5-14-2019

Clinical Practice Guideline Adherence: Primary Prevention of Cardiovascular Disease in At-Risk Adults

Sharnita L. Rice

VALPO

CLINICAL PRACTICE GUIDELINE ADHERENCE: PRIMARY PREVENTION OF CARDIOVASCULAR DISEASE IN AT-RISK ADULTS

by

SHARNITA L. RICE

EVIDENCE-BASED PRACTICE PROJECT REPORT

Submitted to the College of Nursing and Health Professions

of Valparaiso University,

Valparaiso, Indiana

in partial fulfillment of the requirements

For the degree of

DOCTOR OF NURSING PRACTICE

2019

Sharnita L. Rice 5/14/19
Student Date

Advisor Date

DEDICATION

I dedicate this project to my family for being supportive and understanding throughout my DNP education. Thank you for the cooked meals, the positive conversations, and understanding when I could not make it to various events.

To my husband, my love, my strength, my friend, my supporter, and my prayer partner. Without your unconditional love, understanding, and support, I am not sure if I would have keep pushing forward. Thank you for always keeping me grounded, giving me an ear when I needed someone to listen and lending your shoulder when I needed to cry. I love you. WE MADE IT.

I would be remised if I did not thank my Heavenly Father who is the head of my life. Thank you for guiding my footsteps daily. Thank you for keeping me lifted and thank you FATHER for seeing me through the end of my doctoral degree. None of this would be possible without my faith and belief in you.

ACKNOWLEDGMENTS

I would like to acknowledge all the Professors who I had the opportunity to encounter during my DNP goals. From Professor Cory for giving me the harsh reality in the beginning that I needed to work on my writing skills to Professor Winkler for her critiques of my clinical logs. This would not be possible without all of you.

To my mentor and friend Dr. Deborah Coleman-Givens you have been the rock who help me to the end. With you in my corner my writing improved. With you in my corner you help guide me through the DNP process. Thank you for always encouraging me to keep going. I am forever grateful. Because of you, I have this testimony.

To organization, clinical site and HCP where this EBP project was conducted, thank you for allowing me to not only complete clinicals in your office but completing my evidence-based project with you all. Words cannot express my gratitude.

To my editors, Maureen Marthaler and Dr. Vanessa Ann Claus, thank you for taking the time to edit my paper and provide feedback.

To Katina Varner you have been my friend since we meet at the Graduate Program meeting. I am happy we had one another to lean on. We have studied together, cried together, complained together, and we have accomplished two degrees together. I love you and I am forever grateful to have you by my side during this process.

Finally, to Dr. Nola A. Schmidt thank you for taking me under your wing and guiding me throughout my DNP project, as my project advisor. Thank you for your inspiration, support, advice, and constructive criticism. Thank you for guiding me when I felt defeated and things got “tough”. You have been a great instructor and a wonderful project advisor.

TABLE OF CONTENTS

Chapter **Page**

DEDICATION……iii

ACKNOWLEDGMENTS……...iv

TABLE OF CONTENTS ……v

LIST OF TABLES……....vi

LIST OF FIGURES ……vii

ABSTRACT……viii

CHAPTERS

CHAPTER 1 – Introduction……1

CHAPTER 2 – Theoretical Framework and

Review of Literature……11

CHAPTER 3 – Implementation of Practice Change ……46

CHAPTER 4 – Findings……59

CHAPTER 5 – Discussion……74

REFERENCES……94

AUTOBIOGRAPHICAL STATEMENT……102

ACRONYM LIST……103

APPENDICES

APPENDIX A – SUMMARY OF THE EVIDENCE……...105

APPENDIX B – MAJOR RECOMMENDATIONS FOR

STATIN THERAPY FOR ASCVD PREVENTION FLOWSHEET……112

APPENDIX C – OPEN ACCESS CONSENT PAGE……114

APPENDIX D - CONFIRMATION EMAIL

FOR CONSENT TO PUBLISH……115

LIST OF TABLES

Table **Page**

Table 2.1 Database Search Results…….....26

Table 2.2 Rating Hierarchy for Level of Research Evidence using the JHNEBP Appraisal Tool..…….27

Table 3.1 Actual Timeline Fall 2018..……...56

Table 3.2 Actual Timeline Spring 2019..……..57

Table 4.1 Patient Chart Audit Sample Characteristics…..…….....61

Table 4.2 Compliance/Noncompliance....……64

Table 4.3 Compliance *Chi*-Square Test.……66

Table 4.4 Prescribing Trends……..67

Table 4.5 Frequency and Percentage of Prescribing Choice based on Diagnosis……..69

Table 4.6 Validity Correlations……...…….……...73

LIST OF FIGURES

Figure **Page**

Figure 2.1 PRISMA flow chart of Literature Review……22

Figure 4.1 HCP Compliance with Prescribing

Statin and/or Aspirin..…..……..……..……65

Figure 4.2 Prescription Preference…….66

Figure 4.3 Frequency and Percentage of

Prescribing Choice based on Diagnosis……..70

ABSTRACT

The American College of Cardiology (ACC) and the American Heart Association (AHA) (2013; 2016), as well as the American Diabetes Association (ADA) joined forces to create clinical practice guidelines (CPGs) recommendations for healthcare providers (HCPs) to follow with the aim of preventing cardiovascular disease (CVD). Cardiovascular disease is the leading cause of morbidity and mortality in the United States. The Centers for Disease Control (2017a) estimates CVD costs 325 billion dollars annually. Although CVD has an astronomical cost associated with it, CPG adherence continues to be an issue among HCPs and improvement is warranted. The purpose of this EBP project was to alter standard practice among HCPs, with the aim of improving adherence of CPGs through prescribing a statin and/or aspirin among patients who have been diagnosed with dyslipidemia, hypertension (HTN), and/or type 2 diabetes mellites (T2DM) and have a 10-year atherosclerotic cardiovascular disease (ASCVD) risk factor of greater than or equal to 7.5%, thereby potentially preventing primary CVD in these at-risk patients. The sample size ($N = 3$) included one physician and two nurse practitioners who have prescriptive authority. Kotter's change model was used as the theoretical framework and the Promoting Action on Research Implementation in Health Services (PARiHS) model as the evidence-based practice model used to guide this project. An extensive literature search was performed, which generated 10 pieces of evidence that met the inclusion criteria for this EBP project. The interventions for this project included a multi-modal approach that included four strategies: (a) education, (b) computer-generated paper reminders, (c) visual cues and (d) feedback. A cross tabulation *Chi*-square analysis was used to determine the effectiveness of the four intervention strategies for improving adherence by HCPs with prescribing statins and/or aspirin for the primary prevention of CVD in at-risk adult patients. Results showed HCPs prescribed according to the CPGs for 59.4% (n = 139) of the patients. A combined statistically significant improvement between all phases of this EBP project for compliance showed ($X^2 = 6.887$, $df = 2$, $p = 0.032$).

Key terms: *decision support system, reminder, prompt, alert, primary care, healthcare provider*

CHAPTER 1

INTRODUCTION

Clinical practice guidelines (CPGs) have been created as recommendations for health care providers (HCPs) to follow to improve patient outcomes (Fox et al., 2015; Goff et al., 2013; Stone et al., 2013). In 2013, the American College of Cardiology (ACC) and American Heart Association (AHA) joined forces to create CPG recommendations to assess cardiovascular risk (Goff et al., 2013) and to develop blood cholesterol treatment recommendations to reduce ASCVD risks among adult patients (Stone et al., 2013). In 2015, the AHA and American Diabetes Association (ADA) updated their CPG recommendations for the prevention of primary and secondary cardiovascular events (Fox et al., 2015; Garza, Dols, & Gillespie, 2017; Goff, 2014; Stone et al., 2013). These guidelines were endorsed in 2016 by the United States Preventive Services Task Force (USPSTF) (USPSTF, 2016). In 2017, several entities gathered to create new recommendations for blood pressure parameters for the prevention of primary CVD among at-risk adult patients (Whelton et al., 2018).

These CPGs recommend that patients who meet one of the following criteria:

1) Clinical ASCVD,
2) Primary elevations of LDL-C great than or equal to 190 mg/dl,
3) diabetes ages 40-75 years, with a LDL-C of 70-189 mg/dl and without clinical ASCVD or
4) without clinical ASCVD or diabetes with a LDL-C 70-189 mg/dl and estimated 10 year ASCVD risk great than or equal to 7.5% using the Pooled Cohort Equation (PCE) (Stone et al., 2013).
5) One or more CVD risk factor (i.e., dyslipidemia, hypertension (HTN), diabetes, or smoking) and a 10-year estimated ASCVD risk factor great than or equal to 10% using the PCE (USPSTF, 2016).

6) Estimated ASCVD risk great than or equal to 10% using the PCE and systolic blood pressure (SBP) great than or equal to 130 mm HG or diastolic blood pressure (DBP) great than or equal to 80 mm HG (Whelton et al., 2018).

would benefit from initiating a moderate or high intensity 3-hydroxy-3-methyl-glutaryl-coenzyme A reductase inhibitor (statin) (Fox et al., 2015; Stone et al., 2013) or aspirin (USPSTF, 2016). However, prior to prescribing, HCPs must consider the risk of statin and aspirin therapy side effects versus the benefits to patients. Although side effects exist, the benefits of statin therapy outweigh the risks (Bender, 2014). Therefore, HCPs must overcome barriers and comply with CPGs.

Unfortunately, HCPs do not always adhere to the evidence-based CPGs created because of the following barriers: a) lack of knowledge (Jun, Kovner, & Stimpfel, 2016), b) too time consuming to implement (Barth et al., 2016; McKee et al., 2017), c) the CPGs are too long to read (Alexander, Li, Tonelli, & Guyatt, 2016), d) various recommendations (Barth et al., 2016), and/or e) primary care physicians not having input into the creation of the CPGs (Alexander et al., 2016). It is vital for HCPs to implement and adhere to CPGs to improve patient outcomes (Barth et al., 2016; Hendrix, Downs, & Carroll, 2015; McKee et al., 2017). To overcome barriers, strategies have been created which include: a) education (Jeffery et al., 2015), b) audits and feedback (Ivers et al., 2012), c) reminders in electronic medical records (EMR) (Garza et al., 2017; Shojania et al., 2009), d) computer-generated alerts (Arditi, Rege-Walther, Durieux, & Burnand, 2017), e) paper prompts (Pantoja et al., 2014), and f) highlighted reminders on paper (Hendrix et al., 2015). These strategies have and continue to be explored to evaluate the best interventions for HCPs when implementing evidence-based CPGs into practice.

Doctor of nursing practice (DNP) prepared nurses have the unique opportunity to assist physicians and other HCPs in evaluating up to date evidence-based practices (EBPs) to utilize when providing care to patients. Doctor of nursing practice prepared nurses are positioned to

create and adopt strategies to assist physicians with implementing CPGs, thereby improving patient outcomes. Because the prevalence and cost of treating CVD is at a record high in the United States (Healthy 2020, 2014), it is essential that DNP prepared family nurse practitioners (FNPs) have knowledge to recognize and treat the signs and symptoms of CVD. Family nurse practitioners must stay abreast of current evidence to prevent primary CVD in at-risk adult patients and follow the recommended guidelines while treating each patient as a unique individual.

Background

In the United States, CVD costs $325 billion annually (Healthy People 2020, 2014) and is the leading cause of morbidity and mortality regardless of race, ethnicity, or gender (Centers for Disease Control [CDC], 2017a; Healthy People 2020, 2014; National Heart, Lung, and Blood Institute [NHLBI], 2017). Therefore, a goal of Healthy People 2020 (2014) is to:

> Improve cardiovascular health and quality of life through prevention, detection, and treatment of risk factors for heart attack and stroke; early identification and treatment of heart attacks and strokes; prevention of repeat cardiovascular events; and reduction in deaths from cardiovascular disease (Healthy People 2020, 2014).

Cardiovascular disease is an umbrella term, which includes heart disease and coronary heart disease (CHD) (NHLBI, 2017). Heart disease affects the structure and function of the heart (NHLBI, 2017) and can cause strokes, congenital heart defects, and peripheral artery disease (NHLBI, 2017). Hypertension, dyslipidemia, diabetes, smoking, excessive alcohol intake, obesity, unhealthy eating habits, sedentary lifestyle, age, and family history are all risk factors that contribute to primary CVD (CDC, 2012, 2017a; Healthy People 2020, 2014). It is essential that HCPs adhere to evidence-based CPGs to achieve primary prevention of CVD to reduce costs and improve patient outcomes.

According to Fox et al. (2015), preventing primary CVD involves the proper management of five key components: (a) nutrition, (b) obesity, (c) blood glucose, (d) blood pressure, and (e)

cholesterol. Patients and HCPs must work collaboratively towards the following three goals: (a) maintain a hemoglobin A1C of less than or equal to 6.5%, which has been recommended as an acceptable level by the ADA, (b) maintain a SBP of less than or equal to 130 with a diastolic blood pressure (DBP) of less than or equal to 80, which has been noted as an acceptable level by the 8th Joint National Committee (JNC 8) Hypertension Guidelines (Whelton et al., 2018), and (c) maintain a low-density lipoprotein-cholesterol (LDL-C) of less than 70 mg/dl, which is based on the 2013 ACC and AHA guidelines (Fox et al., 2015; Stone et al., 2013).

According to Bender (2014), it is unrealistic to think HCPs alone can combat chronic patient illnesses. Healthcare providers must educate adult patients, who are at-risk for primary CVD, about lifestyle modifications (i.e., obesity, weight loss, heart healthy diet, exercise, and smoking cessation) which are crucial to preventing primary CVD (Fox et al., 2015; Goff et al., 2013; Jensen et al., 2014; Stone et al., 2013). While education can assist in improving patient awareness, patients must take the initiative to modify their lifestyles (Fox et al., 2015; Jensen et al., 2014).

