes through the use of multiple PSDA cycles. Intermediate outcomes included educating the providers on the referral ordering process. During the first two weeks of implementation, the DNP student identified a loophole in the referral process. Providers who saw patients in the hospital thought a CR referral was entered at the time of discharge. However, due to limitations in the electronic health record, inpatient referrals did not cross over to the ambulatory setting. Entering a “consult to cardiac rehabilitation” order in the inpatient setting satisfied Get-With-The-Guidelines registry coding, making it appear that the referral rate was 100%, when in fact, most patients in the inpatient setting did not receive a CR referral. Thus, educating and communicating with providers about the referral process became an intermediate outcome.

**Long-term outcomes.** The project successfully met the short-term outcome goal of increasing CR referrals by at least 10% in ten weeks; however, the success may not be sustainable without further buy-in and engagement from clinic administration. The DNP student diligently followed up on CR referrals at weekly to biweekly intervals to discuss concerns with project implementation.

The long-term intent of this project was to standardize a CR referral and post-MI follow up process to ensure all patients who need CR have the referral to attend. A standardized process could start with an electronic referral from the hospital. However, a post-MI clinic, which mirrors the post-surgical clinic, would be the most effective in getting patients referred to CR. Within the post-MI clinic, a CR nurse liaison would serve as an invaluable resource to educate patients, providers, and MAs about the indications, benefits, and resources available for CR participation. The first step to achieving this long-term outcome will be the dissemination of the findings at the project site.

**Findings.** The clinic ordered a total of 138 CR referrals over the 66-day implementation period. Prior to implementation, 127 CR referrals were ordered in 87-days. By comparing 127 referrals in 87 days to 138 referrals in 66 days, one can conclude that the volume of cardiac rehabilitation referrals increased by 43.24% over ten weeks (see Appendix L). Thirteen weeks before implementation, the clinic averaged 9.77 referrals per week ( $SD = 4.78$ ). Over the ten-week implementation period, referrals averaged 13.80 per week ( $SD = 4.57$ ) (see Appendix M). Variability in the diagnoses for referrals also increased. Referrals for CABGs, valve surgeries, and HF accounted for 85.04% of all CR referrals before implementation. Patients who were status-post NSTEMI, STEMI, or PCI only accounted for 7.08% of all referrals combined. After completing the education with weekly visits to the practice site, referrals for NSTEMI, STEMI, and PCI improved to 13.77% of all referrals within the ten weeks (see Appendix N). There was a 176.87% increase in the proportion of referrals for patients who were status post PCI. The proportion of NSTEMI and STEMI referrals increased by 84.06% and 53.38%, respectively. The share of referrals for CABG remained relatively constant, most likely due to the standardized process set up within the surgical department. During implementation, the HF clinic was in the

process of transitioning to a different facility. Thus, the percentage of referrals to CR for heart failure declined by 62.61%. Provider education and screening tool use could in-part explain the increase in referrals for patients with an MI or PCI.

The CR screening tool did not prove to be as effective as planned. Both the cardiology department and the surgical department used the screening tools. A total of 108 tools were completed, 35 from cardiology and 73 from cardiac surgery. Screening tool completion averaged 10.80 tools per week ( $SD = 10.34$ ) between both the cardiology and cardiac-surgery departments. The cardiology department completed an average of 3.40 tools per week ( $SD = 4.17$ ). Screening tool completion in the cardiology department peaked at week seven of the implementation. No screening tools were completed for the final two weeks of the project.

### **Summary**

The short- and long-term goals for this DNP project were to increase referrals to CR by 10% of the baseline and to establish a standardized referral process, respectively. Even though referrals to CR increased by 43% during the implementation phase, the sustainability of the intervention is at risk. The use of CR Screening Tools did not appear to affect CR referrals. Chapter Eight will discuss project success, limitations, and recommendations for future practice in more detail.

## Chapter Seven: Implications for Nursing Practice

The American Association of Colleges of Nursing [AACN] (2006) created eight *DNP Essentials* to outline competencies one must obtain before earning a DNP degree. The purpose of the *DNP Essentials* is to ensure doctorally-prepared nurses have the skills equipped to transform health care practice and outcomes. This chapter discusses the implications of nursing practice achieved through the planning, implementation, and evaluation of this quality improvement project.

### Practice Implications

**Essential I: Scientific underpinnings for practice.** The first *Essential* acknowledges the complexity and foundation of nursing. It incorporates science, human behavior, nursing processes, and theory to translate knowledge into the clinical practice environment and to evaluate new practice approaches (AACN, 2006). This QI project began with a literature review of cardiac rehabilitation and its effect on heart disease. The DNP student synthesized knowledge after performing an extensive literature search to understand the factors contributing to CR referral and attendance. Cardiac rehabilitation referrals and endorsements from health care providers strongly influence a patient's willingness to participate in the program and thus contribute to improved health outcomes and quality of life.

This QI project used Roger's diffusion of innovations theory to explain why cardiology providers did not frequently address cardiac rehabilitation referrals. On-going budget cuts and staffing shortages contributed to the health care providers' resistance to change. Thus, the use of CR screening tools and provider education was implemented to reach the late majority and laggards. A post-myocardial infarction clinic with a cardiac rehabilitation nurse liaison would help this project site reach patients in need of a CR referral. However, for the post-MI clinic to

be successful, an innovator or early adopter must be willing to advocate for patients to attend CR.

**Essential II: Organization and systems leadership for quality improvement and systems thinking.** *Essential II* stretches beyond individual patient care and strives to improve health care delivery for populations (AACN, 2006). To do this, the doctorally-prepared nurse must understand organizational leadership and team dynamics. This *Essential* focuses on designing and evaluating efficient, affordable, and safe care delivery models (AACN, 2006).

The project site was undergoing multiple budget cuts and staffing crises. Organizational leadership was supportive of this project. Nevertheless, the provider's schedules constantly fluctuated, making it challenging to educate all of the staff on the project plan and purpose of CR. The PDSA model was used to evaluate and modify implementation based on barriers identified during the implementation phase.

Patients can be referred to CR from the hospital or an outpatient clinic setting. It is unclear if the patients consistently follow up with a cardiologist after a coronary event. Some cardiologists may assume the CR referral was ordered in the hospital. However, this project highlighted that this was not the case. A standardized process needs to be created for cardiac patients post-hospital discharge to ensure the patients are receiving the standards of care for cardiac disease. Patient participation in CR can decrease morbidity and mortality by 13 to 24%, prevent rehospitalization, and thus, save on health care costs (Ades et al., 2017). The DNP graduate should advocate for high-quality, cost-saving interventions such as CR.

**Essential III: Clinical scholarship and analytical methods for EBP.** Evaluating and translating evidence into practice is the foundation of *DNP Essential III* (AACN, 2006). This *Essential* requires the doctorally-prepared nurse to analyze and disseminate findings from

evidence-based practice implementation (AACN, 2006). This DNP project began with a literature search and collaboration with the local CR agency to determine needs in increasing participation in CR. The DNP student disseminated results to the project site, local CR agency, DNP faculty, and students. Evidence-based guidelines provided the foundation for this project, as CR is a class Ia recommendation for a variety of cardiovascular conditions. The DNP graduate is expected to stay up to date with clinical practice guidelines and effectively communicate best practices to colleagues. Any quality improvement projects or initiatives should be disseminated to guide the broader healthcare community in practice change.

**Essential IV: Information systems/technology and patient care technology for the improvement and transformation of healthcare.** *Essential IV* requires the doctorally-prepared nurse to use technology to manage data and evaluate the efficiency and outcomes of patient care (AACN, 2006). Graduates must be able to select the appropriate system for tracking results, develop data extraction tools, ensure patient privacy, and evaluate health-related technologies (AACN, 2006). This project utilized Microsoft Excel® to track referrals and screening tool usage. Data were extracted from the EHR and compiled into an Excel® spreadsheet.

The electronic health record served as a barrier to this project's implementation. The project site has been working with the informational technology department for many years to implement an electronic referral to cardiac rehabilitation. Unfortunately, this is not completed yet. Many providers suggested that an electronic referral or more straightforward referral process would help get patients to CR. The project site needs to collaborate with inpatient providers and information technology employees to ensure referrals can easily be entered in both the hospital and outpatient settings.

**Essential V: Healthcare policy for advocacy in healthcare.** This *Essential* requires the DNP graduate to engage the development, implementation, and advocacy of health policy and the nursing profession (AACN, 2006). The doctorally-prepared nurse should be able to communicate practice concerns to policymakers and participate at local, state, and national levels (AACN, 2006). Evaluation of policy's impact on patient care outcomes is also part of this *Essential* (AACN, 2006).

Currently, Medicare mandates that CR programs must have direct supervision by medical doctors on-site during all CR sessions. Nurse practitioners (NP) and physician assistants (PA) are not allowed to fulfill this requirement. A bill was passed that will allow NPs and PAs to provide direct supervision in 2024 (American Association of Nurse Practitioners [AANP], n.d.). As the legislation currently stands, NPs are not permitted to order CR services. A bill was introduced into Congress to move the date to 2020 and also allow NPs and PAs to prescribe CR (AANP, n.d.). The current legislation limits the impact CR can have, especially in areas where there are physician shortages. Furthermore, physician-only supervision drives up the cost of CR programs, making them unaffordable for the people in need. The doctorally-prepared nurse must advocate for legislation to remove these barriers and increase access to CR.

**Essential VI: Interprofessional collaboration for improving patient and population health outcomes.** A doctorally-prepared nurse is qualified to serve as a leader for interprofessional teams. *Essential VI* prepares the graduate to collaborate with a variety of different professions to build practice models, guidelines, and establish standards of care (AACN, 2006). The graduate acts as both a consultant and a leader to employ models that deliver safe, effective, and efficient patient-centered care (AACN, 2006).

Interprofessional collaboration was at the core of this DNP project. Not only did this DNP student collaborate among professionals within the project site, but she worked with the cardiac rehabilitation facility. The DNP student served as the link between cardiac rehabilitation, the hospital, and the project site. As project coordinator, the DNP student acknowledged the expertise of each team member and utilized suggestions from medical assistants, physicians, and administrators to modify implementation and address clinical concerns. For example, the DNP student communicated feedback to the CR site from providers about the CR program's hours of operation and referral process.

Teamwork and collaboration are skills that require patience, self-reflection, and humility. As a leader of future health care teams, the doctorally prepared nurse must understand and value each profession's contribution to the team. An interprofessional team needs to be flexible and willing to work for the common goal of improving outcomes and the lives of patients. In CR programs, interprofessional teams are crucial in providing the patient with the physical activity, nutrition, medication adherence, and lifestyle changes necessary to prevent recurrent cardiac events.

**Essential VII: Clinical prevention and population health for improving the nation's health.** Health promotion and disease prevention are at the core of *Essential VII* (AACN, 2006). The DNP graduate uses the epidemiological, biostatistical, cultural, and environmental aspects of public health to design, implement, and evaluate programs (AACN, 2006). These programs promote health, prevent disease, or address gaps in the care of populations (AACN, 2006).

Heart disease is the second leading cause of death in North Carolina (CDC, 2018). Cardiac rehabilitation is an evidenced-based tertiary prevention program that promotes lifestyle modification to prevent recurrent cardiac events (Wall et al., 2018). The Million Hearts®

Initiative set a goal to save one million lives from cardiovascular-related death by 2022. Cardiac rehabilitation is included in this initiative, as it has been proven to decrease mortality by 13 to 24% (Ades et al., 2018). Health care providers must consistently refer patients to CR and strongly encourage patient participation. Participation in CR can improve population health outcomes, prevent rehospitalizations, and thus decrease health care costs.

**Essential VIII: Advanced nursing practice.** As healthcare becomes increasingly sophisticated and complex, the DNP degree prepares nurses to apply advanced knowledge and mastery within a specific area of practice (AACN, 2006). A DNP graduate can implement comprehensive and systematic assessments to design therapeutic nursing interventions (AACN, 2006). *Essential VIII* requires graduates to educate, mentor, and support nurses through the process of practice improvement and evidence-based change.

This DNP student provided support to medical assistants and cardiology providers throughout the implementation of practice change. The student analyzed practice workflow, referral data, and current processes to accommodate CR discussions into daily practice. As a result, cardiology providers and medical assistants increased the frequency in which they discussed CR with patients. Doctorally-prepared nurses have the skills to evaluate research and evidenced-based guidelines to implement them into practice quickly. The DNP graduate should utilize knowledge and practice expertise to design, implement, evaluate, and support quality improvement initiatives.

### **Summary**

The eight *DNP Essentials* address the core competencies of doctoral nursing education. A DNP graduate is expected to critically evaluate literature, evidence-based practice, system processes, and policy to design, implement, and evaluate practice improvement. One cannot

achieve successful quality improvement without strong leadership skills, persistence, and interprofessional collaboration. Future implications for this project include the development of a CR nurse liaison position, electronic referral, the implementation of standardized processes, and consistent discussion of evidence-based practice guidelines to improve healthcare outcomes.

## **Chapter Eight: Final Conclusions**

Cardiac rehabilitation (CR) is indicated after myocardial infarction, percutaneous coronary intervention, cardiac surgery, or heart failure. Despite this recommendation, many patients in this cardiology clinic did not receive referrals. This project aimed to increase referrals to CR from an outpatient cardiology clinic through the use of education and a CR screening tool. This chapter will discuss the significance of the findings, project limitations, strengths, weaknesses, and recommendations for future practice.

### **Significance of Findings**

Cardiac rehabilitation referrals increased by 43% over the ten weeks, surpassing the set goal of 10%. While the project team was excited to see this improvement, the sustainability of the project intervention was questionable. To achieve the 43% increase, the DNP student traveled to the project site at weekly intervals to reinforce education and keep CR referrals at the forefront of the providers' minds. A standardized process must be developed to capture all cardiology patients in need of a CR referral. A post-MI clinic or addition of a CR nurse liaison could aid in the sustainability of this project.

Also, through conversations with the site champion and providers at the clinic, the DNP student identified a disconnect between inpatient and outpatient referrals. Many cardiology providers at the project site worked in both inpatient and outpatient settings. A standard order set within the hospital included a "consult to cardiac rehabilitation" order. However, this order did not cross over to the ambulatory setting, leading many providers who worked in both inpatient and outpatient settings to believe they referred the patient to CR, when in fact, no referral was made. Thus, when patients followed up in the cardiology clinic after a cardiac event, many

providers did not address CR in the clinic because they thought the patient should have already received a referral.

The CR Screening Tool did not seem to influence the provider's decision to refer to CR, as evidenced by the wide variability in screening tool use per week. However, this could be due to the lack of consistency of screening tool initiation by medical assistants during triage. When educating providers, some mentioned they had not seen the screening tools and wanted the medical assistants to help identify those patients who needed referrals. Yet, the project struggled to keep medical assistants engaged despite multiple PDSA cycles to incorporate the screening tool into clinic flow.

Not only did the project increase CR referrals, but the results also noted an increase in variety, incorporating more referrals for PCI, MI, and cardiomyopathy, rather than just surgical diagnoses. Therefore, weekly education must have reached some providers. Rogers's diffusion of innovations explains why some providers were hesitant to change their practice and start addressing CR in the clinic (Rogers, 2003). Consistent with literature review findings, providers frequently discussed cost, distance to CR facility, CR hours of operation, and patient comorbidities as factors influencing the decision to refer (Dahhan et al., 2015). However, it is the provider's responsibility to enter the referral and let the patient decide if he or she will attend. In retrospect, more reliable support from medical assistants and clinic administration, along with consistent use of the screening tool, could have helped reinforce education and ultimately helped providers incorporate CR referrals into their daily routine.

### **Project Strengths and Weaknesses**

A strength of this project was the ability to increase referrals in a short timeframe. Additionally, identification of the "consult to cardiac rehabilitation" inpatient order loophole

helped providers understand the importance of discussing CR within the clinic. The collaborative relationship between the DNP student and project champion helped provide clarification about the feasibility of CR for patients, including cost, insurance, and physical co-morbidities. The project helped build a relationship between the cardiology clinic and the cardiac rehabilitation facility.

Staff engagement was a significant weakness of the project. Medical assistants, though initially engaged, did not follow through with implementing the screening tools. Clinic administrative staff supported the project idea but had too many prior obligations to reinforce education and hold providers and MAs accountable to CR referrals. Thus, unless the DNP student was at the project site, the project education and processes were not reinforced.

### **Project Limitations**

There were several limitations to this project. The DNP student had a difficult time getting all providers in one place at one time to provide education. Thus, some providers did not receive instruction on CR and the project purpose until halfway through the implementation period. Additionally, providers' perceptions influenced their willingness to refer. The DNP student had difficulty getting providers to refer patients to CR due to opinions about the cost of CR, distance to CR, co-morbidities of the patient, and frustrations of the referral process. Furthermore, the clinic was undergoing staffing and budget cuts, and some providers were overwhelmed with increasing demands of higher patient loads. Clinic administration was also preoccupied with staffing and budget issues, so they could not provide as much support and reinforcement for the project.

The project was also limited by the EHR, as there was no way for providers to directly enter an electronic referral from both the inpatient and outpatient settings. All referrals had to be

processed through referral coordinators between the clinic and the CR facility. The DNP student could not determine the total number of patients who would have been eligible for CR due to limitations within the EHR and poor participation with CR screening tools. Thus, the exact referral rate was not identified.

### **Project Benefits**

Given there was an increase in referrals by 43%, the project team assumed that at least five patients received a CR referral that may not have otherwise. Participation in CR can prevent a patient from having a repeat cardiac event. An average hospital stay following a PCI was 3.1 days and costs an average of \$18,931 (Cowper et al., 2019). Thus, if five people went to CR that would not have otherwise gotten a referral, one can conclude this project saved close to \$100,000 for patients and the health care system.

The project also brought limitations and barriers related to the referral process to the surface so that they can be improved upon in future QI projects. For example, many providers were unaware of a financial assistance program for patients who might not be able to afford CR. The collaboration between the CR facility and the cardiology clinic improved communication between the two facilities to understand where the referral process needed improvement. Additionally, providers learned about the limitations of the inpatient referral process, which convinced some providers to begin discussing CR in the outpatient setting.

### **Practice Recommendations**

Based on the outcomes of this project, the project team identified three recommendations for future practice. First, the cardiology clinic needs to develop a post-MI clinic that mirrors a similar program within the cardiac-surgery department. Patients who experienced an MI or PCI should be seen in a cardiology clinic within two weeks. At that visit, the provider should discuss

risk factors for repeat events and initiate the CR referral. CR teaches and supports patients in making the lifestyle changes necessary to prevent repeat cardiac events (Menezes et al., 2014).

Additional recommendations include creating standardized electronic referrals and best-practice advisory (BPA) pop-ups within the EHR to ensure all patients receive a CR referral. Many providers expressed frustration that the inpatient referral did not cross over to the outpatient setting. However, even if the referral did transfer over, patients still need the education on the purpose and indication for CR. An electronic referral process with a BPA would ensure all patients receive a referral to CR, but would not guarantee an impact on enrollment unless providers spent time educating the patients on the purpose of CR.

Evidence demonstrates that the strength of a provider's recommendation is highly predictive of a patient's willingness to attend CR (Ghisi et al., 2013). The final recommendation includes hiring a CR nurse liaison to meet with patients after an MI, PCI, or HF diagnosis to discuss the purpose, indications, and benefits of CR jointly with the patient. This would be beneficial in increasing referrals and participation. The nurse could provide teaching and counseling surrounding the CR referral, leaving more time for the cardiology provider to discuss other concerns during each visit. While hiring a new team member may be an additional expense, the nurse could help improve outcomes and thus improve reimbursement by ensuring patients receive the education, support, and rehabilitation they need to prevent repeat events.