Obesity is a major modifiable risk factor for dyslipidemia, HTN, T2DM, and CVD (Jensen et al., 2014). Therefore, it is critical to educate individuals who are overweight, with a body mass index (BMI) of 25.0 to 29.9 kg/m^2 or obese with a BMI greater than 30 kg/m^2, to alter their lifestyles to that of a heart healthy lifestyle because they are at a higher risk for morbidity and mortality (Jensen et al., 2014). Weight loss can be achieved by eating a healthy diet and incorporating intense exercise into one's routine or through diet, medication, meal replacement, or bariatric surgery (Fox et al., 2015; Jensen et al., 2014).

Modifying one's diet is another strategy that can aid in reducing one's risk of CVD. The Mediterranean Diet, Dietary Approaches to Stop Hypertension (DASH) diet, and the American Heart Association diet are diets recommended by CPGs to decrease risk factors for morbidity and mortality (Eckel et al., 2014; Fox et al., 2015). Consuming a low-salt, low-fat, low carbohydrate diet with increasing one's fruit, vegetables, legumes, and whole grains intake

effectively improves blood glucose levels, blood pressure, and lipid levels (Eckel et al., 2014; Fox et al., 2015; Jensen et al., 2014; Stone et al., 2015).

Exercise is an essential strategy for preventing primary CVD among at-risk adult patients (Fox et al., 2015). Intense physical activity, which occurs three or more times per week, for at least 40 minutes has aided in reducing one's weight, waist circumference, blood glucose levels, lipid levels, and blood pressure (Fox et al., 2015; Jensen et al., 2014). Physical activity must be incorporated alongside a healthy diet to prevent CVD among at-risk adult patients (Fox et al., 2015).

Smoking tobacco is another modifiable risk factor associated with CVD (CDC, 2017a; Fox et al., 2015). Adult patients who quit smoking tobacco, though gain weight, have a greater chance of preventing primary CVD than individuals who continue smoking tobacco (Fox et al., 2015).

Although these risk factors are modifiable, individuals are generally not inclined to change their behavior to become healthier (Bender, 2014). Even with lifestyle modification, some patients remain at-risk for CVD and require pharmacological interventions to prevent dyslipidemia, HTN, and T2DM (Fox et al., 2015). Therefore, several strategies have been published to remind HCPs to implement CPG recommendations and have included: (a) using audit and feedback techniques (Ivers et al., 2012; Li, 2018), (b) utilizing computer-generated paper reminders (Arditi et al., 2017), (c) implementing electronic medical record alerts (Garza et al., 2017; Hendrix et al., 2015; Shojania et al., 2009), (d) incorporating manual paper prompts at point of care (Pantoja et al., 2014), and (e) using clinical decision support systems (CDSS) (Fiks et al., 2015; Rokstad, Rokstad, Holmen, Lehmann, & Assmus, 2013; Zahanova, Tsouka, Palmert, & Mahmud, 2017).

Statement of the Problem

Clinical practice guidelines are evidence-based recommendations created to assist HCPs when making decisions to improve patient outcomes (Goff et al., 2013; Fox et al., 2015,

Stone et al., 2013; Whelton et al., 2018). Unfortunately, evidence shows that barriers prevent HCPs from following CPGs. Common barriers that impact HCPs adherence to CPGs include: (a) lack of knowledge, (b) the length of CPGs, (c) the time consuming nature of CPG implementation, (d) the fact that primary care physicians (PCPs) are not always involved in creating CPGs, (e) the age of the provider, and (f) disagreement with CPGs (Alexander et al., 2016; Barth et al., 2016; Jun et al., 2016; McKee et al., 2017). It is vital that HCPs are willing to accept and adhere to guidelines set forth by the governing bodies to prevent CVD among at-risk adult patients. Healthcare providers must become knowledgeable of the evidence available and be receptive to new and improved patient treatment options.

Morbidity and mortality rates increase among patients who have been diagnosed with CVD (CDC 2012, 2017a). Therefore, it is essential that all precautions are taken to assure primary CVD is prevented among at-risk adult patients. The initial focus of lifestyle changes must be patient education to prevent CVD, which includes education about obesity, weight loss, heart healthy diet, exercise, and smoking cessation (Fox et al., 2015; Stone et al., 2015). Patients are not always compliant with the education received from HCPs (Bender, 2014). As a result, HCPs are inclined to initiate statin and/or aspirin therapy for the primary prevention of CVD in at-risk adult patients.

Data from the Literature Supporting Need for the Project

Although the ACC/AHA teamed up to create CPGs, HCPs are not adhering to these developed CPGs (Goff et al., 2013, Fox et al., 2015; Stone et al., 2013). Physician barriers for not adhering to CPGs include: (a) lacking input in regard to the creation of CPGs, (b) a weak level of evidence when forming the CPGs, (c) lacking clarity, (d) length of the CPGs, (e) ambiguity of the CPGs (Alexander et al., 2016), (f) content disagreement, (g) unaware or lack familiarity of the CPGs, (i) inadequate time associated with implementing CPGs, and lacking resources (Barth et al., 2016). Healthcare providers who adhere to recommended CPGs have noted better patient outcomes (Barth et al., 2016; Hendrix et al., 2014; Jun et al., 2016; McKee

et al., 2016). Registered nurses express similar barriers for not adhering CPGs as those denoted by physicians, which include: (a) attitudes and perceptions, (b) motivation, cultural differences, (c) reluctance, (d) no benefit, (e) knowledge, (f) usability, (g) not easily accessible, (h) format and content, (i) conflicting evidence, (j) many without goals, (k) clarity or direction,(l) conflicting with physician's practices, (m) time, (n) workload, (o) equipment, (p) leadership support, and (q) the culture of the organization (Jun et al., 2016; McKee et al., 2017).

Several strategies have been published regarding how to implement CPGs into practice. Researchers have noted that the following techniques have been beneficial in improving patient CPG adherence: (a) audit and feedback (Ivers et al., 2012), (b) computer-generated reminders delivered on paper (Arditi et al., 2017; Garza et al., 2017), (c) paper reminders with highlights (Hendrix et al., 2015), (d) EMR prompts (Garza et al., 2017; Hendrix et al., 2015), (e) on screen point of care reminders (Shojania et al., 2009), and (f) manual paper reminders (Pantoja et al., 2014).

Garza et al. (2017) conducted a quality improvement project that sought to improve primary prevention of CVD among adults with T2DM. The researchers created alerts in the EMR system that alerted HCPs for adults with and without complicated T2DM who had never had a cardiovascular event to follow CPGs. The alert system opened the PCE to calculate a patient's 10-year ASCVD risk factor for HCPs to complete if one had not been completed within the last 5 years. The EMR alert system improved CPG compliance through initiating a statin or an aspirin regimen, as well as educating patients about the importance of healthy diet and exercise (Garza et al., 2017). The authors noted that alert systems work when the systems are properly utilized, stakeholders are involved and agree with changes, and individuals work as team players.

Data from the Clinical Agency Supporting Need for the Project

Upon providing care for patients in an urban Midwest community clinic, the Project Leader (PL) noted that at-risk patients were not being treated with proper medications to prevent primary CVD. A pilot audit of 100 patient charts showed that 63 patients who attended

point of care visits within the past 2 years and who met the criteria recommended by the ACC/AHA, AHA/ADA, and the USPSTF were not prescribed a statin or aspirin to prevent to prevent primary CVD. Given the information available to the PL, it was unclear if the lack of adherence of HCPs to CPG recommendations was due to lack of knowledge about CPGs among HCPs, ambiguity about CPGs, the time constraints associated with implementing CPGs, or that HCPs were too comfortable their current medical practices. Furthermore, laboratory findings revealed that many patients who were 40 to 75 years of age had a LDL-C of 70 mg/dl to 189 mg/dl, elevated or stage 1 hypertension, T2DM, smoked, and/or were obese, thus confirming that screenings were not properly conducted nor were strategies implemented to prevent primary CVD. Some patients, ages 40 to 75, did not have a baseline lipid panel ordered, which is problematic because lipid panels can alert HCPs to patients who have dyslipidemia, are at risk for primary CVD, and require statin initiation. Furthermore, patients who did have a lipid panel ordered did not follow up with testing.

The PL observed that HCPs, at the project site, did not utilize the PCE to evaluate patients' 10-year ASCVD risk factors. This failure to use the PCE is concerning because patients need to be initiated on a moderate or high dose statin and/or aspirin, as noted by the current CPGs (Fox et al., 2015; Stone et al., 2013). In addition to lacking CPG implementation, the PL observed that there was no mechanism in place for reminding HCPs to identify adult patients at-risk for primary CVD. While the facility uses an EMR system, there was no reminder system in place for HCPs to perform the PCE to evaluate if patients need a statin and/or aspirin initiated. After communicating with information technology staff members, the PL found that the facility was not able to implement an electronic reminder in the EMR for this medical practice because of interference throughout the enter hospital system.

Finally, the facility began receiving notifications from insurance companies that reminded HCPs to initiate statin therapy for T2DM patients. Therefore, the initial focus of this EBP project shifted from patients diagnosed with T2DM to all patients at-risk (such as those who have

dyslipidemia, HTN, and/or T2DM) for prevention of primary CVD. Broadening the population to include patients who had a diagnosis of dyslipidemia and HTN was also warranted based on the data collected during the pilot.

Purpose of the Evidence-Based Practice Project

The purpose of this EBP project was to alter standard practice among HCPs by improving their adherence to CPGs by prescribing a statin and/or aspirin among patients who have been diagnosed with dyslipidemia, HTN, and/or T2DM and have a 10-year ASCVD risk factor of greater than or equal to 7.5%. Changing practice to conform to CPGs potentially prevents primary CVD in these at-risk patients. It is imperative that HCPs take the time to utilize the PCE, which is available through the AHA or ACC website or for download to their mobile device, to ensure ease of equation access. Through using the PCE, HCPs can estimate 10-year ASCVD risk factors among patients, as well as educate adult patients about lifestyle modification to assist in preventing primary CVD.

Compelling Clinical Question

The compelling clinical question that guides this study is, “What is the best intervention to implement for HCPs to adhere to CPGs, so at-risk adult patients will be prescribed a statin and/or aspirin in accordance with the ACC/AHA AHA/ADA CPGs and USPSTF recommendations?” The decision to adhere to the CPGs must be made by evaluating a patient’s modifiable and non-modifiable risk factors, assessing patients estimated 10-year ASCVD risk factor (through utilizing the PCE), evaluating patients’ allergies, risk of side effects versus benefit of initiating a statin and/or aspirin, and a collaborative agreement among the HCP and patient.

PICOT Question

The PICOT question that guided this study is, “For healthcare providers in a primary care setting, does incorporating a multi-modal approach that involves education, using computer-generated paper reminders at point of care, visual cues, and ongoing feedback about

prescribing performance improve the initiation of medication therapy for the prevention of primary CVD in at-risk adult patients over a 7-week period?"

Significance of the EBP Project

It is imperative that HCPs move evidence into practice by implementing strategies that remind them to initiate a statin and/or aspirin for at-risk patients. Electronic medical record alerts (Garza et al., 2017; Shojania et al., 2009), audits and feedback (Ivers et al., 2012; Li, 2018), education (Jeffery et al., 2015), computer-generated paper alerts (Arditi et al., 2017), manual paper reminders (Pantoja et al., 2014), highlighting prompts on paper reminders (Hendrix et al., 2015), and CDSS (Fiks et al., 2015; Rokstad et al., 2013; Zahanova et al., 2017) are a few strategies that can be implemented to ensure CPG compliance by HCPs. Healthcare providers who utilize strategies to implement CPGs have noted improved patient outcomes (Fox et al., 2015; Goff et al., 2013; Stone et al., 2013).

Through determining the best evidence-based practices, this doctoral EBP project had the potential to improve HCP adherence to the guidelines set forth by the ACC/AHA (2013, 2018), the AHA/ADA (2015), and the USPSTF (2016). The aforementioned guidelines recommend that patients who are 40 to 75 years old and have an estimated 10-year ASCVD risk factor greater than or equal to 7.5, an LDL-C of 70-189 mg/dl, a SBP greater than or equal to 130, and a DBP greater than or equal to 80 should be started on a statin and/or aspirin regimen (Fox et al., 2015; Stone et al., 2013; USPSTF, 2016; Whelton et al., 2018). Every 5 years, a patient's ASCVD should be calculated using the PCE, which is available through the ACC and AHA websites, as well as available for download using one's mobile device (Goff et al., 2013; Stone et al., 2013). The prevention of primary CVD among at-risk adult patients aligns with the goals expressed by Healthy People 2020 (2014). Additionally, DNP prepared nurses are in a unique position to implement strategies to assist HCPs stay abreast of CPGs.

CHAPTER 2

THEORETICAL FRAMEWORK, EBP MODEL, AND REVIEW OF LITERATURE

Evidence-based practice, theory, and EBP models are fundamental aspects of to the practice of DNP prepared nurses because these aspects work together to guide practice. Evidence-based practice is essential for changing practice to obtain the best possible patient outcomes. The PL believes that through implementing this DNP project, a culture of change can occur from current practice by HCPs to a culture in which HCPs adhere to prescribing or statins and/or aspirin so that patient outcomes can improve. The incorporation of CPGs can assist in preventing primary cardiovascular disease among adult patients who have identified risk factors (i.e., dyslipidemia, HTN, and/or T2DM) (Fox et al., 2015; Stone et al., 2013).

The PICOT question that guided this EBP project reads, "For healthcare providers in a primary care setting, does incorporating a multi-modal approach that involves education, using computer-generated paper reminders at point of care, visual cues, and ongoing feedback about prescribing performance improve the initiation of medication therapy for the prevention of primary CVD in at-risk adult patients in a 7-week period?"

Theoretical Framework

There are various theoretical frameworks that nurses can use to guide evidence-base projects. For example, nurses are introduced to nursing theory in undergraduate nursing baccalaureate programs. Nursing schools often utilize a theoretical framework to guide nursing curriculum. Nurses can focus the care that they provide to patients using a theoretical framework. Oftentimes, DNP prepared nurses are well versed about theories and use them to guide EBP projects. The selected theory must be the best choice for the population, environment of focus, and goal of the EBP project.

Overview of Theoretical Framework

After researching various change models, which are well respected in the field of nursing, the PL realized that Kotter's 8-step change model (Kotter, 1995, 1996, 2012) best aligned with this EBP project's purpose. Kotter (1995) initially wrote about his change model in Harvard Business Review. Although, the 8-step change model is often applied in organizations, this model can work well when making changes to HCPs daily practice. For example, Mork, Krup, Hankwitz, and Malec (2017) utilized Kotter's change theory to create change efforts regarding handoff communication among nurses in an intensive care unit. Small et al. (2016) performed the same quality improvement project as Mork et al (2017), on a surgical orthopedic trauma unit, where 96% of patients and 86% of nurses were satisfied with the changes made regarding handoff communication. Mork et al. stated that with stakeholders, directors, and managers being onboard with the changes to handoff communication, the change was successful. Kotter's change framework has been utilized to implement change in a football for health program (Langton, Khan, & Lusina, 2010), transforming library services (Wheeler & Holmer, 2017), and for integrated care communities (Bradbury, 2014). The 8-step plan is easy to follow and adaptable to any environment (Mork et al., 2017).

Kotter's (1996, 2012) 8-step change model includes three phases and 8-steps. Phase one is the defrost phase which consist of steps 1-4 which is when the transformation process is occurring, phase two which is the introduction and implementation of the change which includes steps 5-7, and phase 3 includes steps 8 which is anchoring the change by making the change permanent. Kotter explained that each step of the model must be completed for successful change to occur. Kotter (1996, 2012) continues to explain that prior steps must be reinforced when issues arise while moving to the next step. The steps for the 8-step change model include:

1) establishing a sense of urgency,

2) creating the guiding coalition,

3) developing a vision and strategy,

4) communicating the change vision,

5) empowering broad-based action,

6) generating short term wins,

7) consolidating gains and producing more change, and

8) anchoring new approaches in the culture (Kotter, 1996, p. 21).

The PL selected Kotter's model of change because organizational change needed to occur in the selected project location. The PL recognized the critical nature of organizational change, specifically among HCPs who were not following CPGs. The CPG process implemented involved prescribing a statin and/or aspirin in patients who had a diagnosis of dyslipidemia, HTN, and/or T2DM, as well as a 10-year ASCVD risk factor of greater than or equal to 7.5%. The goal of this project was to implement strategies to facilitate HCPs prescribing a statin and/or aspirin to prevent primary CVD among at-risk adult patients.

Application of Kotter's Framework to EBP Project

Establishing a sense of urgency entails identifying problems within the organization (Kotter, 1996, 2012). Preventing primary CVD in T2DM patients was established as a priority for patients who were being provided care in the urban walk-in clinic in which this project was conducted. A pilot chart audit was performed to establish feasibility for the project. Based upon the results of the pilot chart audit, it was determined that HCPs were not prescribing statins and/or aspirin to at-risk patients who had a 10-year ASCVD score great than or equal to 7.5%. Therefore, the focus of this project was broadened to preventing primary CVD in at-risk adults including those who had a diagnosis of dyslipidemia, HTN, and T2DM.

The second step of Kotter's change model involves creating the guiding coalition, which entails determining individuals who can lead the coalition for change, as well as encouraging teamwork among group members (Kotter, 1996, 2012). The project leader encouraged teamwork among the medical assistants and the office manager, thus enhancing the EBP project's likelihood of success. The project leader asked the medical assistants to lead the coalition and to ensure that the PCE was being completed and printed. Furthermore, the office

manager was asked to assure the paper reminders were placed in the examination rooms so the HCPs would refer to them when prescribing a statin and/or aspirin for at-risk patients.

The third step in Kotter's change model (Kotter, 1996, 2012) involves developing a vision and strategy. For this project, the third step of Kotter's model was utilized by ensuring that key stakeholders were educated about strategies that could enhance CPG compliance about prescribing a statin and/or aspirin in patients who had a diagnosis of dyslipidemia, HTN, and/or T2DM and had a 10-year ASCVD risk factor of greater than or equal to 7.5%. During the first week that this project began, the PL was in the office each day. The PL educated the office manager and medical assistants regarding how to properly perform the PCE to calculate a patient's 10-year ASCVD risk factor.

Step four in Kotter's change model involves communicating the change vision to key organizational stakeholders. Specifically, this process involved educating and communicating the project's vision and strategies to all participants, as well as reiterating the vision to organizational stakeholders (Kotter, 1996, 2012). A PowerPoint presentation was presented to HCPs, medical assistants, and the office manager regarding the fact that HCPs were not prescribing statins or aspirin to prevent primary CVD in at-risk patients. The PL provided an educational session about the national statistics for CVD mortality. Additionally, pilot chart audit data were provided to all HCPs. Education about the 2013, 2015, and 2018 CPGs were discussed and details regarding the 10-year ASCVD risk calculator were provided, thereby ensuring comprehension among participants. Additional education was provided to the medical assistants and the office manager regarding where the PCE was located. When providing information about the PCE, a see one, do one, teach one approach was utilized. To remind HCPs about CPGs, a visual cue (flowsheet) (Appendix B) was placed in each examination room.

The fifth step begins phase two in Kotter's change model which involves empowering broad-based action. This step ensures that obstacles are removed, specifically those that will

hinder change from occurring (Kotter, 1996, 2012). To carry out this step, education about CPGs was provided to HCPs, medical assistants, and the office manager. The HCPs were informed that they would receive each patient's ASCVD risk factor percentage. Based on the ASCVD percentage and a patient's diagnosis of dyslipidemia, HTN, and/or T2DM, HCPs were asked to recommend that patients start on a moderate or high dose statin, an aspirin, or both treatment regimens. The PL provided step-by-step instructions to the medical assistants and the office manager regarding the online location of the AHAs and ACCs PCE. Furthermore, the PL demonstrated to the medical assistants and office manager what information belonged in each category of the PCE to calculate at-risk patients' 10-year ASCVD risk factor and showed individuals how calculation results would appear. These results were printed out and the patient's identification number was written in the top right-hand corner, thereby revealing whose ASCVD risk factor percentage was obtained without providing any identifying demographics. To ensure anonymity, no patient information was saved on the computer nor kept on the calculator. The computer-generated reminder was printed out then placed in the examination room with the patient. The PL showed the medical assistants and office manager where to place the printed calculation form so HCPs would notice the printed 10-year ASCVD risk factor calculation. The form provided details to HCPs regarding if a patient needed or did not need the statin or aspirin intervention. The PL asked the medical assistants and office manager to return the printed PCE calculation to the front desk and place it in a manila folder.

Step six of Kotter's change model involves generating short-term wins. These short-term wins consist of visibility, unambiguousness, and clarity and are related to the change effort (Kotter, 1996, 2012). Kotter (1996, 2012) stated that the roles of short-term wins are to: (a) provide evidence that sacrifices are worth it, (b) reward change agents with a pat on the back, (c) help fine-tune vision and strategies, (d) undermine critics and self-serving resisters, (e) keep bosses on board, and (f) build momentum. To accomplish short-term wins, the PL conducted weekly audits of five charts over the 7-weeks during which this project was conducted. Monthly

lunches were also provided, by the PL, to the HCPs during the times project members met to discuss the project. During these meetings, the PL and project participants discussed adherence or nonadherence to CPGs. Additionally, the PL provided feedback, as needed, to ensure project success. However, the medical assistants and office manager received a positive verbal gesture along with monthly lunches for performing the PCE calculations and providing the printed reminders for the HCPs to locate and intervene on at-risk patients.

Step seven in Kotter's (1996, 2012) change model involves consolidating gains and producing more changes. To ensure that changes are made, the change process must continue, and a sense of urgency and momentum must be established. It is important to note when short-term wins are accomplished (Kotter, 1996, 2012). For this project, the PL acknowledged and displayed appreciation for the progress being made by the medical assistants and office manager, specifically in terms of thanking these individuals for supplying HCPs with patients' 10-year ASCVD risk factor calculations. Furthermore, the PL provided positive feedback to HCPs as they continued to change their daily practice by adhering to CPGs by prescribing a statin and/or aspirin in patients who have a diagnosis of dyslipidemia, HTN, and/or T2DM and a 10-year ASCVD risk factor greater than or equal to 7.5%. Additionally, the PL informed all stakeholders of the goal of this EBP project, which involved 100% of patients who were diagnosed with dyslipidemia, HTN, and/or T2DM and demonstrated a 10-year ASCVD risk calculation of greater than or equal to 7.5% being started on a statin and/or an aspirin regimen.

The final step is phase three of Kotter's change model involves anchoring new approaches in the culture by making change permanent within an organizational culture (Kotter, 1996, 2012). The success of this step depends on results, requires a great deal of conversation, may result in turnover, and involves decisions regarding succession planning. Organizational change can be a slow and tedious process, which is often difficult since individuals are accustomed to their normal routines. To ensure that the change was successfully implemented,

the project leader assisted with the PCE, as necessary; however, this assistance was not habitual. Feedback regarding the results provided to the HCPs during the pre-intervention, implementation, and post-intervention phases of this project.

Strengths and Limitations of Theoretical Framework for EBP Project

Several organizations have utilized Kotter's 8-step change model (Bradbury, 2014; Langton et al., 2010; Mork et al., 2017; Small et al., 2016; Wheeler & Holmer, 2017) since its inception. In 1995, the model was updated and published. Kotter's 8-step change model is highly regarded by organizational development practitioners, scholars, and change agents. The 8-step change model has been used in businesses, as well as within healthcare organizations, thus reinforcing the model's applicability regardless of industry/setting.

One of the limitations of this model is that all eight steps had to be completed to ensure a successful change effort. Steps can be reinforced as one moves forward to other steps; however, steps could not be skipped, overlooked, or rushed (Kotter, 1996, 2012). This approach is not always compatible with the culture of the United States because rapid changes are preferred. Furthermore, the culture was not open to many change initiatives, thus adding to the stressors of deviating from the status quo. This model was too difficult to use given the short timeframe of this study. Although the PL believed that this model was best to ensure that organizational change occurred, it proved to be challenging in the clinical setting.

Evidence-based Practice Model

Evidence-based practice models are used to guide the implementation of an EBP project. Doctor on nursing practice prepared nurses are educated about several types of EBP models; therefore, these individuals can choose the best model for projects. Each model is different and should be carefully assessed and evaluated prior to model implementation.

Overview of EBP Model

The project leader chose to use the promoting action on research implementation in health services framework (PARiHS) as the EBP model for this project. The PARiHS framework

includes three elements. Each of the elements has sub-elements. Kitson, Harvey, & McCormack (1998) proposed that implementing research into practice is a function (f) and that evidence (E), context (C), and facilitation (F) should be considered simultaneously. The formula created for the framework to ensure successful implementation is (SI) = f(E, C, F) (Kitson et al., 1998). All elements must be given equal time and energy, because each element is equally important when implementing evidence into practice.

Evidence can be obtained from various sources and is advantageous in several settings. To ensure the quality of evidence, ratings are provided. An example of high-level evidence is the use of randomized control trials (RCT) (Kitson et al., 1998). An example of low-level evidence is the use of descriptive opinion statements (Kitson et al., 1998). Regardless of the level of evidence, if the HCP and the patient agree to the evidence provided, that evidence will guide the changes implemented.

The context, as represented in the formula above, is related to the setting where the implementation of the evidence will occur (Kitson et al., 1998). The context plays a major role in the successful implementation of a change effort. The sub-elements to help with the context are culture, leadership, and evaluation (Kitson et al., 1998; Melnyk & Fineout-Overholt, 2015).

Facilitation consist of the individuals who support and encourage one another throughout the implementation process (Kitson et al., 1998). Change is not an easy process and individuals are often hesitant of change efforts. Thus, a team effort is needed to support, encourage, and provide understanding regarding the desired outcomes associated with the change being implemented. Kitson et al. (1998) noted that open dialogues about roles, being open-minded, and changing one's thought process can facilitate a change effort.

Application of EBP Model to EBP Project

For this EBP project, the PL applied the PARiHS framework by obtaining high-level evidence from peer-reviewed literature to support the implementation of CPGs into practice by

HCPs. The evidence used in this project was appraised and the quality was graded. Only high and good quality evidence was used in this project.

The context for this EBP project was an urban outpatient walk-in clinic. When this project began, the PL realized that CPGs were not followed by the HCPs. Therefore, the PL provided education to all individuals who were involved in this EBP project, thus ensuring understanding of the requirements, the purpose of the project, etc. Furthermore, when questions arose, the PL answered questions accordingly. To ensure successful project implementation, the PL emphasized the importance of teamwork to improve patient outcomes.

The PL supported the medical assistants throughout the facilitation of this EBP project. The PL assured the medical assistants were completing the PCEs for at-risk patients and the computer-generated reminders were placed in examination rooms. The computer-generated reminders alerted HCPs initiate a statin and/or aspirin for the prevention of primary CVD at point of care visits. The project leader was available to HCPs and medical assistants for questions regarding the PCE calculation, the 10-year ASCVD risk factor for primary CVD, and which intensity of medication should be prescribed based on the patient's risk factor.