### **Final Summary**

Cardiac rehabilitation is an evidenced-based tertiary prevention program focused on lifestyle modification and exercise for patients who have experienced a coronary event. The American Heart Association endorses this program as a class Ia recommendation for patients after an MI, PCI, or cardiac surgery. Randomized control trials, meta-analyses, and

nonrandomized studies have demonstrated that participation in CR after a cardiac event can reduce morbidity, mortality, and the likelihood of repeat cardiac events. Despite these recommendations, CR is not frequently discussed in cardiology offices.

Through provider education and use of a CR screening tool, the practice site was able to increase CR referrals by 43% over baseline, surpassing the goal of a 10% increase during project implementation. This project's goals aligned with the Million Hearts® Initiative to increase participation in cardiac rehabilitation from 20% to 70% in five years, as the first step in attendance is a referral. Barriers to implementation included provider availability, misconceptions about CR, poor compliance with screening tool use, and limitations of the inpatient referral process. Future QI projects at this clinic should focus on the development of a post-MI clinic, the addition of a cardiac rehabilitation nurse liaison, and the development of a standardized electronic referral process.

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Appendix A

Literature Search Flow Map

270 articles found using search terms with limitations of 5-year period, full-text, and peer reviewed articles using PubMed and CINHALL

58 articles remained after reviewing titles and abstracts, removing duplicates, and articles without a primary focus of CR; these were reviewed in full

32 articles plus 3 AHA/ACC Guidelines remained pertinent and were used for literature synthesis

## Appendix B

## Literature Matrix

Article (APA Citation)	Level of Evidence (I to VII)	Data/ Findings	Summary	Use of Evidence in EBP Project Plan
McMahon, S. R., Ades, P. A., & Thompson, P. D. (2017). The role of cardiac rehabilitation in patients with heart disease. <i>Trends in Cardiovascular Medicine</i> , 27(6), 420-425. doi:10.1016/j.tcm.2017.02.005	Level VII	In 2014 Medicare started to cover CR for patients with HFpEF. Death and hospital admission decreased 38% with exercise-based CR. Mortality reduced 45% for patients with HFpEF. HFpEF is not covered by many 3rd party payers.	CR can decrease mortality, reduce hospital admissions, and improve quality of life.	CR is under used and underappreciated. More research is needed to demonstrate the benefits of HFpEF. These statistics provide evidence for the need and support the Million Hearts initiative.
Ko, J. U., Lee, G. J., Kim, H. M., & Bang, H. J. (2018). The effect of the revised clinical pathway of cardiac rehabilitation on participation rates in patients with myocardial infarction: A retrospective study. <i>Korean Journal of Adult Nursing</i> , 30(5), 536-545. doi:10.7475/kjan.2018.30.5.536	Level IV	A revised clinical pathway for CR included decreasing the amount of time the patient had to go to the hospital post discharge. Participation rates increased significantly at one month and three months for the revised program (26% to 60% and 12% to 35% respectively.  **New protocol: simplified steps for the patient. Exercise test and CR assessment occurred on same day as cardiology visit. Also used home based CR with automatic text reminders.	Redesigning the referral process to reduce the number of times a patient must come to hospital post discharge and reducing wait times may contribute to better CR participation. The use of CR liaison nurse can be helpful.	Evaluate project site process for CR referral. See if it can be streamlined to be easier for providers and patient Is there an RN that can act as a liaison? Does the site have resources to do CR evaluation at the clinic?  **Limitations: retrospective, small sample size, Korean study
Resurrección, D. M., Motrico, E., Rigabert, A., Rubio-Valera, M., Conejo-Cerón, S., Pastor, L., & Moreno-Peral, P. (2017). Barriers for nonparticipation and dropout of women in cardiac rehabilitation programs: A systematic review. <i>Journal of Women's Health</i> , 26(8), 849-859. doi:10.1089/jwh.2016.6249	Level V	Barriers for lack of participation or dropout in CR include self-reported health, health beliefs, no time, motivation, lack of social support, work conflicts, transport, distance, services offered, group format, <b>lack of referral, cost, negative health system experience</b> Several studies stated physician felt CR referral was unnecessary.	There are many barriers to CR attendance. Many of these can be addressed via the provider/patient relationship or with policy changes. Providers should assess for barriers to CR using a measurable scale such as the Cardiac Rehabilitation Enrolment Obstacles scale.	The first step to increasing CR participation is referral. A QI project to tackle referrals, discuss costs, and improve experience with the health systems could improve CR participation.

<p>Giuliano, C., Parmenter, B.J., Baker, M.K., Mitchell, B.L., Williams, A.D., Lyndon, K., . . . Levinger, I. (2017). Cardiac rehabilitation for patients with coronary artery disease: A practical guide to enhance patient outcomes through continuity of care. <i>Clinical Medicine Insights: Cardiology</i>, (11), 1-7. doi:10.1177/1179546817710028</p>	<p>Level VII</p>	<p>Informational, management, and relational continuity between the 3 phases of CR is necessary. Low attendance can be related to insufficient referral process and poor organization between program/providers.</p>	<p>Involve patients in CR referral. Staff should be aware of CR options and understand barriers to participation.</p>	<p>Improving patient handover/relaying health information, improving access, overcoming scheduling delays, and developing relationships will help increase CR attendance. ** This study focuses on <b>system pathways</b> to increase referrals.</p>
<p>Wall, H.K., Stolp, H., Lucido, B., &amp; Graff, K. (2018). Cardiac rehabilitation change package. Retrieved from <a href="https://millionhearts.hs.gov/files/Cardiac_Rehab_Change_Pkg.pdf">https://millionhearts.hs.gov/files/Cardiac_Rehab_Change_Pkg.pdf</a></p>	<p>Level VII</p>	<p>Resource published by the Million Hearts initiative, which provides tools and teaching points to increase CR referrals and participation. Uses the PDSA -- what's the goal, how do we know when it's met, what's the change?</p>	<p>Million Hearts—CDC and CMS goal of 70% participation in CR. Uses process measures to identify a standardized outcome.</p>	<p>This QI project must generate more awareness, increase referrals, and remove barriers to CR. Utilize the <i>Vital Conversations with Medical Teams &amp; Hospital Administrators About Cardiac Rehabilitation Services Delivering Value Based Care</i> PowerPoint for <b>provider education!</b></p>
<p>Thomas, R. J., Balady, G., Banka, G., Beckie, T. M., Chiu, J., Gokak, S., . . . Wang, T. Y. (2018). 2018 ACC/AHA clinical performance and quality measures for cardiac rehabilitation: A report of the American college of Cardiology/American heart association Task Force on Performance measures. <i>Journal of the American College of Cardiology</i>, 71(16), 1814. doi:10.1016/j.jacc.2018.01.004</p>	<p>Level VII</p>	<p>Explains performance measures (PM) regarding CR referral and delivery; Significant PMs include (1) CR referral from outpatient setting -- all eligible patients should be referred (2) Exercise referral from outpatient setting for HFrEF -- improves capacity and decreases mortality. An additional quality measure remains pertinent: Patient enrollment and adherence (care coordination)</p>	<p>To meet PM: Must document conversation with patient and official referral or document refusal. This is a proportion out of the total number of eligible patients. To track quality measure: Number of patients whom CR provides written info regarding enrollment, attendance, and outcomes to referring provider</p>	<p>Utilize these performance and outcome measures as basis for DNP project outcomes.</p>

<p>Ades, P. A., Keteyian, S. J., Wright, J. S., Hamm, L. F., Lui, K., Newlin, K., . . . Thomas, R. J. (2017). Increasing cardiac rehabilitation participation from 20% to 70%: A road map from the million hearts cardiac rehabilitation collaborative. <i>Mayo Clinic Proceedings</i>, 92(2), 234-242. doi:10.1016/j.mayocp.2014.10.014</p>	<p>Level VI</p>	<p>CR can reduce mortality 13-24% over 1-3 years and decrease hospitalization by 31% in one year. While CR is Covered by Medicaid only 19-34% attend. The South has the lowest participation. Increasing CR from 20 to 70% could reduce mortality by 12,000 and hospitalizations by 87,000.</p>	<p>CR is class 1 recommendation by AHA for patients after MI, PCI, or HF. CR can decrease mortality and hospitalization, improve quality of life and functional capacity.</p>	<p>Makes the case for why CR is needed. Good resource for background information on the Million Hearts initiative.</p>
<p>Virani, S.S., Maddox, T.M., Chan, P.S., Tang, F., Akeroyd, J.M., Risch, S.A., . . . Petersen, L.A. (2015). Provider type and quality of outpatient cardiovascular disease care. <i>Journal of the American College of Cardiology</i>, 66(16), 1803-1812. doi:10.1016/j.jacc.2015.08.017</p>	<p>Level VI</p>	<p>Compared care given by Advanced Practice Providers (APP) and physicians. Found no difference in CAD, HF, and Atrial fib performance measures between APPs and physicians. APPs were better at smoking cessation (45.6% versus 43.3%) and CR referral (11.8% versus 7.2%) compared to physicians for patients with CAD; APPs followed HF measures 81.2% of the time, while physicians were only 79.2%; AFib was 62.9% for APPs and 61% for physicians. Practices with both APPs and physicians had better compliance with PMs of HF (78.9%) and AF (61.1%) compared to physician only practices (75.5% and 7.7%).</p>	<p>Collaborative care is beneficial for cardiovascular patients with CAD, HF, and Afib. There is no difference in quality of care between APPs and Physicians.</p>	<p>While right now, only physicians can make referrals to CR (NPs have to be cosigned), APPs are referring more patients. Collaborating between APPs and physicians may help improve HF care and increase referrals to CR. If only 45% of patients with CAD were being referred, there's opportunity for the other 55%.</p>

<p>Dahhan, A., MD, Maddox, W. R., MD, Krothapalli, S., MD, Farmer, M., MD, Shah, A., MD, Ford, B., MD, . . . Sharma, G. K., MD. (2015). Education of physicians and implementation of a formal referral system can improve cardiac rehabilitation referral and participation rates after percutaneous coronary intervention. <i>Heart, Lung and Circulation</i>, 24(8), 806-816. doi:10.1016/j.hlc.2015.02.006</p>	<p>Level VI</p>	<p>Preintervention: 375 patients were eligible for CR. Of those, 17.6% were referred. 82.4% lacked documentation of non-referral reason. 38.5% of physicians didn't know CR was class 1 indication for PCI. Reported barriers to referral included no insurance, patient didn't know benefits, thought it'd be addressed in outpatient settings, and assumed non-compliance. <b>Post intervention:</b> 154 patients eligible. Referral rate increased to 88.96%. CR center saw 32.8% increase in daily exercise sessions, meaning more people attended. 137 referrals, 96 to local CR center, 25/96 (25%) participated in CR.</p>	<p>Provider education regarding benefits of CR and addressing perceived barriers to CR referral was instrumental in increasing referral rates.</p>	<p>Assess providers knowledge of CR indications, benefits, and perceived barriers to referral. Consider tracking CR referral rates for eligible patients pre and post intervention.</p> <p><b>**Process in this study:</b> Questionnaire was given to providers to assess knowledge of benefits of CR, eligibility, and barriers to referral. Group meetings discussed local referral rate. Education was given related to statistics, benefits, and barriers of CR. The referral rate was determined before and after intervention.</p>
<p>Karmali, K.N., Davies, P., Taylor, F., Beswick, A., Martin, N., &amp; Ebrahim, S. (2015). Promoting patient uptake and adherence in cardiac rehabilitation. <i>Cochrane Database of Systematic Reviews</i>, (6), 1-65. doi: 110.1002/14651858.CD007131.pub3</p>	<p>Level I</p>	<p>Systematic review of 18 studies, either RCT, parallel group, cross-over, or quasi-randomized design. Eight articles were about increasing adherence, and ten were about increasing uptake. Found weak evidence for interventions to increase adherence and uptake. More research is needed. Primary outcomes included uptake measures and CR adherence to recommendations, exercise, and lifestyle changes</p>	<p>Some interventions to increase uptake included nurse-calls related to illness perception, peer support group, home visits, and early appointment scheduling. Interventions to increase adherence included were goal setting, action planning, self-monitoring, stress management, written commitments, persuasive communication, small group interaction, and spouse inclusion.</p>	<p>Only one study in this Cochrane review targeted health care providers, even though there is evidence that HCP endorsement of CR may increase uptake.</p> <p>This Cochrane review provides additional suggestions for improving patient engagement in CR.</p>
<p>Andrew, D., Natarajan, M.K., &amp; Schwalm, J.D. (2015). Assessing physician barriers to cardiac rehabilitation referral rates in a tertiary teaching centre. <i>Canadian Journal of General Internal Medicine</i>, 11(1), 14-18. doi: <a href="https://doi.org/10.22374/cjim.v11i1.108">https://doi.org/10.22374/cjim.v11i1.108</a></p>	<p>Level VI</p>	<p>Setting: Tertiary care center. Intervention: Survey tool used to assess physician knowledge of CR and referral patterns. Survey assessed knowledge of benefits, eligibility, and local program information. 91/154 completed survey. Internal medicine residents weren't sure of CR guidelines (32.69 compared with 72.02 for cardiology)</p>	<p>Physicians in the cardiology department were more likely to refer than those in internal medicine, yet internal medicine residents were more likely to admit ACS patients.</p>	<p>This study applies to hospital CR referrals. I may be able to use some of the survey questions to develop a tool for assessing outpatient provider knowledge about CR indication and referral processes. It is important for providers to endorse CR programs.</p>

<p>Chernomordik, F., Sabbag, A., Tzur, B., Kopel, E., Goldkorn, R., Matetzky, S., . . . Klempfner, R. (2017). Cardiac rehabilitation following an acute coronary syndrome: Trends in referral, predictors and mortality outcome in a multicenter national registry between years 2006–2013: Report from the working group on cardiac rehabilitation, the Israeli heart society. <i>European Journal of Preventive Cardiology</i>, 24(2), 123-132. doi:10.1177/2047487316680692</p>	<p>Level IV</p>	<p>Israeli 2009-2013 ACSIS survey looked at patients who were referred to CR vs. those that were not. Noted referral rates increased 38% in 2006, 60% in 2010, and 57% in 2013. Those least likely to be referred included women, minorities, elderly, patients with a history of CVA, MI, PVD, CABG, HF, RF, Jewish ethnicity, and those facilities with no CR onsite. Kaplan-Meier survival calculated 32% reduced risk in mortality at 1 year (p=.03) for those patients who attended CR.</p>	<p>Patients who are of older age with comorbidities are less likely to be referred. Education directed towards CR awareness and benefits for high risk populations</p>	<p>This study was completed in Israel, so it may not be generalizable to US population. However, barriers noted in Israel are consistent with research found in US. Supports CR can reduce one-year mortality. ** data from this study was based on ACS, not HF *</p>
<p>Golwala, H., Pandey, A., Ju, C., Butler, J., Yancy, C., Bhatt, D. L., . . . Fonarow, G. C. (2015). Temporal trends and factors associated with cardiac rehabilitation referral among patients hospitalized with heart failure: Findings from get with the guidelines-heart failure registry. <i>Journal of the American College of Cardiology</i>, 66(8), 917-926.</p>	<p>Level IV</p>	<p>This observational study looked at the Get with the Guidelines HR data from 2005 to 2014. It included 105,619 patients from 338 hospitals. 10.4% of eligible heart failure patients received CR referral at discharge. Patients referred to CR were more likely to be younger, less than 70 years old, men, and have lower comorbidities and lower Medicare use. Over a 10-year period HFREF referrals increased from 9.6% to 13.3%. Patients with a CR referral were also more likely to receive other guideline recommendations such as ACE-I/ARB prescriptions.</p>	<p>CR is severely underutilized for heart failure patients despite proven benefits. Work must be done to increase referrals for CR and HF. Physicians perception of CR benefit is major factor in referral.</p>	<p>Provider education regarding benefits may increase referral rates and thus increase participation. ** Article has good graphic to use for education highlighting 89.6% non-referral versus 10.4% referral. Medicaid approves CR for HF with EF &lt;35%, but HFREF is EF &lt;40%. There's a gap.</p>

<p>Turk-Adawi, K. I., Oldridge, N. B., Tarima, S. S., Stason, W. B., &amp; Shepard, D. S. (2014). Cardiac rehabilitation enrollment among referred patients. <i>Journal of Cardiopulmonary Rehabilitation and Prevention</i>, 34(2), 114-122. doi:10.1097/HCR.00000000000017</p>	<p>Level VI</p>	<p>This study investigated the role of patient and organization factors in CR enrollment. Out of 6874 patients referred to CR, 67.6% enrolled (at least one session). CABG and those with health insurance were more likely to enroll. Those with HF, DM, current smokers, no insurance, MI without procedure, and older than 65 years old were less likely to enroll. 4.1% of enrollees had HF (OR 0.4). Patients were three times more likely to enroll if they had health insurance; 24.2% had CABG, OR of referral = 1.72</p>	<p>Heart failure patients, those without insurance, older age, multiple comorbidities, smokers were less likely to enroll in CR. CABG and insurance are predictors for CR enrollment.</p>	<p>Extra education and resources need to be spent talking with patients who are less likely to enroll. Referral should be made for all eligible patients. This study only examines enrollment, not referral. More information regarding how referral influences enrollment is needed. Study was performed in WI using Wisconsin Cardiac Rehabilitation Outcomes Registry web-based survey.</p>
<p>Ghisi, G. L. M., Polyzotis, P., Oh, P., Pakosh, M., &amp; Grace, S. L. (2013). Physician factors affecting cardiac rehabilitation referral and patient enrollment: A systematic review. <i>Clinical Cardiology</i>, 36(6), 323-335. doi:10.1002/clc.22126</p>	<p>Level I</p>	<p>Systematic review looking at referral/enrollment in CR. Two out of four studies demonstrated the relationship of appointment with the cardiologist at discharge led to increase in referrals. Two studies looked at physician barriers to referral. Six studies discussed strength of physician recommendation.</p>	<p>Geographic access, patient motivation, reported benefit, and indication determined physician referral patterns. Half of another study identified lack of insurance as a barrier and 40% reported lack of patient motivation and a factor. CR enrollment is related to the strength of recommendations. Providers who were skeptical of CR or didn't trust the local program had lower referral/enrollment rates</p>	<p>This article was from 2013, but it highlights the physician barriers to CR referral that affect patient enrollment.</p>
<p>Menezes, A. R., Lavie, C. J., Milani, R. V., Forman, D. E., King, M., &amp; Williams, M. A. (2014). Cardiac rehabilitation in the united states. <i>Progress in Cardiovascular Diseases</i>, 56(5), 522-529. doi:10.1016/j.pcad.2013.09.018</p>	<p>Level VII</p>	<p>CR is multidisciplinary, improves functioning, quality of life, nutrition, and psychosocial states. CVD risk factors include obesity and sedentary lifestyle, DM 2, and HTN. CR may reduce lipids and obesity. HFrEF patients report depressive symptoms decreased by 40% from exercise therapy. Less than 30% of all eligible CVD patients go.</p>	<p>CR may be dose dependent. More benefit is seen with more sessions completed (14% lower mortality attending 36 sessions than 24). Poor referral rates are related to lack of standard process, lack of discharge communication, inconvenience, weak physician recommendation, poorer exercise habits, low health literacy, and high copays.</p>	<p>This article provides an overview of CR benefits. Information should be shared with providers to encourage referral. This information should be translated to patients so they may understand the value. Low referral rates indicate the problem lies at the healthcare provider level right now.</p>