Strengths and Limitations of EBP Model for EBP Project

The PARiHS framework was selected because its focus involves moving evidence to practice. Kitson et al. (1998), the creators of PARiHS, provided three core values to help guide the implementation process which are evidence, context, and facilitation. The PARiHS framework has been refined, since inception, and has face validity, content validity, and construct validity (Kitson et al., 1998; Rycroft-Malone et al., 2004). While there are various strengths associated with PARiHS, limitations also must be explored. As previously noted, HCPs are accustomed to their normal practice, therefore utilizing the PARiHS framework changes the workflow for HCPs. Before this project was implemented, the PL realized that HCPs may experience barriers (i.e., not agreeing with the intervention/approach) when using CPGs to prevent primary CVD in at-risk patients.

Literature Search

Evidence-based practice is an essential component of DNP preparation and to the discipline of nursing. Doctor of nursing prepared nurses are expected to keep abreast about new evidence, thereby ensuring that the highest quality of care is provided to patients. As primary care providers, DNPs must also be prepared to implement EBP projects that can assist in the improvement of patient care outcomes. To ensure that the best evidence is utilized, DNPs need to conduct thorough literature reviews. Through utilizing timely, high-quality, and highly cited sources, DNPs can ensure that they are utilizing highly regarded EBPs. Conducting a saturated search of literature is a vital task for DNPs.

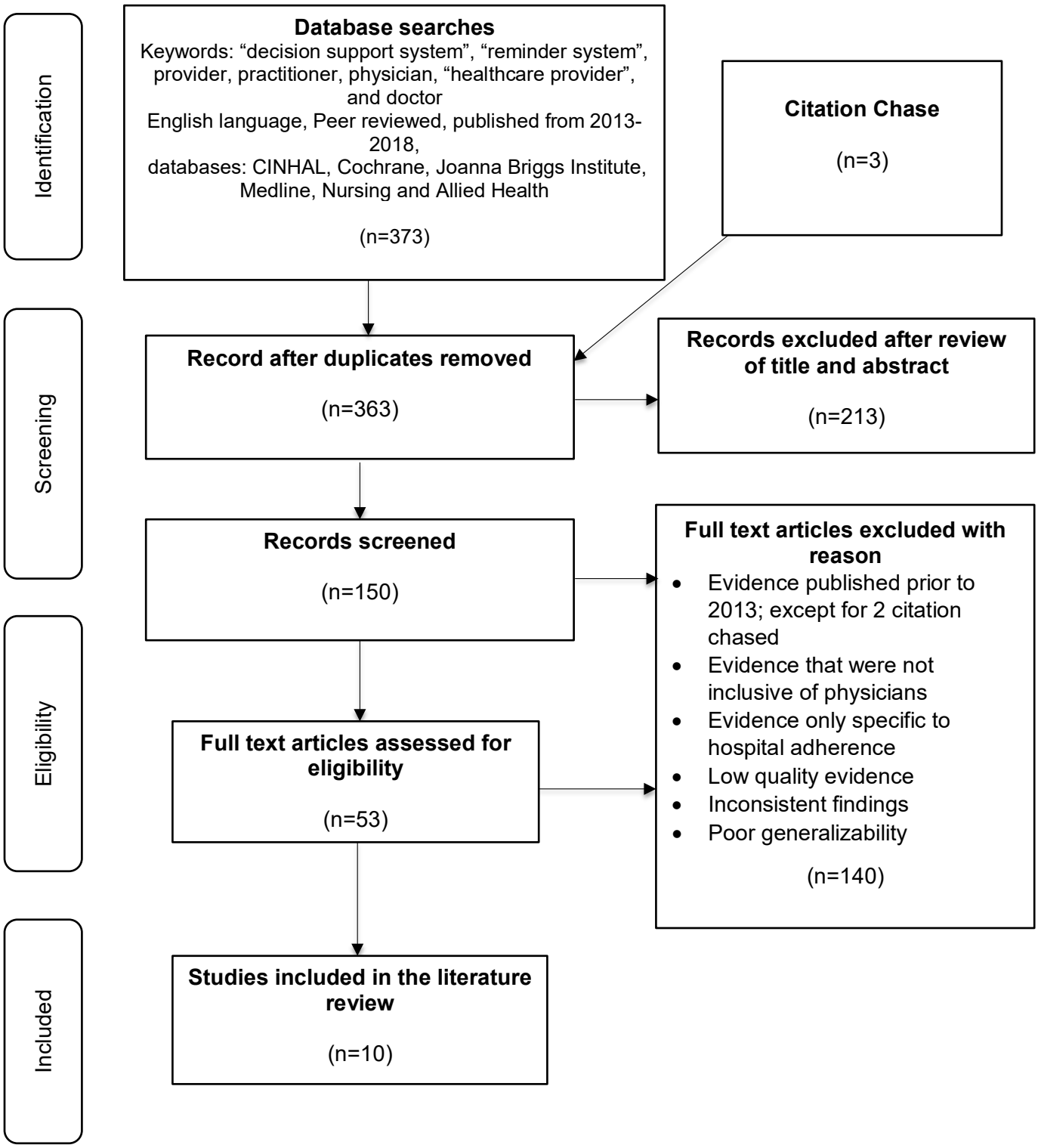
Sources Examined for Relevant Evidence

For this project, the PL performed a saturated search to find the most relevant evidence for preventing primary CVD in at-risk patients. The focus of the literature search was to locate evidence that discussed strategies to alert, prompt, or remind HCPs to comply with CPGs. The PL gathered the highest level and best quality of evidence, using several databases, to support this EBP project. The PL utilized various search strategies and databases to ensure that all literature was explored. The Cumulative Index to Nursing and Allied Health Literature (CINAHL), Cochrane, Joanna Briggs Institute (JBI), Medline, and the Nursing and Allied Health were thoroughly explored. Duplicate pieces of evidence were eliminated. The Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) process is summarized in Figure 2.1.

The inclusion criteria used by the PL consisted of evidence that discussed alert, reminder, prompt, or decision support systems. General practitioners, primary care providers, and ambulatory/outpatient/hospital settings were also included. Evidence included in this project involved studies that have been published within the past 5 years (2013-2018). An exception of this timeline was made for two pieces of evidence, which were collected during the citation

chase. Evidence was excluded that solely focused on patient reminders, patient adherence, and bedside nursing reminders and adherence.

Figure 2.1. PRISMA flow chart of Literature Review



The CINAHL database search yielded 76 pieces of evidence. The initial search of CINAHL database involved the following search keywords: decision support system, clinical, and technique. This initial search yielded 1,266 pieces of evidence. The next CINAHL heading reminder systems with the Boolean operator OR between each which yielded 1,501 pieces of evidence. The next line search consisted of the following keywords: provider, practitioner, physician, healthcare provider, and doctor. These keywords yielded 352 pieces of evidence. With 352 pieces of evidence, additional Boolean operators (AND and OR) were utilized. Furthermore, quotations around two or more words and phrases, as well as an asterisk for truncation led to the discovery of more evidence. The PL added a third line of keywords, which resulted in a more succinct search. The keywords used during the third line of keywords search included: guideline, protocol, practice guideline, and clinical practice guideline. This final step in the search process resulted in the discovery of 76 pieces of evidence. The PL limited the CINAHL database search to articles that were published from 2013 to 2018, were in scholarly/peer-reviewed journals, and were written in the English language.

A search of the Cochrane database yielded 71 results. The keyword that was used in the initial search was: reminder system. The second search included the keyword decision support system and included the Boolean operator OR between both keywords. This search resulted in 73 articles. During the third search, other keywords utilized included: provider, practitioner, physician, healthcare provider, and healthcare professional. During this step in the process, the Boolean operator AND was added to the beginning of the search and the Boolean operator OR was placed between each keyword. Quotations were placed around keywords with two or more-words phrases. The final addition of the keywords yielded 71 results. The limiters used when searching the Cochrane database included articles that were published from 2013 to 2018 and Cochrane Reviews.

The Medline database was searched, and 80 pieces of evidence were located. The initial medical subject headings (MeSH) searched used the term “reminder systems,” which

yielded 680 pieces of evidence. The second MeSH heading used included the term “decision support systems.” When using the term “decision support systems,” the PL added a Boolean operator OR between each MeSH heading, thereby yielding 6,636 pieces of evidence. Keywords added to this search included: doctor, nurse, clinician, physician, practitioner, healthcare professional, and healthcare provider, thus yielding 1,726 results. All keywords had the Boolean operator OR between each keyword, the Boolean operator AND between each line, and an asterisk was added for truncation to yield the most results. The PL then added another line, which began with the Boolean operator AND. Furthermore, other keywords used included: guideline, protocol, practice guideline, and clinical practice guideline. This step yielded 406 pieces of evidence. A final line of key phrases was added to this search and began with the Boolean operator AND. In the final line, keywords included: primary care, family practice, and physician office, thereby yielding 80 pieces of evidence. All keywords had the Boolean operator OR between each and each line began with the Boolean operator AND. Phrases with two or more-words phrases were placed in quotation marks, so the database did not separate the words during the search. The limiters used when searching the Medline database included articles that were published from 2013 to 2018 and articles written in the English language.

The Nursing and Allied Health database was also searched and yielded 120 results during the final search. The keyword utilized with MeSH headings included “reminder systems,” thereby yielding 18 pieces of evidence. Decision support systems MeSH headings were added to the search and resulted in 155 pieces of evidence. All MeSH headings had the Boolean operator OR between each heading. The PL added another line with the Boolean operators AND at the beginning of each line, as well as OR between each keyword. During the third search, the PL used the keywords: clinical provider, practitioner, physician, healthcare provider, and doctor. This step in the search yielded 120 pieces of evidence. Quotations were placed around keywords with two or more phrases and an asterisk was placed for truncation. The limiters utilized when searching the Nursing and Allied Health database included articles that

were peer reviewed, published in scholarly journals from 2013-2018, and were written in the English language. It is important to note that the database only yielded evidence from 2013-2014.

The JBI database was searched and yielded 30 pieces of evidence. The keyword used during the initial search included the word reminder system, which was input with quotations, thereby yielding 16 results. Of the 16 results yielded, only one of the results was relevant to the study. The next search included the keyword decision support system and used the Boolean operator AND between both keywords (i.e., reminder system AND decision support system). This search yielded 30 results. From the 30 results gathered, only 3 pieces of evidence were relevant to the study. A third search line was included, but the PL did not consider the search as a relevant step, specifically since this search removed relevant evidence. The keywords used in the final step included: provider, practitioner, physician, healthcare provider, and doctor. Boolean operators AND and OR were utilized. Furthermore, quotations were used around two or more-word phrases. This final search yielded 22 results. Of the 22 results, only 2 pieces of evidence were relevant to this study. The limiter used when searching the JBI database was articles published from 2013-2018.

The PL also citation chased three pieces of evidence. Citation chasing consist of locating a piece of evidence which was cited in another piece of evidence that was not yielded in the search criteria but is important for a paper or project. Of the three pieces of evidence located, two of the articles were outside of the publication date limiters. Despite the timeframe used, the citations found were relevant and high-level pieces of evidence. Therefore, these two citations were included to support this EBP project. The database search results for this project are detailed in Table 2.1.

Table 2.1

Database Search Results

Database	Evidence Yielded	Duplicates	Reviewed	Accepted
CINAHL	76	7	20	3
Cochrane	67	0	10	3
Joanna Briggs Institute	30	0	3	1
Medline	80	5	11	1
Nursing and Allied Health	120	1	6	0
Citation chased	3	0	3	3

Level of Evidence

The PL utilized the Johns Hopkins Nursing Evidence-Based Practice (JHNEBP) (Dang & Dearholt, 2018) as the selected appraisal tool. The JHNEBP tool is used to rate the level of evidence selected. The level of evidence ratings, for each piece of evidence used in this project, is presented in Table 2.2.

Appraisal of Relevant Evidence

An appraisal of each of the final 10 articles (Appendix A) was conducted utilizing the JHNEBP appraisal tool. The JHNEBP rates the level of evidence and can be utilized as an appraisal tool to analyzes the design, quality, consistency, and applicability of the evidence (Dang & Dearbolt, 2018). The PL selected this tool because of its ease of use, detailed description, and the rating scale utilized to assess the quality of evidence presented. The JHNEBP rating hierarchy has five levels, levels I-III is considered researched evidence, while levels IV-V is non-researched evidence. The rating hierarchy for the level of research evidence is found in Table 2.2 and in Appendix A.

The JHNEBP rating tool can be used to appraised evidence. The appraisal tool allows users to rate the quality of evidence. Quantitative and qualitative research can be appraised using the JHNEBP appraisal tool. Quality of evidence is given a grade A, B, or C which is consistent with a high to low rating.

Evidence given a quality grade level of high (A) has “consistent, generalizable results; sufficient sample size for study design; adequate control definitive conclusions; consistent recommendations based on comprehensive literature review that includes thorough reference to scientific evidence” (Dang & Dearbolt, 2018, p. 131). For this study, there were seven quality A graded pieces of evidence used. Studies that were given a grade A include: Arditi et al. (2017), Fiks et al. (2013), Flodgren et al. (2016), Hendrix et al. (2015), Ivers et al. (2012), and Li (2018). Evidence given a quality grade level of good (B) included “reasonably consistent results; sufficient sample size for the study design; some control; fairly definitive conclusions;

reasonably consistent recommendations based on fairly comprehensive literature review that includes some reference to scientific evidence" (Dang & Dearbolt, 2018, p. 131). For this project, there were three quality B graded pieces of evidence: Regan, (2017), Rokstad et al. (2013), Shojania et al. (2009), and Zahanova et al. (2017).

Evidence given a quality grade level of low or majorly flawed (C) demonstrates "little evidence with inconsistent results; insufficient sample size for the study design; conclusions cannot be drawn" (Dang & Dearbolt, 2018, p. 131). For this project, there were no quality level C grade evidence used. The quality of the evidence is discussed in the detailed level of evidence appraisal for each piece of evidence utilized for this project. The quality rating for this research evidence is found in Table 2.2 and Appendix A.