<p>Viana, M., Borges, A., Araújo, C., Rocha, A., Ribeiro, A. I., Laszczyńska, O., . . . Azevedo, A. (2018). Inequalities in access to cardiac rehabilitation after an acute coronary syndrome: The EPiHeart cohort. <i>BMJ Open</i>, 8(1), 1-11. doi:10.1136/bmjopen-2017-018934</p>	<p>Level VI</p>	<p>Portuguese study: 853 patients were included in study. Only 158 (32.3%) of patients from Porto were referred, while 39 (10.7%) of NER patients were referred. Reasons for non-participation included long wait to get in, limited time, lack of perceived benefit (20%), distance, and cost. The probability of referral decreased with age (OR=0.95). Those with comorbidities were less likely to be referred (1, OR=.04, 2+ OR =0.22)</p>	<p>Reasons for not attending CR included long wait time, limited time to participate, lack of perceived benefit, distance to center, and cost. Patients who are younger, male, employed, have insurance, higher education, PCI, and no comorbidities are more likely to get referral.</p>	<p>Identified barriers and bias to referral. Compared rural and urban settings but cannot necessarily be generalized to entire populations. Providers should be aware of the bias and ensure open discussion about CR for all eligible patients.</p>
<p>Pirruccello, J. P., Traynor, K. C., Natarajan, P., Brown, C., Hidrue, M. K., Rosenfield, K. A., . . . Wasfy, J. H. (2017). An electronic cardiac rehabilitation referral system increases cardiac rehabilitation referrals. <i>Coronary Artery Disease</i>, 28(4), 342-345. doi:10.1097/MCA.000000000000491</p>	<p>Level VI</p>	<p>Massachusetts General implemented electronic referrals for CR. The number of referrals increased from 14 to 559 after intervention. EHR increased referral by 1.8-fold monthly (17-fold total). Attendance remained at 54.8%.</p>	<p>EHR increased referrals, but not attendance. Referrals that went to other facilities couldn't be tracked.</p>	<p>Electronic referrals can significantly increase the number of patients referred to CR.</p>
<p>Schopfer, D.W. &amp; Forman, D.E. (2015). Cardiac rehabilitation in older adults. <i>Canadian Journal of Cardiology</i>, 32(9), 1088-1096. doi:10.1016/j.cjca.2016.03.003</p>	<p>Level VII</p>	<p>Older adults are more prone to deconditioning, joint instability, comorbidities. CR can help. Multiple studies demonstrated improvement in exercise capacity after CR (similar improvement as younger patients).</p>	<p>CR improves quality of life (QOL) for older patients. Some studies suggest CR may improve depression. As exercise capacity increases, mood and QOL did too. Increased exercise capacity can improve cognitive function and increase socialization. It's a myth that CR will increase falls for older patients Barriers: MDs don't discuss benefits with older patients.</p>	<p>Older adults are less likely to enroll and participate in CR, but CR can help these patients improve QOL, socialization, and mood. Will not increase falls for older adults.</p>

<p>Fletcher, S.M., &amp; McBurney, H. (2016). Strategic moments: Identifying opportunities to engage clients in attending cardiac rehabilitation and maintaining lifestyle changes. <i>Journal of Cardiopulmonary Rehabilitation and Prevention</i>, 36(5), 346-351. doi:10.1097/HCR.0000000000169</p>	<p>Level VI</p>	<p>Qualitative study that identified decision making drivers for CR attendance or nonattendance. 84 study participants (3 declined CR, 24 didn't complete, 57 completed). Themes: info about participation, person centered approach, ongoing support needs</p>	<p>Participants spoke of being referred but not knowing what it would entail, overload of information at hospital, CR getting lost in the mix, and nervousness related to CR attendance. Some spoke about education not being individualized and the timing of CR sessions were not flexible for their schedule. Patients spoke of a need for ongoing support to maintain lifestyle changes.</p>	<p>If a referral was made but the patient wasn't engaged in the process, the referral was lost. If not strongly encouraged to attend, any barrier can provide an excuse to not go. An individualized CR plan may be more effective, yet cardiology providers could take this task on by asking about it at every visit. Setting goals, providing individualized support may make CR more effective and appealing.</p>
<p>Aragam, K.G., Dai, D., Neely, M.L., Bhatt, D.L., Roe, M.T., Rumsfeld, J.S., &amp; Gurm, H.S. (2015). Gaps in referral to cardiac rehabilitation of patients undergoing percutaneous coronary intervention in the united states. <i>JACC (Journal of the American College of Cardiology)</i>, 65(19), 2079-2088. doi:10.1016/j.jacc.2015.02.063</p>	<p>Level VI</p>	<p>Using the National Cardiovascular Data Registry, authors assessed referral rates after PCI from July 2009 to March 2012 and was compared with other quality measures. 97.5% of patients were discharged on ASA, 89.8% statins, 79% ACE/ARB if indicated and 61.2% with a CR referral. Patients with an MI and Medicare insurance had a 66% referral rate for CR.</p>	<p>Insurance coverage is not a major factor in low CR referral rates.</p>	<p>Quality measures are being followed for other aspects of post MI care. Why is CR low?</p>
<p>Hutchinson, P., Meyer, A., &amp; Marshall, B. (2015). Factors influencing outpatient cardiac rehabilitation attendance. <i>Rehabilitation Nursing</i>, 40(6), 360-367. doi:10.1002/rnj.202</p>	<p>Level VI</p>	<p>30 item questionnaires; delivered to pts with cardiac condition (audit chart review) 143/394 (36.3% ) response rate. 38% (n=54) attended CR; 30% received no education on how to contact CR after d/c. 57% of those older than 80 did not receive an invitation to CR. Only 16% of pts received CR information from nurse. -- most pts found out about CR post d/c. 33% of part. wanted more information</p>	<p>CR referrals aren't being made. Left up to CR coordinator to contact, makes it hard for pts. Inpatient or first outpatient discussion would be appropriate. Older adults less likely to be offered CR.</p>	<p>Findings are consistent with current practice at Vidant. Most patients find out/get information about CR after discharge. If they receive info in hospital, usually don't recall. That is why it's important to discuss CR at outpatient appts. . Limitation: one New Zealand hospital.</p>

Colbert, J. D., Martin, B., Haykowsky, M. J., Hauer, T. L., Austford, L. D., Arena, R. A., . . . Stone, J. A. (2015). Cardiac rehabilitation referral, attendance and mortality in women. <i>European Journal of Preventive Cardiology</i> , 22(8), 979-986. doi:10.1177/2047487314545279	Level VI	Compare gender: CR referral, completion, and mortality. APPROACH database. Eligible if 1 vessel CAD. 6374/25,958 female. 31.1% of women referred, 42.2% men referred. 50% of females attended, 60% of males attended. Median f/u 7.4 yrs. Those who attended had greater survival. Women who completed CR had HR of 0.36 compared to those with no referral. 0.82 HR for referred but no complete. Men (0.51 complete. 0.86 referred no complete)	64% risk reduction for women compared to 49% risk reduction for men. Women may see greater mortality reduction than men	Women may see greater benefit from CR yet are less likely to be referred. Providers must be aware of this bias and remember to discuss CR with female patients.
Gee, M. A., Viera, A. J., Miller, P. F., & Tolleson-Rinehart, S. (2014). Functional capacity in men and women following cardiac rehabilitation. <i>Journal of Cardiopulmonary Rehabilitation and Prevention</i> , 34(4), 255-262. doi:10.1097/HCR.000000000000066	Level VI	UNC CR Program assesses functional capacity b/w men and women. Outcome: metabolic equivalents before and after; independent variable: sex 346 women, 758 men. Baseline METs men: 8.8, women 6.8. After adjusting for age, BMI, and indication, women improved METs 1.66, Men improved 2.22	Men may benefit from CR more than women in terms of functional capacity (27% improvement).	Study did not account for comorbidities. Does CR need to be more tailored to women? This study contradicts Colbert et al., 2015.
Ghisi, G.L., Contractor, A., Abhyankar, M., Syed, A., & Grace, S. L. (2018). Cardiac rehabilitation knowledge, awareness, and practice among cardiologists in India. <i>Indian Heart Journal</i> , 70(5), 753-755. doi:10.1016/j.ihj.2018.04.011	Level VI	India: survey of cardiologists at conference. 258 participants. 12 questions (MC, yes/no, Likert). 7% (n=20) did not answer any ? Correctly. 51.6% of providers referred 20-30% of patients. Only 23.5% referred more than 50% of patients. 3.69 (+or - 0.59) on scale of 1-4 on perceived importance of availability of trained people for CR. 47% of responders said patient disinterested was reason for not referring	Patient disinterested was top reason for not referring to CR in India. Furthermore, providers were not completely educated about recommendations for CR.	Limitations: Selection bias. Study was not in US. There's a lack of continuing education regarding CR in India. Enforces the point providers need more education regarding CR. Patient disinterested is a top barrier, but if providers know more about it, they can talk about the benefits with patients.
McIntosh, N., Fix, G. M., Allsup, K., Charns, M., McDannold, S., Manning, K., & Forman, D. E. (2017). A qualitative study of participation in	Level VI	Qualitative study to look at perspectives for enrolled, unenrolled pts, providers who refer, and those who provide CR. Include pts w/ MI, PCI, CABG. 15 providers, 16 pts participated.	Provider factors to increase participation: offering different times, home based CR, hybrid, or location closer to home, stable schedule (engrained in routine), specialized	Study identified barriers and benefits to CR (Health belief theory). Encourage providers to help pts overcome barriers by reducing inconvenience factors and sending repeated messages about