Level-I evidence. According to Dang and Dearbolt (2018) level-I evidence is defined as "an experimental study randomized control trial (RCT), explanatory mixed methods with only level I quantitative study or systematic review of RCTs, with or without meta-analysis" (p. 130). For this project, there were four sources of evidence that were rated as level-I evidence: Flodgren et al. (2016), Hendrix et al., (2015), Ivers et al. (2012), and Li (2018).

Flodgren et al. (2016) performed a systematic review evaluating if tools developed and disseminated by individuals who produce guidelines are effective in ensuring guideline implementation. For the systematic review, the authors utilized four cluster-RCTs, which were conducted in various locations. The studies included in the systematic review of literature focused on HCPs adherence to guideline. One of the studies used an educational workshop as the intervention. Three of the other studies utilized forms, reminders, paper-based educational material, or a combination of all tools to ensure compliance. The sample size included four RCTs, which all involved HCPs, health system managers, and policymakers.

Table 2.2

Rating Hierarchy for Level of Research Evidence using the JHNEBP Appraisal Tool

Author(s)	Grade of Evidence	Level of Evidence	Database
Arditi, Rege-Walther, Durieux, and Burnand (2017)	A	II	Cochrane Database of Systematic Reviews.
Fiks, Zhang, Localio, Khan, Grundmeier, Karavite, … Forrest (2013)	A	I	CINAHL
Flodgren, Hall, Goulding, Eccles, Grimshaw, Leng, and Shepperd (2016)	A	I	Cochrane Database of Systematic Reviews
Hendrix, Downs, and Carroll (2015)	A	I	Citation chase
Ivers, Jamtvedt, Flottorp, Young, Odgaard-Jensen, French, … Oxman (2012)	A	I	Cochrane Database of Systematic Reviews Citation chased
Li (2018)	A	I	Joanna Briggs Institute
Regan (2017)	B	III	CINAHL and Medline
Rokstad, Rokstad, Holmen, Lehmann, and Assmus (2013)	B	II	CINAHL
Shojania, Jennings, Mayhew, Ramsay, Eccles, and Grimshaw (2009)	A	II	Cochrane Database of Systematic Reviews Citation chased
Zahanova, Tsouka, Palmert, and Mahmud (2017)	B	II	CINAHL

For each of these four reviewed RCTs, trainees and medical students were excluded. Interventions by the World Health Organization (WHO), the National Institute for Health and Care Excellence (NIHCE), and the Scottish Intercollegiate Guidelines Network (SIGN) were included because these interventions involved the creation of CPGs to improve guideline implementation (Flodgren et al., 2016). Interventions such as learning modules, educational outreach visits, communication tools, and tailored formatting were created by CPG producers (i.e., WHO, NIHCE, and SIGN). The creators suggested assessing the feasibility and impact of creating templates that automatically generate patient's data. The systematic review of literature noted that CPG acceptance, by HCPs, may be better received and implemented when a CDSS is utilized. The interventions were categorized according to the following classifications: tailoring, education, targeting the patient, targeting the organization of care, and mass media interventions. No theory guided any of the studies utilized in this systematic review. The authors concluded that adherence to CPGs by HCPs improves when tools, developed by creators of CPGs, are implemented. The level of evidence for this systematic review was rated a level one and the quality was rated high, which denotes a grade A rating.

Hendrix et al. (2015) performed a (RCT) that consisted of four pediatric offices. The researchers evaluated if highlighted prompts caused physicians to respond quicker than when using non-highlighted prompts. Two offices were included in the intervention group which received CDSS generated prompts highlighted in yellow. The other two offices were included in the control group and did not receive prompts highlighted in yellow. The prompts were randomized and were then delivered to the medical offices. The researchers also added highlighted high-priority prompts. The high-priority prompts were not randomized because of their importance. A total of 2237 prompts were randomized and delivered to physicians. The results of this study did not indicate any statistically significant difference between responsiveness to highlighted prompts versus non-highlighted prompts (odds ratio 1.056; 95% confidence interval 0.56-1.167; p = .259, NS; X^2 = 0.3; p = .58, NS). Furthermore, the

researchers did not find improvement between physicians responding to highlighted high priority prompts as compared to the prior years when non-highlighted prompts were utilized. Chi-square and binary regression were utilized to analyze the RCT results. Bonferroni correction was utilized to establish a cutoff for statistical significance. A post hoc power analysis of 80% was obtained to detect the absolute difference in response rate of 5% for the overall study (Hendrix et al., 2015). The researchers utilized the signal detection theory to discuss possible reasons why physicians did not respond to highlight prompts. The researchers initially hypothesized that highlighted prompts would result in improved responsiveness by the physicians. Intrinsic and extrinsic factors such as lack of motivation and operational conditioning regarding responding to reminder prompts are two possible reasons for the minimal response rates from physicians when responding to the highlighted prompts. The researchers postulated that paper prompts were a study limitation. The researchers suggested structured feedback about ignored prompts, highlighting prompts on a computer screen, and hard stops in EMR systems for future interventions to improve physician's responsiveness to highlighted prompts. This RCT study was given a level-I evidence rating and a quality rating grade of A by the project leader.

Ivers et al. (2012) performed a systematic review to assess the effectiveness of audit and feedback regarding HCPs daily practice and patient outcomes. The reviewers had three objectives that were addressed in their study (Ivers et al., 2012, p. 6):

1) Is audit and feedback effective for improving health provider performance and healthcare outcomes?
2) What are the key factors that explain variations in the effectiveness of audit and feedback?
3) How does the effectiveness of audit and feedback compare to other interventions?

This systematic review included 140 RCTs that focused on audit and feedback. Audit was defined as evaluating any individual's professional practice, while feedback was defined as a

process of communicating process measures to the professional. The samples included health care professionals. Studies that focused on facilitation or reminders systems were excluded from this systematic review. The results of this systematic review showed that healthcare professionals who have low baseline compliance are more inclined to respond to audit and feedback. Audit and feedback, along with other interventions (i.e., such as reminders or educational meetings), have limitations. The acceptance of information provided in audit and feedback depends on the individual's mindset and motivation level. For this systematic review, the reviews focused on individual behavioral change theories. Ivers et al. (2012) concluded that professional practices will notice small but important improvements when audits and feedback are used as intervention methods. When audit and feedback were the core intervention, a 4.3% increase in compliance occurred. Compliance rates improved when using audit and feedback, especially when these forms of feedback occurred monthly and involved individuals who have authority, seniority, and/or were able to give a verbal or written warning. The researchers postulate that with the proper context and design, audit and feedback will improve healthcare professional's practice, thereby improving patient care outcomes. The PL rated this systematic review with a level-I score and an A quality rating.

Li (2018) performed a systematic review of RCTs studies to evaluate if implementing audit and feedback, as a strategy, would assist in fostering HCPs practice changes. The author evaluated four pieces of evidence. Between the four RCTs utilized, 190 studies were evaluated. Each study contained a minimum of one piece of evidence, which focused on audit and feedback as a strategy. Li (2018) concluded that audit and feedback alone, as well as in unison with other strategies, can improve HCPs practice and patient outcomes. Change agents must consider the characteristics of HCPs behaviors and the context in which these strategies are applied. This systematic review included all RCTs; therefore, the PL rate the level of evidence a level I. High quality, consistent, and generalizable results were provided, thereby resulting in a grade A for this systematic review.

Level-II evidence. Level-II evidence is defined by Dang and Dearholt (2018) as "a quasi-experimental study, explanatory mixed methods with only level II quantitative study, or systematic review of a combination of RCTs and quasi-experimental studies, or quasi-experimental studies only, with or without meta-analysis" (p. 130). For this EBP project, there were four sources of level-II evidence used: Shojania et al. (2009), Arditi et al. (2017), Zahanova et al. (2017), and Rokstad et al. (2013).

Shojania et al. (2009) performed a systematic review to assess the effectiveness of computer reminders, during point of care visits, that are delivered on screen to HCPs. The three objectives for this systematic review (Shojania et al., 2009, p. 3) included:

1) Do on-screen computer reminders effectively improve processes or outcomes of care?
2) Do any readily identifiable elements of on-screen reminders influence their effectiveness?
3) Do any readily identifiable elements of the targeted activity influence the effectiveness of on-screen reminders?

The researchers included 28 RCTs and quasi-RCTs. Several databases were utilized by the reviewers to obtain relevant studies related to their research topic. The inclusion criteria used for this systematic review required that 50% of the participants were physicians or physician trainees. The reviewers excluded studies that included nurses, dentists, pharmacists, or other health professionals as the research's primary focus. Adherence to computer reminders improved by 4.2% when used as an intervention. However, computer reminders during point of care visits, improved HCPs behavior modestly. Study interventions that targeted inpatient settings showed an improvement of 8.7% when compared to 3% improvement in outpatient settings ($p = 0.34$). Shojania et al. (2009) denoted the following systematic review limitations, which included heterogeneity, variable degree of reporting (such as description of key intervention features and the systems which they were delivered), and the authors median

effects of focus. Additionally, the authors suggested focusing on quality problems or the reminder system design as improvements for future studies/projects. No theoretical framework guided this systematic review. The PL rated this systematic review as a level-II, using the level of evidence scale, and gave this review an A quality rating.

Arditi et al. (2017) performed a systematic review of literature to evaluate if professional practice and patient outcomes are affected by computer-generated reminders, which are delivered on paper. This systematic review covered (Arditi et al., 2017, p. 7):

1) Manual paper reminders
2) Computer-generated paper reminders delivered on paper
3) On-screen reminders

The reviewers performed a thorough search of several databases to retrieve the most relevant evidence for this review. Thirty-five studies were included in this study, which consisted of RCTs and non-RCTs. An outpatient setting was used in all pieces of evidence, except two. The inclusion criteria were patients, HCPs, practice, and hospitals. The review compared HCPs normal practice, using no reminders, to computer reminders that were delivered on paper. Using computer reminders, delivered on paper, as a multifactorial intervention and/or alone, slightly improved care by 6.8%. In a single intervention, computer-generated reminders, which were delivered on paper to HCPs, improved quality of care by 11%. Adding reminders as an intervention to another intervention improved the quality of care by 4.0%. The reviewers concluded that computer-generated reminders, which are delivered on paper, slightly improves the quality of care received with moderate-certainty. Arditi et al. (2017) noted the following limitations for the systematic review: (a) evidence certainty because of low level of evidence and quality ranking, (b)methodology, (c) inconsistency, and (d) wide confidence intervals of the utilized studies. The authors provided the following recommendations for future studies: (a) reminders be used in a variety of settings, (b) leave space on the reminder for responses for the HCPs, (c) explanation of the content of the reminder, and (d) provide relevant sources with large

effect sizes. Arditi et al. (2017) concluded with moderate certainty that the quality of care of patients moderately improved when HCPs received computer generated reminders delivered on paper regarding CPG compliance. No theoretical framework guided this systematic review. The PL rated this systematic review as a level-II, using the level of evidence scale, and gave this review an A quality rating.

Zahanova et al. (2017) performed a pilot study utilizing the iSCREEN Diabetes Dashboard at a pediatric diabetic clinic during point of care visits. The researchers hypothesized that CPG adherence by HCPs, knowledge of CPGs, and easy access to guidelines and patient information would improve through utilizing the CDSS. iSCREEN was implemented to assist in preventing overscreening, as well as to remind HCPs when testing was needed, as based on the Canadian Diabetes Association (2013) CPGs for the Prevention and Management of Diabetes. This study included 50 adolescents, who were between the ages of 14 to 18, and had a diagnosis of type 1 diabetes. Twenty-five charts were reviewed during the pre-intervention phase and 25 charts were reviewed during the post-intervention phase. To obtain baseline knowledge of pre-intervention practice behaviors, five charts from five different endocrinologist were reviewed. The researchers used a convenience sample and the first five eligible patients, of that year, were selected to have their charts reviewed. The researchers stated they took all precautions to eliminate bias, though they noted that bias may exist. Patients were excluded from the study if they were enrolled in another study, had celiac disease screenings that needed to be performed, or were adolescents who were diagnosed with T2DM. The researchers screened subjects for microalbuminuria, retinopathy, thyroid disease, dyslipidemia, and HTN using three different categories (i.e., adequate, inadequate, or over screened). HCPs were given a pre-test and post-test survey, which consisted of 10 multiple choice questions and three Likert scale type questions, that was used to assess HCPs knowledge of CPGs, as well as access to CPGs. Zahanova et al. (2017) addressed the following in their study:

- frequency of adequate screening of complication and comorbid conditions,

- scores on knowledge questionnaires, and
- relative ease of access to guidelines and patient information with the launch of iSCREEN dashboard.

Upon the implementation of the intervention (i.e., post-intervention), underscreening and overscreening decreased (p = 0.03) for nephropathy screening. Furthermore, the amount of initial nephropathy screening improved. Initial retinopathy screening also improved (p = 0.04). Dyslipidemia and thyroid function screening showed no statistically significant change. Hypertension screening had no statistically significant change from 90% at baseline. Pre-intervention (n = 31) and post-intervention (n = 27) surveys were collected. Following the successful launch of the CDSS iSCREEN, an 11% improvement of knowledge of CPGs was noted. This pilot study supported Zahanova et al.'s (2017) hypotheses that knowledge of CPGs, easy access to guidelines, and knowledge of patient information, in CDSS, can improve adherence to CPGs among HCPs. Zahanova et al. (2017) provides the following limitations: (a) retrospective study, (b) small and feasible sample size, (c) the control group was historical, (d) invalid knowledge questionnaires, and (e) the inability to perform a power analysis prior to beginning the study. The researchers suggested the iSCREEN tool be used in PCP offices and diabetic education clinics. Zahanova et al. (2017) further suggested future studies should be conducted long term to evaluate if knowledge translation retention improved, and to evaluate patient outcomes and iSCREENs cost to healthcare. The researchers concluded that guideline compliance can have an impact on healthcare cost and patient outcomes when incorporated in the iSCREEN tool. There was no discussion of IRB approval nor was there a theoretical framework used to guide this study. The PL rated this systematic review as a level-II, using the level of evidence scale, and gave this review a B quality rating.