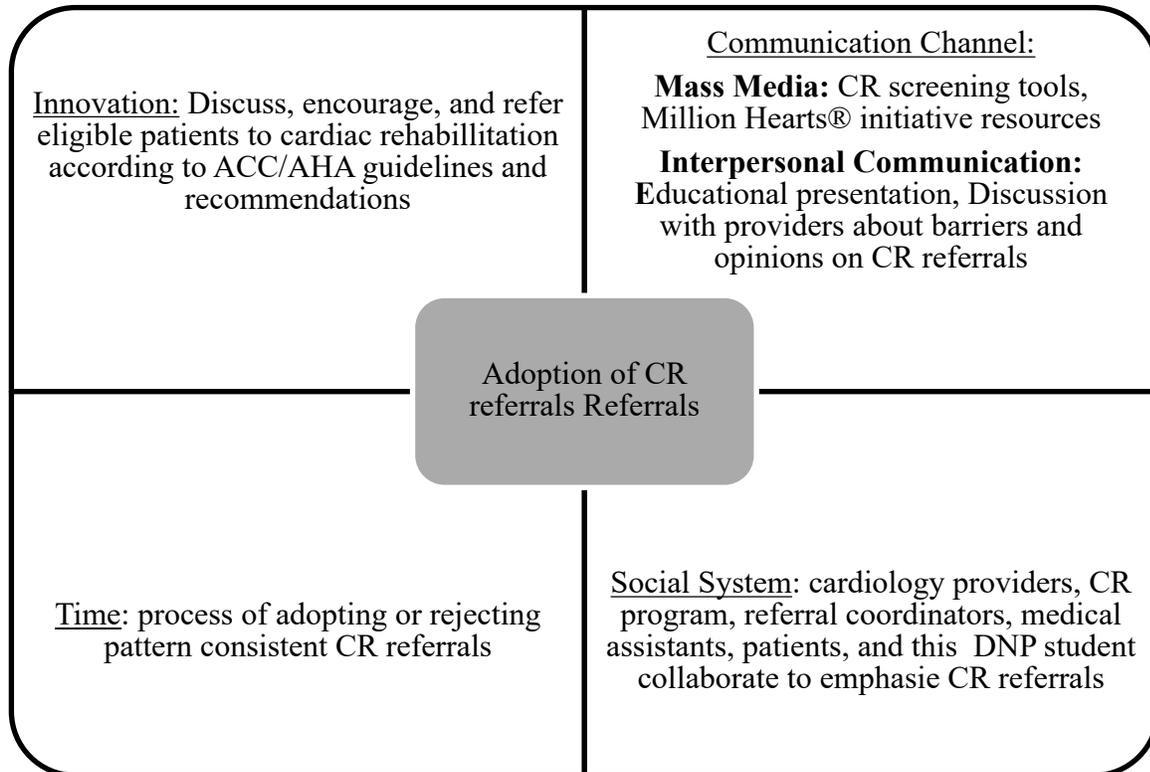
<p>cardiac rehabilitation programs in an integrated health care system. Military Medicine, 182(9), e1757-e1763. doi:10.7205/MILMED-D-17-00053</p>			<p>equipment such as ACLS/telemetry emphasizes safety, social enrolment /peer network causes comradery. Patient factors: <b>Provider endorsement and information about CR increased participation. Family support helps too.</b> Pts discussed concerns of comorbidities, no transportation and fear of exercise. Providers also described encouraging pts to return if dropped out.</p>	<p>the benefits. Limitations: one location, men only, didn't have as many pts from low enrollment sites</p>
<p>Frechette, K. M., Conley, S. M., Tang, A., &amp; Welch, T. D. (2019). Cardiac rehabilitation in a rural setting: OPTIMIZATION OF REFERRAL AND PARTICIPATION RATES. <i>Journal of Cardiopulmonary Rehabilitation and Prevention</i>, 39(1), E4-E7.</p>	<p>Level VI</p>	<p>QI project: Dartmouth has CR referral rate of 98%. Have CR nurse to advocate and identify eligible patients; CR nurse talks with pts to discuss benefit ; team-based care. Evaluated pts undergoing PCI, CABG, or valve surgery. 698/710 reviewed by CR nurse; 12 pts were missed, 167 valid reasons for non-participation. Remaining 531 were all referred. 76/91 pts attended at Dartmouth, 264/440 attended at regional programs</p>	<p>CR nurse providing initial education in inpatient setting helps increase referral and attendance rates. More patients were referred to regional centers.</p>	<p>Limitations: inpatient intervention, doesn't include pts with ACS or HF. Only 1 session was required for participation rates. Increase referral rates requires personal connection, integration with physician network, and knowledge of regional centers as well.</p>
<p>Gallagher, R., Neubeck, L., Du, H., Astley, C., Berry, N.M., Hill, M.N., &amp; Clark, R. (2016). Facilitating or getting in the way? the effect of clinicians' knowledge, values and beliefs on referral and participation. <i>European Journal of Preventative Cardiology</i>, 23(11), 1141-1150. doi:10.1177/2047487316630085</p>	<p>Level V</p>	<p>Identified knowledge of benefits of CR increases referral rate. Reasons for non-referral included refusal, distance, LTC, transportation, psych comorbidities, language barrier. Clinician must value CR and lifestyle modification. Referral rates higher for CABG; possible providers are filtering referrals based on belief</p>	<p>Strength of physician recommendation -- highly predictive of referral and enrollment. Some pts do not know what CR is before discharge (esp. if short stay). Strong understanding and provider recommendation influences patient to be more proactive towards health. Some patients may think the problem is "fixed" after surgery or PCI.</p>	<p>Clinician knowledge, values, and beliefs influence referral process. It's essential they know the benefits and local CR options. Specialized training regarding CR indications and benefits may help providers with CR referral. Also consider things to make it easier for providers: electronic referrals. Systematic review -- didn't specify type of studies included</p>

<p>Pack, Q. R., Squires, R. W., Lopez-Jimenez, F., Lichtman, S. W., Rodriguez-Escudero, J. P., Lindenauer, P. K., &amp; Thomas, R. J. (2015). Participation rates, process monitoring, and quality improvement among cardiac rehabilitation programs in the united states: A NATIONAL SURVEY. <i>Journal of Cardiopulmonary Rehabilitation and Prevention</i>, 35(3), 173-180. doi:10.1097/HCR.000000000000108</p>	<p>Level VI</p>	<p>Primary outcome: Measurement of participation rates in past 5 years. Questions about types of referral (Liaison, automatic, hospital, clinic). 334 program directors answered at least 1 question, 290 answered all. 41/285 (14.4%) were able to report information about clinic referral. Strong correlation between referral rate documentation and implementation of QI projects</p>	<p>Outpatient clinic -- lowest monitoring of referral rates and use of systematic referral (18% use systematic referral) Of referrals made in outpatient, 35% enroll</p>	<p>CR programs are not implementing QI projects. Identifies gaps in referral and enrollment for which to improve</p>
<p>Samayoa, L., Grace, S.L., Gravely, S., Scott, L B., Marzolini, S., &amp; Colella, T. J. F. (2014). Sex differences in cardiac rehabilitation enrollment: A meta-analysis. <i>Canadian Journal of Cardiology</i>, 30(7), 793-800. doi:10.1016/j.cjca.2013.11.007</p>	<p>Level I</p>	<p>Systematic review and meta-analysis 45% of men enroll in CR, 38.2% of women enroll</p>	<p>Disparity exists between CR enrollment between men and women</p>	<p>CR is recommendation is not specified by gender. Each patient should be referred based on diagnosis, not gender.</p>
<p>Dunlay, S.M., Pack, Q. R., Thomas, R.J., Killian, J. M., &amp; Roger, V.L. (2014). Participation in cardiac rehabilitation, readmissions, and death after acute myocardial infarction. <i>American Journal of Medicine</i>, 127(6), 538-546. doi:10.1016/j.amjmed.2014.02.008</p>	<p>Level IV</p>	<p>Tracked pts with MI from 1987 to 2010 (MN). 2991 pts with MI. 1569 patients (52.5%) participated in CR w/in 90 days of DC. Most people attended first session median 7 days. 76% (2265) of pts re-hospitalized at least once. Pts who attended CR decreased risk of readmission. NSTEMI -- reduction in risk of readmission Hazard ration 0.69 if attend CR. 1 year predicted mortality was 1.8 or 20.5% for participants vs. nonparticipants</p>	<p>CR can reduce the risk of readmission for patients with an MI. It also significantly lowers 1-year mortality</p>	<p>CR is a class I recommendation that remains underused, despite its proven benefits in mortality reduction and hospital readmission reduction</p>

<p>Yancy, C. W., Jessup, M., Bozkurt, B., Butler, J., Casey, J., Donald E, Drazner, M. H., . . . Wilkoff, B.L. (2013). 2013 ACCF/AHA guideline for the management of heart failure. Journal of American College of Cardiology, 62(16), e137-e239. doi: https://doi.org/10.1016/j.jacc.2013.05.019</p>	<p>Level II</p>	<p>HF - inability to pump/fill with blood; Reduced EF &lt;40%, preserved EF &gt;40%. Americans have 20% chance of developing.</p>	<p>CR - class IIa recommendation for HF; reduces mortality hospitalizations; improve health care QOL and functional capacity. Exercise therapy is class I indication.</p>	<p>CR is recommended for HF and is part of the guidelines for treatment.</p>
<p>Benjamin, E.J., Virani, S.S., Callaway, C.W., Chamberlain, A.M., Chang, A.R., Cheng, S., . . . Munter, P. (2018). Heart disease and stroke statistics-2018 update: A report from the American heart association. Circulation, 137(12), e67-e492. doi:10.1161/CIR.00000000000558</p>	<p>Level I</p>	<p>6.5 million Americans with HF. Increase from 5.7 million from 2009-2012.  <ul style="list-style-type: none"> <li>• Projected prevalence increase of 46% from 2012 to 2030. --- leading to &gt;8million</li> <li>• 1,000,000 new cases of HF annually • Medicare beneficiaries – 1-year HF mortality rate 29.6% 1998-2008. Has declined but still remains elevated</li> </ul>                     Total cost for HF \$30.7 BILLION – 68% to direct medical costs                      o Projections say 2030 – Rise to \$69.7 billion -- \$244 for every US adult</p>	<p>20.6% of Medicare beneficiaries had re-hospitalization after AMI from 2000 to 2010. CHD attributed to 35.6% of pts had more than 2. Between 2007-2012 – CR referrals increased from 72.9% to 80.7% for pts after STEMI/NSTEMI admission                      Medicare claim analysis – only 13.9% enroll after AMI, 31% enroll after CABG. Between 2009-2012 – only 59% referred after PCI                      Direct costs of HD in 2013-2014 – 100.9 BILLION                      MI = 12.1 billion, CHD = 9.1 billion</p>	<p>This article provides statistics on the prevalence and impact of heart disease. It addresses the degree to which recommendations are followed/implemented.</p>
<p>Amsterdam, EA., Wenger, N.K., Brindis, R.G., Casey, D.E., Ganiats, T.G., Holmes, D.R., . . . Zieman, S.J. (2014). 2014 AHA/ACC guideline for the management of patients with Non-ST-elevation acute coronary syndromes: A report of the American college of Cardiology/American heart association task force on practice guidelines. Circulation, 130(25), e344-e426. doi:10.1161/CIR.000000000000134</p>	<p>Level I</p>	<p>Class 1 Recommendation: All patients with NSTEMI should be referred to CR from inpatient or at first outpatient visit. Barriers to referral can be mitigated with provider-patient discussion. Provides education, risk factor modification, supervised exercise, lifestyle modification</p>	<p>Can begin aerobic 1-2 wks. after d/c from PCI or CABG, mild resistance at 2-4 wks. post d/c. CR reduces symptoms, improves insulin resistance, helps control weight</p>	<p>Discusses the class IA recommendation for CR. Discusses what should be included in CR program and benefits of participation.</p>

Appendix C

Roger's Diffusions of Innovations Model Applied to CR Referrals



(Rogers, 1995).

Appendix D

PDSA Worksheet

**Objective:** To increase cardiac rehabilitation referrals from an outpatient cardiology clinic consistent with ACC/AHA guidelines and recommendations

**1. Plan:** Plan the test, including a plan for collecting data.



**Questions and predictions:**

- Do providers consistently discuss and recommend cardiac rehabilitation for all eligible patients?
- Will provider education, knowledge, and awareness increase cardiac rehabilitation referrals from an outpatient cardiology clinic?
- It is assumed cardiology providers do not consistently refer patients to cardiac rehabilitation for several reasons, including provider bias, unawareness of indications, unclear communication, lack of standardized referral process, and lack of time during appointments.

**Who, what, where, when, how?**

- Who: Cardiology providers including MDs, NPs, PAs, and fellows
- What: Cardiac rehabilitation referrals
- Where: An Eastern NC cardiology clinic
- When: August 2019 to November 2019
- How: Provider education via a staff meeting and one-on-one education; screening tools by medical assistants to screen patients for CR referral

**Plan for collecting data:**

- Referral coordinator tracked patient diagnosis, age, gender, and date of referral on data collection tool. Data was tracked 2.5 months before intervention and for 10 weeks after the intervention. Number of referrals was compared.
- Screened patients before appointment to determine eligibility for CR and presence of a referral
- Follow up every week with medical assistants and providers to determine barriers to referral.
- PDSA review cycles will occur biweekly during the intervention period.



**2. Do:** Run the test on a small scale.

**Describe what happened. What data did you collect? What observations did you make?**

Screening tools were not being handed out. Moved them from nurses station to check in desk and finally settled at triage station.

No providers attended the original staff meeting. One-on-one education was implemented.

Fellows meeting was rescheduled for week 8 of implementation.



**3. Study:** Analyze the results and compare them to your predictions. **Summarize and reflect on what you learned:**

Identified a loop-hole in the system. Inpatient “consult to cardiac rehab” order satisfied registry coding from the inpatient side, but that order did not cross over to the ambulatory setting. Some providers were unaware of this; thus providers were not discussing CR with patients at outpatient visits after an MI or PCI. After education was provided, an increase in referrals for PCI and MI was noted.



**4. Act:** Based on what you learned from the test, make a plan for your next step. **Determine what modifications you should make — adapt, adopt, or abandon:**

Consider abandoning the staff meeting, as providers were not available to attend. One-on-one education and a meeting with the fellows was most effective. Consider making the CR screening tool electronic. Develop a post-MI clinic that mirrors the post-surgical clinic. Consider adding a CR nurse liaison position to facilitate CR referrals from the cardiology clinic.

(Institute for Healthcare Improvement, 2017).

Appendix E

Project Site Approval Letter

May 8, 2019

To East Carolina University College of Nursing:

We at the [REDACTED] have reviewed Corrie Hansen's DNP Project Proposal "Emphasizing and Increasing Cardiac Rehabilitation Referrals in an Outpatient Cardiology Clinic." Ms. Hansen has organizational support and approval to conduct her project within our institution. We understand that the timeframe for this project is from the date of this letter through April 30, 2020. Implementation at the project site will occur August/September through November 30, 2019, unless otherwise negotiated. We understand that for Ms. Hansen to achieve completion of the DNP program, dissemination of the project and a manuscript submission will be encouraged.

Our organization has deemed this project as a Quality improvement initiative. Our organization is aware that his project will be processed through the University and Medical Center Internal Review Board of East Carolina University (UMCIRB).

Thank you,

[REDACTED]

[REDACTED]

[REDACTED]



## Appendix G

## DNP Project Budget

<b>Item</b>	<b>Unit Cost</b>	<b>Quantity</b>	<b>Total</b>
<b>Paper and Printing</b>	\$0.13	400	\$52.00
<b>Smashed Waffles</b>	\$74.00	1	\$74.00
<b>Cookies</b>	\$6.00	2	\$12.00
<b>Travel</b>	\$0.54/mile	1760	\$950.14
<b>Grand Total</b>			<b>\$1,088.14</b>

## Appendix H

## Cardiac Rehabilitation Screening Tool

**DNP QI Cardiac Rehabilitation Screening Tool**

Date of Appointment:

**Indication for Cardiac Rehabilitation**

Have you ever had any of the following? (Check all that apply)

- Myocardial infarction (heart attack)
- Percutaneous coronary intervention (PCI) or “stents” or “balloon”
- Stable angina (chest pain for which your doctor has prescribed nitroglycerin)
- Coronary artery bypass graft (CABG) “bypass surgery” or “open heart surgery”
- Heart valve repair or replacement via surgery
- Heart failure or congestive heart failure
- Heart transplant

If none of these conditions are applicable, do not fill out this form.

**Cardiac Rehabilitation Referral**

Have you ever been referred to cardiac rehabilitation?

- Yes
- No
- Not sure

If yes, have you attended cardiac rehabilitation?

- Yes
- No



Appendix J

Cardiac Rehabilitation PowerPoint Education

### Increasing Cardiac Rehab Referrals

Corrie Hansen  
East Carolina University  
Doctor of Nursing Practice Student

### Million Hearts® Initiative Overview

Aim: Prevent 1 million heart attacks by 2022  
Priority Areas:  
• Keeping People Healthy  
• **Optimizing Care**  
  • Improve ABCS (Target: 80%)  
  • Increase use of Cardiac Rehab (Target: 70%)  
  • Engage people in healthy behaviors (Target: TBD)  
• Improving Outcomes for Priority Populations

### Cardiac Rehabilitation:

**Comprehensive, team-delivered programs designed to:**

- Limit the effects of cardiac illness
- Reduce the risk for sudden death or re-infarction
- Control cardiac symptoms
- Stabilize or reverse the atherosclerotic process
- Enhance the psychosocial and vocational status of patients

Typically administered in 36 sessions over ~12 weeks

### Indications

Evidence supports cardiac rehabilitation for patients who have:

- Had a myocardial infarction.
- Stable angina.
- Received a stent or angioplasty.
- Heart failure with reduced ejection fraction.
- Undergone bypass, valve, or a heart, lung, or heart-lung transplant surgery.

### Benefits

- **Reduces:**
  - Death from all causes by 13-24%
  - Death from cardiac causes by 26-31%
  - Hospitalizations by 31%
- **Improves:**
  - Functional status, mood, and Quality of Life scores
- **More is Better**
  - 36 vs fewer sessions reduces risk of heart attack and death
  - 25 sessions is generally considered a healthy "dose"

### Barriers to CR Referral

Referral barriers include:

- Lack of awareness
- No clear, consistent signal to patients and families
- CR program is not integrated into CV services
  - Consult order vs. referral order
- Lack of electronic referral

### Current National Statistics

- Referral to CR varies by qualifying condition or procedures:
  - ~80% for patients who had an acute heart attack
  - ~80% for patients who undergo angioplasty
  - ~10% for patients with heart failure

*The strength of the physician's endorsement is the greatest predictor of CR participation.*

### Cardiac Rehab Locations In Eastern North Carolina

- Vidant CR (Greenville, NC)
- Vidant Health – Chowan (Edenton, NC)
- Vidant Health – Beaufort (Washington, NC)
- New Hanover (Wilmington, NC)
- Lenoir Memorial CR (Kinston, NC)
- Outer Banks Hospital (Nags Head, NC)
- Nash General Hospital (Rocky Mount, NC)
- Bladen County Hospital CR (Elizabethtown, NC)
- Wayne UNC Healthcare CR (Goldsboro, NC)

All locations can be found at <http://ncrcr.org/online-program-directory/>

### Cardiac Rehabilitation Locations in NC

Retrieved from <http://ncrcr.org/online/about/program-directory/>

### Referral Process

1. Enter a CR referral into the computer.
2. The referral coordinators will contact the CR agency. A form will be sent back to you to "write the orders" for CR.
3. Sign the form.
4. The referral is processed.
5. CR will contact the patient.

The "consult to cardiac rehab" order set in EPIC is not a referral for cardiac rehabilitation. You need the REFERRAL option.

### The Project

In line with the Million Hearts® initiative, [redacted] has decided to focus on increasing referrals to CR from the outpatient setting.

Medical assistants will provide the CR screening tool to patients. HOP: Review the CR screening tool. If a patient is eligible and has not been referred, or is unsure of referral, the [redacted] provider should initiate a CR referral.

Discuss CR with all eligible patients!!