Rokstad et al. (2013) conducted a pilot study to improve patient referrals to specialist by general practitioners (GPs). This study was conducted at outpatient clinics of Haukeland University Hospital, which receives approximately 2400 annual patient referrals. For this study,

an electronic optional guideline tool was used in 93 GP offices to assist in the referral process for patients who presented with sleep apnea, chronic obstructive pulmonary disease, and lung tumors. EMR systems were updated at 93 GP offices to include the electronic optional guideline tool. The control group consisted of 117 GPs whose EMR systems were not being updated; therefore, normal practice for referral to specialist continued. The researchers compared the intervention group to the control group. Both groups were evaluated without their knowledge. Referral consideration and management was timed. The anonymous evaluation form was scored on a 0-10 scale, based upon referral diagnoses. The researchers conducted telephone interviews with GPs who were part of the intervention group. Information obtained during telephone interviews included details about system usage, ease of use, the time used to write referrals, and feelings about referral improvement. Rokstad et al. (2013) analyzed the variables referral time and total score collected on the anonymous evaluation forms using a between-group design. During this study, there were 1080 new referrals for patients who presented with sleep apnea, chronic obstructive pulmonary disease, and lung tumors. The researchers stated that 664 referrals were from GPs; however, it was unknown if the GPs were from the intervention group or the control group. One can assume that GPs were from the intervention group. Anonymous evaluation form analyses noted a 30% rate of referral improvement from GPs to specialist in all diagnostic groups. There were no significant differences in referring patients for a chest x-ray ($p = 0.142$) and CT thorax ($p = 0.234$) when the suspected diagnosis was a lung tumor. The researchers also assessed for burnout among members of the intervention group and found no significant difference between groups. Those who were in the intervention group spent 34% less time on referrals, as compared to those in the control group. The intervention group began with 93 GPs; however, only 82 GPs reported that they had utilized the new electronic optional guideline tool. Of the 82 GPs who utilized the tool, 96% stated the tool was useful, saved time, and was easy to utilize. Rokstad et al. (2013) noted the following limitations to this study: (a) non-randomization of the Bergen GPs which created bias, (b)

inability to differentiate whether the GP was a specialist, and (c) some of the referrals included were not from the GPs in the study. The researchers did not provide suggestions for future studies but, they addressed how this study addressed suggestions from past studies. The researchers concluded that implementation of the electronic optional guideline tool should be used in a variety of setting because it saves time, will assist with efficiency and quality of care in outpatient clinics regarding referrals. The researchers did not use a theoretical framework to guide this study. The PL rated this systematic review as a level-II, using the level of evidence scale, and gave this review a B quality rating.

Level-III evidence. A quantitative nonexperimental study; explanatory mixed methods with only level III quantitative study; exploratory, convergent, or multiphasic mixed methods studies; systematic review of a combination of RCTs, quasi-experimental, and nonexperimental studies, or nonexperimental studies only; or qualitative study or systematic review of qualitative studies, with or without a meta-synthesis (Dang & Dearholt, 2018, p. 130).

There were two sources of level III evidence (Fiks et al., 2015; Regan, 2017) used for this EBP project.

Fiks et al. (2015) hypothesized that an increase of clinical decision support (CDS) system implementation would result in an increase of feedback on performance. The researchers had three aims for this study (Fiks et al., 2015, p. 492):

1) characterize patterns of adoption of the CDS,
2) assess the impact of performance feedback on CDS adoption by primary care clinicians, and
3) measure the impact of CDS use on guideline adherence.

Clinical decision support systems were to be received by 16 practices, which were randomized by the researchers. A second randomization of practices was completed. This randomization was determined by the practice level to physician performance feedback. However, some practices were not randomized. HCPs who regularly treat patients who have otitis media, acute

otitis media, otitis media with effusion diagnosis, and children ages 2 months through 12 years were included in this study. HCPs who had 25 or fewer patients who have otitis media were excluded from this study. This study is an extension of a previous study conducted by Forrest et al. in 2013. Interventions of this study included study explanation, education about otitis media CPGs, and the use of CDS. Feedback regarding baseline data was given after 1 year of CDS implementation. During the next 10 months, the researcher's hand-delivered six rounds of feedback to the randomized sites. The control group did not receive feedback or any further interaction; however, they had access to CDS. To measure adherence to acute otitis media guidelines, four measures were utilized, which includes: "(a) appropriate use of amoxicillin as a first-line antibiotic, (b) use of high-dose amoxicillin, (c) pain assessment, and (d) analgesia use" (Fiks et al., 2015, p. 496).

Fiks et al. (2015) noted that CDS otitis media tool adoption rates were low. In fact, the tool was never utilized by two clinicians. Furthermore, 12 of the clinicians did not use the CDS tool after the 3-month trial period. The CDS was utilized in less than 10% of the visits by 38.9% of the HCPs. At 10-25% of the visits the CDS tool was used by 20.3% of the clinicians. Further, 30% of clinicians used the CDS tool during 21.3% of visits. The CDS tool was utilized an average 16.8% based on practice level. Practices that saw fewer otitis media patients were more inclined to utilize the CDS tool. The CDS tool was more heavily utilized during sick visits as opposed to well visits. The CDS tool was utilized in children 2-5 years old but less in children less than 6-months (p = .05), and children at high risk for adverse outcomes (p = .02).

Feedback increased a practice's usage of CDS, especially among practices that received the multifactorial intervention as compared to practices that received the single CDS intervention tool (Fiks et al., 2015). Practices had a 2.2%-point increase in CDS tool usage with feedback compared to 6.8% decrease in non-feedback practices when compared to baseline data. The CDS tool usage with feedback increase was statistically significant (p = .001) with a relative difference of 9.0% points regarding the 10-month and 12-month comparison.

Otitis media CPG adherence in association with CDS usage improved adherence among HCPs regarding CPGs. There was a relative increase of 7.5 ($p < .001$) and 8.6 ($p = .01$) in CDS usage in acute otitis media care with and without effusion. Pain treatment had a 48.2%-point relative increase for all types of otitis media. Amoxicillin, prescribed as first-line therapy, had a 5.4%-point relative increase. Furthermore, there was a 4.9% relative point increase among patients who had a penicillin allergy who were prescribed the appropriate antibiotic. High-dose amoxicillin prescription rates had a 17%-point relative increase (Fiks et al., 2015). Unfortunately, the researchers noted that a 2.7% relative increase in non-indicated antibiotic prescriptions occurred. A CPG improvement rate of 12% was noticed in otitis media with effusion diagnosis.

Rogers' theory of diffusion of innovation (1970, 1986, 1990) was utilized as a theoretical framework to guide the study by Fiks et al. (2015). The implementation of the CDS for this project is innovative to its users. Fiks et al. (2015) projected that physicians will fully convert to utilizing the CDS instead of the using the normal process of decision making. The interventions were not complicated, testing did not take a significant amount of time, and the benefits were noticed by users. Feedback was an intervention to assist participants to recognize the benefits of the CDS. The context from conversations held during feedback visits evaluated the use of CDS for otitis media. Some HCPs felt EHR benefitted their practice, while others felt that EHR involved too many button clicks and was too burdensome to use for patients who expressed multiple complaints. Some HCPs also preferred typing notes themselves due to the complex nature of the CDS tool. Overall, the results of this study demonstrated that HCPs who had low guideline compliance benefitted the most from the CDS tool. The researchers noted limitations for this prospective cohort study included: (a) the study was evaluated based on the description of CDS tool adoption, (b) instead of randomization, and (c) it was conducted in one healthcare system. Suggestions made by the researchers for future improvements are to evaluate the independent effect of CDS adoption on patients' diagnosis and chief compliant. The PL rated this study as having level-III evidence and provided an A grade for quality of the evidence.

Regan's (2017) study aimed to improve the knowledge of HCPs regarding chronic kidney disease, as well as to improve awareness of CPGs to increase early point of care referrals to nephrologists. The study was conducted in an organization composed of 80 HCPs, who worked in 11 primary care offices. No nephrology group was affiliated with the organization where this study occurred. The JBNEBP model guided this study, since the model focuses on EBP implementation in the clinical setting. In the study's setting, there were 60,985 active patients (pre-implementation). After intervention implementation, 64,577 patients were seen. The study used an anonymous optional survey to assess HPCs knowledge about chronic kidney disease. Upon the completion of the anonymous optional survey, during a stakeholders' meeting, details regarding vital baseline patient data, an educational presentation about chronic kidney disease and tutorials about the CDS pathway was provided to stakeholders. Since not every HCP was able to attend this stakeholders' meeting, educational materials were sent to every HCP. Reminders regarding the chronic kidney disease project and measures was sent during the first month of implementation. The CDS intervention was evaluated for progress and improvement areas. Feedback about the projects progress and improvement was sent via email to HCPs. Three months after implementation of the CDS intervention, data collection began. The researchers performed a post-intervention survey to assess HCPs knowledge. Participation in this survey was optional. Patients who were 18 years and older and arrived at their schedule appointments were included in this study. Patients were excluded if they were inactive patients or passed away during the time of the study. During this study, the following variables were evaluated: diagnosis of chronic kidney disease, stage 3-5 chronic kidney diagnosis, diabetes and chronic kidney disease, HTN and chronic kidney disease, estimated glomerular filtration rate < 60 ml/min and < 30ml/in with or without diagnosis of chronic kidney disease, chronic kidney disease or estimated glomerular filtration rate < 60 ml/min with albumin/creatinine ratio results, chronic kidney disease linked nephrology referrals, and patients with estimated glomerular filtration rate < 30 ml/min or albumin/creatinine ratio (ACR) > 300 mg/g with a

nephrology referral. Forty-four of the 80 HCPs completed the optional survey at baseline and 23 HCPs completed the post-intervention survey. Laboratory testing specific for chronic kidney disease (Z = -2.00, p = .046), chronic kidney disease stages interpretation (Z = -2.83, p = .005). Patient who presented with a diagnosis of chronic kidney disease, overall assessment improved significantly (Z = - 2.41, p = .024). Overall knowledge regarding chronic kidney disease greatly improved (U= 335.50, p = .01). Patients who were referred to a nephrologist as well as patients who were recently diagnosed with chronic kidney disease, regardless of the variable evaluated (e,g, glomerular filtration rates less than 60 ml/min or urine microalbumin test with an albumin/creatinine ratio results), significantly improved. The findings of this study were consistent with previous research studies that support PCPs using CDS at point of care visits to for chronic kidney disease guideline dissemination and algorithm management (Regan, 2017). Regan (2017) provided several limitations in this study: (a) generalizability, (b) homogeneity, (c) composition of the organization, (d) a small number of HCPs responded to the survey, (e) knowledge deficits of existing survey because it was sent to their work email, (f) only physicians received the CDS tool education etc.). The researcher suggested HCPs in primary care increase their knowledge base and awareness about chronic kidney disease and incorporate ways to promote guidelines using a CDS tool. For detection of early stages of chronic kidney disease, a large-scale research study with risk stratification is suggested. Regan (2017) concluded that chronic kidney disease guidelines be followed through a CDS tool by HCPs. CDS tools assist PCPs with detection and management of chronic kidney disease, assist with healthcare cost, and improves the care and safety of patients. The PL rated this systematic review as a level-III, using the level of evidence scale, and gave this review a B quality rating.

Construction of Evidence-based Practice

Synthesis of Critically Appraised Literature

This literature review provided information about numerous strategies that HCPs can utilize to follow recommended evidence-based CPGs. Breaking down barriers held by HCPs

about implementing CPGs can be done by using various educational strategies (i.e. face-to-face presentation, computerized education, etc.), tailoring CPGs to ensure user friendliness, developing different versions of CPGs (i.e. for organizations and another public or media use), and promoting strategies to inform HCPs that new CPGs recommendations are available (Flodgren et al., 2016) are critical to ensure CPGs are implemented for improved patient outcome. When CPGs are not followed, patient outcomes are less than optimal. Therefore, it is imperative for HCPs to select the best strategy to implement CPGs in their daily practice, thereby ensuring that CPG utilization is easily supported, efficient, and effective.

Although several studies focused on a single approach to CPG adherence (Arditi et al., 2017; Pantoja et al., 2014; Regan, 2017; Rokstad et al., 2013; Shojania et al., 2009; Zahanova et al., 2017), other studies supported the use of a multi-modal approach (Fiks et al., 2015; Flodgren et al. 2016; Hendrix et al., 2015; Ivers et al., 2012; Li, 2018). Education is an important intervention for HCPs to learn about CPGs. Education alone is not an effective strategy for improving CPG adherence among HCPs. Historically, paper alerts were used as a strategy to prompt HCPs about patient needs; however, with the usage of computer/electronic systems, paper prompts are not being utilized as often as they once were. Unfortunately, issues arise with computer/electronic alerts. For example, HCPs are inundated with numerous computer/electronic alerts, which cause alert fatigue, thereby resulting in ignored or overlooked alerts (Hendrix et al., 2015; Shojania et al., 2009; Zahanova et al., 2017). Regardless, researchers have noted that CDSS, computer-generated alerts, or EMR systems have been beneficial and effective in ensuring HCPs adherence (Fiks et al., 2015; Hendrix et al., 2015; Shojania et al., 2009; Zahanova et al., 2017). Visual cues in the form of flowsheet (Appendix B) are an easy and concise intervention that will assist HCPs follow CPG recommendations. Flowsheets helps reading and understanding CPGs less time consuming. Audit and feedback can improve adherence among HCPs, specifically about following CPG recommendations. Providing feedback to HCPs makes them aware that improvement is necessary regarding

following CPGs. No matter what strategy HCPs implement, it is critical that they use this strategy/resource on a continuous basis, thereby resulting in improved patient outcomes.