### Consent Form: Referral to Cardiac Rehabilitation

Dear Mr. [redacted]:

Below are the criteria for Cardiac Rehabilitation. Please check all that apply:

- Myocardial infarction (heart attack)
- Coronary artery bypass graft (CABG) or "bypass"
- Stent or angioplasty (heart procedure)
- Heart failure (weak or irregular heart)
- Heart valve disease or replacement (valvular)
- Heart failure or congestive heart failure

If none of these conditions are applicable, do not fill out this form.

**Cardiac Rehabilitation Referral**

Have you ever been referred to cardiac rehabilitation?

Yes  
 No

If you have, when was your last referral?

Yes  
 No

### Referrals from 6/4/19 to 8/30/19

#### REFERRALS BY GENDER

Gender	Percentage
Males	65%
Females	35%

### Referrals from 6/4/19 to 8/30/19

#### REFERRING DIAGNOSIS

Diagnosis	Percentage
CABG	12%
HF	2%
Valve	2%
NSTEMI	12%
STEMI	12%
PCI	36%
Cardiomyopathy	24%
Other	4%

### The Project

Goal: increase the number of patients referred to CR

Referrals will be tracked from 9/3/19 to 11/8/19 (ten weeks).

### Questions??

Contact information:

Corrie Hansen, BSN, RN, CCRN  
Doctor of Nursing Practice Student

[Redacted contact information]

## Appendix K

Table 1.

*Participant's Job Titles and Type of Education Received*

Job Classification	Staff Meeting (n)	Individual Contact (n)	Fellows Meeting (n)
Medical Assistants	12	0	0
Attendings	0	7	0
Fellows	0	6	7
Nurse Practitioners	1	3	0
Nurses	1	0	0
Other	1	0	0

*Note.* Some participants received two different types of education.

Appendix L

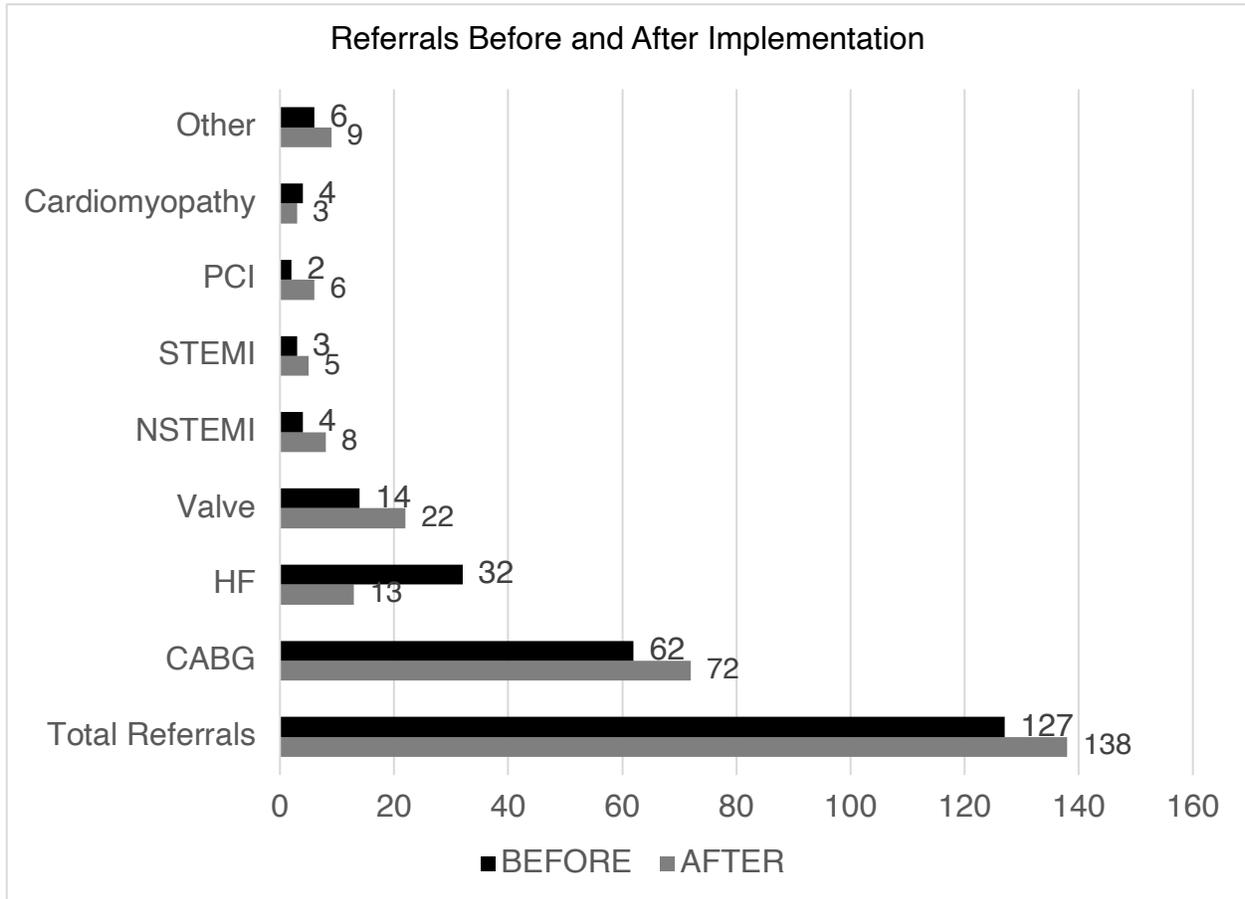


Figure 1. Referrals before and after implementation. This bar graph demonstrates the total number of referrals before and after implementation by diagnosis. Before data included 87 days of data, while after data included 66 days.

## Appendix M

Table 2.

*Referrals per week*

Week	1	2	3	4	5	6	7	8	9	10	11	12	13
	Referrals (n)												
Before	7	7	2	18	1	15	9	11	10	14	12	10	11
After	11	20	15	8	11	9	20	16	18	10			

*Note.* Pre-implementation period was 13 weeks, while post-implementation was 10 weeks. Referrals per week before ( $M = 9.77$ ,  $SD = 4.78$ ). Referrals per week after ( $M = 13.80$ ,  $SD = 4.57$ ).

Appendix N

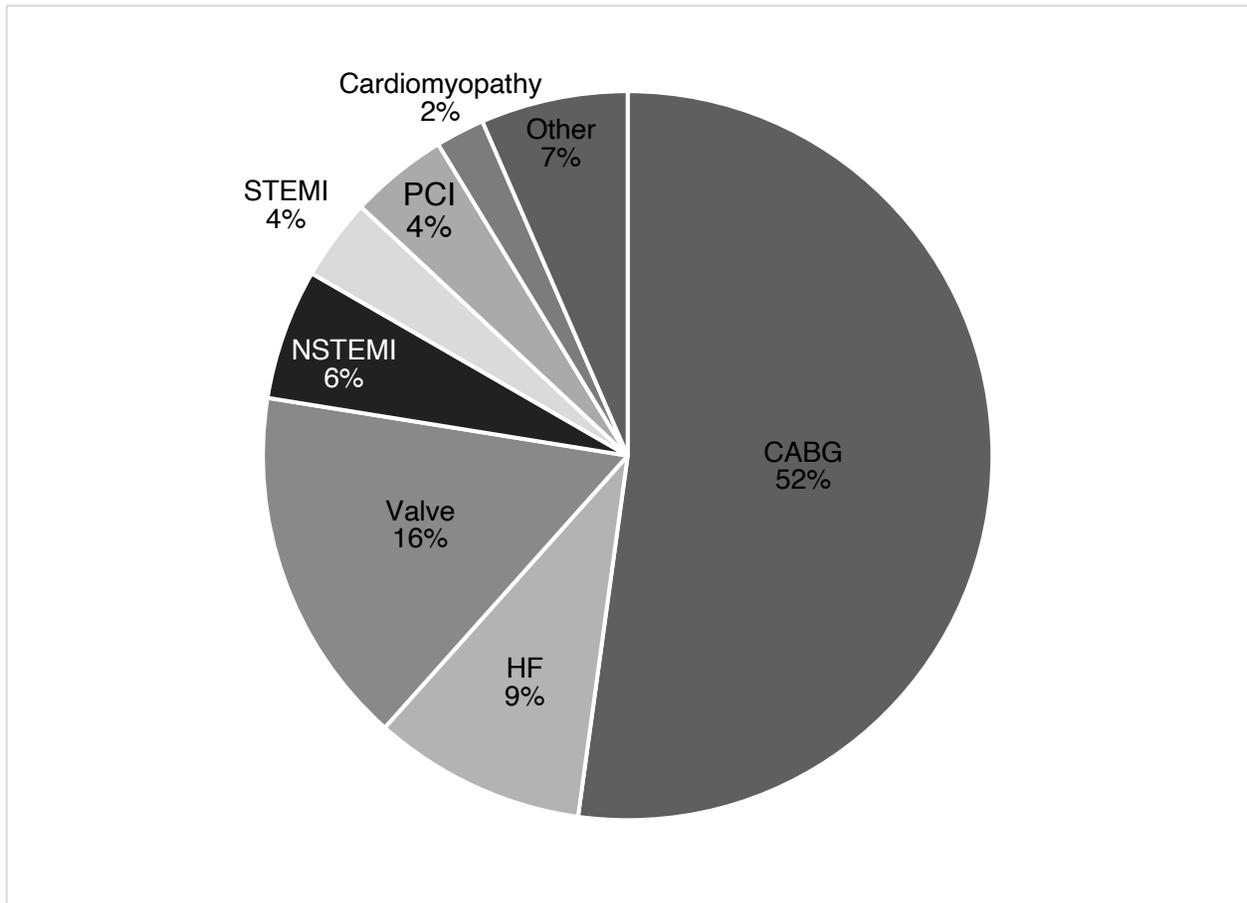


Figure 2. Referrals by diagnosis. This figure demonstrates the percentages of referrals by diagnosis code after implementation.