Best Practice Model Recommendation

Evidence shows that the best way to facilitate CPG compliance among HCPs is for computer prompts as reminders be placed in the EMR system. Shojania et al. (2009) suggested CPG compliance is best with computer prompts, but better compliance is noted with computer prompts at point of care visits. Zahanova et al. (2017) suggested CDSS improves CPG compliance because it provides HCPs with easy access to CPGs, knowledge about CPGs and access to patient information. Rokstad et al. (2013) stated that although HCP were given an option of using the electronic optional guideline tool that it was bypassed by some HCPs. Rokstad et al. (2013) stated that HCPs who utilized the electronic optional guideline tool found it was advantageous when treating patients. Fiks et al. (2015) found mixed reviews about CDS tools from HCP. Some HCPs found the CDS tool feasible for their practice while other suggested the CDS tool was too time consuming (Fiks et al., 2015). Arditi et al. (2017) suggested computer-generated reminders be delivered on paper with or without another intervention improved CPG compliance. Hendrix et al. (2015) noted EMR system reminder fatigue; therefore, HCPs bypassed and disregarded the reminder prompts in the EMR system. Hendrix et al. (2015) suggested using hard stops as an intervention to prevent HCPs from bypassing CPG recommendations in the EMR system.

How the Best Practice Model Will Answer the Clinical Question

The best practice model will be used to answer the clinical question, “For healthcare providers in a primary care setting, does incorporating a multi-modal approach that involves education, using computer-generated paper reminders at point of care, visual cues, and ongoing feedback about prescribing performance improve the initiation of medication therapy for the prevention of primary CVD in at-risk adult patients in a 7-week period?” Incorporating all elements and sub-elements of the PARiHS framework and giving equal value to each element

allowed for successful EBP implementation to occur. The major elements of evidence, context, and facilitations were essential to implementing CPGs into practice (Kitson et al., 1998).

Computer-generated 10-year ASCVD calculated risk factor calculations were delivered to HCPs on paper. These scores served as a reminder to initiate a statin and/or aspirin for patients at-risk for primary CVD. The PL conducted an educational intervention about the benefits of using evidence-based practice CPGs to prevent primary CVD. Thus, this educational intervention will keep HCPs abreast of the need to initiate a statin and/or aspirin in patients' at-risk for primary CVD. The context where this EBP project was conducted was a very busy, fast paced practice. Given the nature of pace in this practice, medical assistants were responsible for performing the 10-year ASCVD risk factor calculation, which was given to HCPs, which did not drastically change the workflow for HCPs. Teamwork, communication, and knowledge regarding how to perform the PCE, for appropriate patients, resulted in smoother project implementation during the first week. Focusing on all elements and sub-elements of the PARiHS framework helped the project leader answer the clinical question guiding this evidence-based practice project.

CHAPTER 3

IMPLEMENTATION OF PRACTICE CHANGE

Evidence-based practice can greatly assist in changing practice behaviors. Groomed to be leaders and change agents, DNP prepared nurses can make long-term/long-lasting healthcare practice changes. “Practicing in the clinical setting provides an environment for the DNP graduate clinician to develop and utilize skills pertaining to evaluating, integrating, and implementing EBP” (Chism, 2016, p. 76). Doctor of nursing prepared nurses are often able to make contributions through the application of knowledge and scholarship (Boyer, 1990; Chism, 2016), thus providing institutions with the best evidence available to improve the future of nursing care.

This EBP project took place in a Midwestern urban community-based clinical setting. The PL evaluated whether patients 40-75 years of age, who are at-risk for primary CVD, were receiving statins or aspirin (which is recommended by the ACC/AHA, AHA/ADA CPGs, and USPSTF). During this project, a multi-modal approach that included four strategies was implemented:

1. Education was used to provide the latest CPGs to prevent primary CVD. Computer-generated reminders, on paper, were introduced at point of care visits to alert HCPs about patients who had a diagnosis of dyslipidemia, HTN, and/or T2DM.
2. The Pooled Cohort equation was utilized to calculate at-risk patients 10-year estimated ASCVD risk factor. Once the ASCVD computer-generated calculation was obtained, the office staff printed out the calculation, wrote the patient’s medical record number in the upper right-hand corner then made it accessible to HCPs during point of care visits. An estimated ASCVD 10-year risk factor greater than or equal to 7.5 mg/dl on the PCE and an at-risk diagnosis alerted HCPs to prescribe a statin and/or aspirin, which is based on CPGs.
3. For the visual cues, copies of the CPG flowchart (Appendix B) were placed in each examination room as a quick reminder.

4. Patient charts of all three participants were audited and feedback was provided to HCPs on a weekly basis via letter format.

Participants and Setting

This project took place in a low-income urban walk-in clinic located in the Midwestern region of the United States. In this walk-in clinic, there are a total of six staff members. The staff members consist of three HCPs (one physician and two nurse practitioners), two medical assistants, and one office manager. Participants included in this evidence-based project consisted of a physician and two family nurse practitioners who have prescriptive authority. Participants excluded from this study are those who worked in the primary care office but, did not have prescriptive authority. Although the medical assistants were not participants in this EBP project, they played a vital role by collecting data from patient charts, inputting the data into the PCE at point of care visits, printing off the computer-generated PCE then placing it in the examination room on the computer for the HCP to obtain.

The physician had stated to others that he is comfortable with his daily practice and is not interested in following CPGs. The newest FNP has less than 3 years of experience and works closely with the physician. The other FNP has over 10 years of clinical experience but stated, “there is no time to read through CPGs.”

In 2018, it was projected that approximately 500 patients were seen per month (T.J. Harvey, personal communication, July 5, 2018). Many of the patients seen at the clinic have several comorbidities, which include dyslipidemia, HTN, T2DM, and obesity. Additionally, many are smokers. T. J. Harvey (personal communication, April 24, 2018) stated, “this is a great project and is necessary in this office.”

Outcomes

The targeted outcome was to improve compliance among HCPs with prescribing statins and/or aspirin for the primary prevention of CVD among at-risk adult patients. This recommendation was based upon the standards set forth by Fox et al., 2015; Stone et al., 2013;

Whelton et al., 2016; USPSTF (2016) in the CPGs. The PCE was utilized to calculate the 10-year ASCVD risk factor for patients who had a diagnosis of dyslipidemia, HTN, and/or T2DM, which assesses an individual's risk for a cardiovascular event. Adherence was determined by using chart audits, which were conducted before, during, and following the intervention.

Intervention

The interventions used in this project included a multi-modal approach, which encompassed four strategies: (a) education, (b) computer-generated reminders on paper, (c) visual cues, and (d) audit and feedback to assist in improving HCP compliance (i.e., prescribing statins and/or aspirin for the primary prevention of CVD. Education about the ACC/AHA (Stone et al., 2013, 2018), AHA/ADA (Fox et al., 2015) CPGs and the USPSTF (2016) to prevent primary cardiovascular disease among at-risk patients who had an ASCVD of greater than or equal to 7.5% was provided to HCPs, the medical assistants, and office manager. Education was also provided regarding how to utilize and where to locate the PCE on the AHA and ACC website. Demonstration by the PL and redemonstrations of completing the PCE was performed as part of the educational phase. This education was provided to the medical assistants and the office manager; however, the office manager stated, she would not be able complete any ASCVD risk factors because of her workload (S. Sams, personal communication, October 5, 2018).

Although evidence showed that best practice involves reminders embedded in the EMR, the affiliated hospital did not want to change the EMR system because organizational leaders believed a change in the EMR would interrupt HCPs workflow throughout the system. Therefore, computer-generated paper reminders were selected as the intervention. During point-of-care visits, the medical assistants collected patient data from their charts regarding ethnicity, gender, age, current blood pressure, LDL-C, high density lipoprotein (HDL), total cholesterol, history of T2DM, current, former or never a smoker and whether the patient is on a statin, aspirin, and/or blood pressure medication input this information into the PCE to calculate

the 10-year estimated ASCVD risk factors of at-risk patients. Once the estimated 10-year ASCVD risk factor calculations were generated from the computer utilizing the PCE from the AHA or ACC website, the medical assistant printed the results. To ensure that calculations was made quickly, the PCE remained open on computers. The medical assistant who performed the PCE wrote the patient's medical record number, as the patient identifier, in the upper right-hand corner of the paper. The printed calculation informed the HCPs that a patient's ASCVD risk is greater than or equal to 7.5 mg/dl.

When at-risk patients were taken to the examination room by the medical assistant, the printed computer-generated calculation was placed on the computer in the patients' examination room; however, at times it was placed in the box outside of the patients' examination room for the HCP to access and review. By providing the computer-generated PCE calculations, the paper reminder was readily available to HCPs, when they provided care, thereby increasing the likelihood that preventative medication was initiated.

To ensure visibility of the CPG, the PL placed copies the CPG flowsheet (Appendix B) in each examination room. The flowcharts served as a quick reminder of the CPGs. The flowsheets provided information to HCPs regarding how to follow the recommended CPGs for at-risk patients with an ASCVD greater than or equal to 7.5%.

To provide feedback, the project leader performed weekly chart audits. Weekly chart audits included randomly selecting five patients from each of the HCPs and evaluating compliance rates among HCPs. Aggregated data regarding compliance or issues with initiating a statin and/or aspirin were presented to the HCPs with a weekly feedback letter because the HCPs were never in the office together. Monthly lunches were provided to the staff as a celebration of short-term goals. During the monthly lunches, verbal feedback was provided about the progression of the project. Since all HCPs are not in the office on the same day, the PL went to the office on physician days to buy the physician lunch, but lunch was refused because of the number of patients.

Planning

The PL discussed the idea of conducting a project about prescribing statins to T2DM patients to the project liaison in April of 2018. The PL noticed several patients who came into the office with T2DM and were not prescribed a statin or an aspirin. The project liaison stated that the EBP practice topic was necessary in this clinical setting. While completing a pilot chart audit in August 2018 to evaluate if conducting an EBP project about prescribing T2DM patients a statin and/or aspirin, it was noted that patients who were diagnosed with dyslipidemia and HTN also did not have a statin or aspirin prescribed as recommended by the evidence-based CPGs. Evaluating the pilot data, the PL noticed that more patients with T2DM were prescribed a statin. Communication occurred between the PL and the liaison about T2DM and statins. The project liaison informed the PL that insurance companies were now sending correspondences to the office as a reminder to HCPs to prescribe a statin to all T2DM patients. The PL and the project liaison then discussed completing the EBP project about prescribing statins and/or aspirin to patients who were diagnosed with dyslipidemia, HTN, and T2DM.

The PL then communicated with the physician in the office about conducting this EBP project in the office; however, all details were not revealed because the PL did not want to introduce bias or the Hawthorne effect. The PL found after several literature searches about the best evidence for HCP to comply to CPGs was prompts in the EMR system. After the approval was given by the physician, the PL communicated face-to-face and email correspondences with several individuals at the affiliated hospital about incorporating an EMR alert system into the current electronic database for the medical assistants to complete for each at-risk patient's during triage. Later, the PL was informed by individuals at the affiliated hospital that changes to the EMR was unable to be made for this EBP project because it would disrupt HCP flow in the office and the changes could not be made for one office.

After rejection of computer prompts in the EMR system by the affiliated hospital, the PL searched the literature to find the next best option for HCP to adhere to CPGs. The next best

option found in the literature was computer-generated alerts printed on paper as reminders for HCP to adhere to CPGs. Interventions about audit and feedback were also discovered in several research articles during the literature search. The PL decided to perform weekly chart audits about the HCPs compliance with prescribing a statin and/or an aspirin to at-risk patients based on the research articles read. The PL discussed with the medical assistants and the office manager that an EBP project was going to be performed at this urban walk-in clinic. The PL informed the medical assistants and office manager that their help was going to be needed to complete this project. All parties agreed to assisting with the EBP project. After deciding which appraisal tool, change theory, and EBP model to guide this EBP project, the PL sent email correspondences to Johns Hopkins and John Kotter for permission to utilize their information for this EBP project. Permission was not needed from the ACC and AHA to use their information for this EBP project.

The PL created a PowerPoint presentation to educate the HCPs, medical assistants, and office manager about the urgent need of the EBP project in this clinic. The PL taught the medical assistants and the office manager how to obtain the PCE to calculate the 10-year ASCVD risk factor using the website. The PL explained that their roles in this EBP project was the gatekeepers.

Data

Data were collected before, during, and after the intervention. Chart audits included patient data to evaluate HCPs adherence to prescribe a statin and/or aspirin if patients had a diagnosis of dyslipidemia, HTN, and/or T2DM and were ages of 40-75 and never had a cardiovascular event which included stroke or open-heart surgery. The patient's medical record number was utilized as a patient identifier; however, only the PL and academic advisor had access to this. It is important to note that age and gender information were necessary in the PCE to obtain patients 10-year ASCVD risk factor. All data were placed in an Excel spreadsheet then transferred to SPSS version 22.

To be compliant with confidentiality rules and Healthcare Insurance Portability and Accountability Act (HIPPA), after point of care visits paper reminders were placed in a manila folder by the office managers desk or in the physicians' outbox. Computer-generated paper reminders placed in the physician outbox were then retrieved by the PL or the medical assistants then placed in a manila folder, which was kept at the front desk. The PL collected the computer-generated reminders which displayed patients 10-year ASCVD risk factor on a weekly basis. The computer-generated reminders are locked in a file drawer in the PL's home. Data typed in the Excel spreadsheet on the PL's computer were and continue to be password protected and saved on a universal serial bus (USB) flash drive which was and continues to be kept in a locked file drawer. At the end of the project, the computer-generated paper reminders and chart audit data will continue to be kept in a locked filed drawer in the PL's home until the time limit has been reached for it to be destroyed. The PL and EBP project advisor are the only people who had access to the data.

Measures and their Reliability and Validity

The PCE was used to measure a patient's ASCVD 10-year estimated risk factor which tells patients risk for primary CVD. The PCE can be located on the AHA or ACC website: http://static.heart.org/riskcalc/app/index.html#!/baseline-risk or http://tools.acc.org/ascvd-risk-estimator-plus/#!/calculate/estimate/. The PCE is a reliable and valid tool to obtain patients 10-year estimated ASCVD risk factor as evidenced by a c-index of 0.82 in women (95% CI: 0.78-0.86) and 0.74 (0.71-0.78) in men. Although validity was provided for the PCE, recalibration improved the equations performance using the Hosmer-Lemeshow *Chi*-square, which resulted in scores of 23.8 in women and 56.7 in men (Khalili et al., 2015). Emdin et al. (2016) and Khalili et al. (2015) postulated that although the PCE is valid but it still has flaws. The equation overestimates a patient's risk of CVD by 57% in women, 48% in men (Khalili et al., 2015) and 167% overall (Emdin et al., 2016). However, the ACC/AHA (Stone et al., 2013) CPG

recommends the use of the PCE, as it has been successfully used in many national and international studies over time (Fox et al., 2015; Garza et al., 2017; Stone et al., 2013).

Data Collection

When the PL piloted this study, 100 patient charts were audited to assess the project's feasibility. The PL recognized that out of the 100 charts audited, 18 patients met the criteria of having T2DM and a 10-year ASCVD risk factor of greater than or equal to 7.5% for the initially planned EBP project. It was presumed that there was low number of T2DM patients identified, who met the criteria during chart audits, because insurance companies began sending reminders into the office for HCPs to initiate statins for diabetic patients (T.J. Harvey, personal communication, July 24, 2018). Recognizing the low number of T2DM patients, who met this EBP project's criteria, the project leader decided to collect additional data. Patients who were diagnosed with dyslipidemia, HTN, and/or T2DM and were not prescribed a statin and/or aspirin were included in the study. Ultimately, the PL shifted the focus of this EBP project to include all patients who are at-risk (i.e., who present with dyslipidemia, HTN, and/or T2DM diagnosis) for primary CVD.

The PL performed the pre-intervention chart audits during the Fall of 2018 semester, after IRB approval was granted. The PL randomly selected 100 patient charts for audit during the pre-intervention phase of this EBP project. During the audit process, the PL evaluated HCPs adherence to prescribing a statin and/or aspirin in patients ages 40-75 years old who presented with a diagnosis of dyslipidemia, HTN, and/or T2DM. During the implementation phase of the intervention, chart audits occurred weekly. The PL randomly selected five patient charts of each of the HCPs in the office. Aggregated data were provided to HCPs to provide feedback about adherence to the EBP project. During post-intervention, the PL randomly selected 100 patient charts to audit to evaluate if the HCPs are continuing to follow the CPGs by prescribing a statin and/or aspirin in patients at-risk for the prevention of primary CVD.

Sample

The sample for this EBP project included three participants. The participants included one physician and two FNPs who had prescriptive authority. Although, the HCP were the focus of this EBP project patient charts were audited to evaluate HCP compliance with prescribing a statin and/or aspirin to at-risk patients. Patient charts audit included patients who were 40-75 years of age and had been diagnosed with dyslipidemia, HTN, and T2DM. For the project, 300 charts were audited. However, not all patients met the inclusion criteria. For example, audits showed that some patients had an ASCVD of less than 7.5 were not prescribed statins or aspirin, which although compliant with the CPGs, was not the focus of the PICOT question. After removing patients who did not meet the inclusion criteria, 243 patient charts were included in the final sample.

Management and Analysis

Data, obtained through chart audits, was initially entered in an Excel spreadsheet then transferred to SPSS software (Version 22). Descriptive statistics were calculated to describe the frequency of the patient chart sample characteristics. These characteristics are detailed in Table 4.1. The PL utilized a cross tabulation *Chi*-square test to analyze the compliance rates of HCP with prescribing statins and/or aspirin to patient with the risk factors of an ASCVD greater than or equal to 7.5%, dyslipidemia, HTN and T2DM (See Table 4.2 and see Figure 4.1 for details). Secondary outcomes about HCP prescription preference and how many patients received a statin only, aspirin only, both, or none based on risk factors are discussed in Chapter 5. Frequencies were calculated to assess the number of comorbidities that were plaguing the HCPs and patients at this walk-in clinic. Details about these incidental findings are discussed in Chapter 5.

Protection of Human Subjects

Expedited IRB approval was obtained through the Methodist Hospitals, Inc. and Valparaiso University. The PL created a proposal summary and completed the IRB for project approval by Valparaiso University. The PL was initially informed by an individual at the affiliated

hospital that IRB was not needed because the EBP project was not research. The PL continued to question the need for IRB at the affiliated hospital until the PL found out that IRB approval was necessary. The PL then completed the IRB approval for the affiliate hospital. The initial IRB for Valparaiso University and the affiliated hospital was returned for revising. The IRBs for both entities was revised and sent back. In approximately the middle to end of September the IRB for both entities was approved.

The PL created a consent form (Appendix C) for the three participants (the one physician and two HCPs) to sign for participation in this EBP project. This EBP project began the first week in October 2018, in which the PL was in the office the entire week to answer questions and assure project initiation was a smooth transition. The PL implemented this project in the Fall of 2018 and completed in March of 2019 (see Table 3.1 and 3.2 for the Actual Timeline).

On a weekly basis, the PL collected the paper reminders, which were placed in a manila folder located at the front desk. These paper reminders were put into the manila folder after point of care visits by the medical assistants or they removed them from the physician's outbox. To protect participants, the PCE with patients 10-year ASCVD risk factor was locked in a file drawer, which is located in the PLs' home. Data typed into the Excel spreadsheet, located on the PL's computer, are password protected and saved on a USB flash drive. The USB is kept in a locked file drawer located in the PL's home office. At the end of the project, the paper reminders and chart audit data will be kept in the PL's home in a locked file drawer. The project leader and EBP project advisor were the only people who had access to the data collected for this EBP project.

Table 3.1

Actual Timeline Fall 2018

Fall 2018 Semester Weeks	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Empirical Phase																
1. IRB approval	X	X	X	X	X											
2. Pre-intervention data collection							X	X								
3. Staff education								X								
4. Intra-intervention data collection									X	X	X	X	X	X	X	
Fall 2018 Semester Weeks	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

Table 3.2

Actual Timeline Spring 2019

Spring 2019 Semester Weeks	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Empirical Phase continued																
4. Intra-intervention data collection continued				X	X	X										
5. Post-intervention data collection							X	X								
Analytical Phase																
1. Entering data in SPSS					X	X	X	X	X							
2. Data Analysis									X	X						
3. Interpretation of results										X	X					
4. Abstract preparation					X	X										
5. Poster development								X	X	X	X					
6. Finalizing paper									X	X	X					
Dissemination Phase																
1. Discussing project results with stakeholders								X								
2. Develop project improvements recommendations									X							
3. Hand-off plan									X							
4. Biography preparation		X	X	X												
5. Abstract preparation					X	X										

6. Poster preparation								X	X	X	X					
7. Presentations/reports												X	X			
8. Utilization of findings													X	X		
Spring 2019 Semester Weeks	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

CHAPTER 4

FINDINGS

Research has an imperative place in nursing. Through critical thinking and scholarly writing, research leads DNP prepared nurses to conduct EBP projects which can be used to improve the health of patients. The purpose of this EBP project was to alter standard practice among HCPs, thereby improving adherence to CPGs for prescribing a statin and/or aspirin among patients who have been diagnosed with dyslipidemia, HTN, and/or T2DM and have a 10-year ASCVD risk factor of greater than or equal to 7.5%, thereby potentially preventing primary CVD in these at-risk patients. The PICOT question that guided this study is, "For healthcare providers in a primary care setting, does incorporating a multi-modal approach that involves education, computer-generated paper reminders at point of care, visual cues, and ongoing feedback about prescribing performance improve the initiation of medication therapy for the prevention of primary CVD in at-risk adult patients over a 7-week period?"

The interventions for this project included a multi-modal approach that included four strategies:

1. Education was used to provide the latest CPGs to prevent primary CVD and about how to create computer-generated paper reminders for at-risk patients.
2. The PCE was utilized to calculate at-risk patients 10-year estimated ASCVD risk factor. Once the ASCVD computer-generated calculation was obtained, the office staff printed out the calculation, wrote the patient's medical record number in the upper right-hand corner then made it accessible to HCPs during point of care visits.
3. For the visual cues, copies of the CPG flowchart were placed in each examination room as a quick reminder.
4. Feedback was provided to HCPs on a weekly basis via letter format.

Participants

Size. Participants included in this EBP project included one physician and two nurse practitioners who have prescriptive authority. Descriptive characteristics for the participants include one male and two females. To preserve anonymity, no further descriptive characteristics will be provided.

To measure the outcome, the initial sample included 285 patient charts which were audited during the EBP project. After assuring that patients included in the audit met the inclusion criteria, the final sample consisted of 234. There were 76 of pre-intervention patient charts, 75 charts audited during the intervention, and 83 charts from the post-intervention audit.

Characteristics. Data were collected about the three HCPs who had prescriptive authority regarding their prescribing a statin and/or aspirin in patients at-risk for primary CVD. Aggregated data will be reported to protect anonymity. Data collected during the patient chart audits included medical record number, gender, age, race, total cholesterol, LDL-C, HDL cholesterol, if the patient is currently taking a statin and/or aspirin, the patient's current blood pressure, presence of a diagnosis of diabetes, if the patient is currently being treated for HTN, and whether the patient is a current, former, or has never smoked. These data were necessary for the PCE to calculate ASCVD risk factor.

Chi-square tests were used to determine if there were any statistically significant differences between the pre-intervention, implementation and post-intervention groups on the variables of gender and race. Results showed that there were no statistically significant differences between the intervention groups on these variables.

The ages of patients ranged from 40 to 75, with an average of 58.21 years and a SD of 7.873 years. There were more females (65%) compared to males (35%). The sample was primarily African American (98.7%), with two Caucasians (0.9%), and one Hispanic/Latino (0.4%). Eighty-nine (88.9%) percent of patients had an ASCVD greater than or equal to 7.5 percent, (92.7%) had a diagnosis of hyperlipidemia, (88.9%) were taking HTN medication, and (52.6%) had a diagnosis of which required a statin and/or aspirin to be prescribed (Table 4.1).

Table 4.1

Patient Chart Audit Sample Characteristics

Variable		Pre-intervention (n = 76)	Implementation (n = 75)	Post-Intervention (n = 83)	Total (n = 234)
Age Mean(SD)		56.87(8.646)	58.09(6.919)	59.55(7.814)	58.21(7.873)
Gender					
	Female	49(64.5%)	47(62.7%)	56(67.5%)	152(65%)
	Male	27(35.5%)	28(37.3%)	27(32.5%)	82(35%)
Race					
	Black	76(100%)	72(96%)	83(100%)	231(98.7%)
	Caucasian	0(0%)	2(2.7%)	0(0%)	2(0.9)
	Hispanic	0(0%)	1(1.3%)	0(0%)	1(0.4%)
Risk Factors*					
	ASCVD	65(85.5%)	71(94.7%)	72(86.7%)	208(88.9%)
	Dyslipidemia	68(89.5%)	73(97.3%)	76(91.6%)	217(92.7%)
	HTN	70(92.1%)	66(88.0%)	72(86.7%)	208(88.9%)
	T2DM	42(55.3%)	33(44.0%)	48(57.8%)	123(52.6%)

*Includes comorbidities

ASCVD. A patient's 10-year ASCVD is based on a patient's gender, age, race, total cholesterol, LDL-C, HDL cholesterol, if the patient is currently taking a statin and/or aspirin, the patient's current blood pressure, if the patient has a diagnosis of diabetes, is currently being treated for HTN and whether the patient is a current, former, or have never smoked. After the patient's data is input into the PCE, the 10-year ASCVD is obtained. Stone et al. (2013) state that patients who have an ASCVD of greater than or equal to 7.5% should be started on a statin; while the USPSTF (2016) recommends starting a statin and/or aspirin in patients who have an ASCVD greater than or equal to 10%. Descriptive statistics were used to determine the frequency and percentage of patients who had an ASCVD score greater than or equal to 7.5%. The results revealed 208 out of 234 (89%) patients had a 10-year ASCVD risk factor that met the criteria for this EBP project (Table 4.1). Results also revealed that 172 (73.5%) patients had a 10-year ASCVD risk factor greater than or equal to 10%.

Dyslipidemia. High cholesterol was determined using an if statement to filter patients who had a LDL-C greater than or equal to 70. Patient who had a LDL-C greater than or equal to 70 mg/dl have a diagnosis of dyslipidemia. Based on this criterion, the frequency of dyslipidemia was 217 out of 234 (92.7%) patients (Table 4.1).

Hypertension. Clinical practice guidelines suggest patients who have a diagnosis of HTN and an ASCVD greater than or equal to 10% should be treated appropriately with antihypertensive medication(s) and started on a statin (Wheaton, 2016). Descriptive statistics were used to determine the number of patients being treated for HTN. Eighty-nine percent (n = 208) was revealed to be receiving HTN treatment (Table 4.1).

Type II Diabetes. A history of T2DM was determined by auditing patient charts of the three providers for this EBP project. Descriptive statistics were used to determine the number of patients who had a diagnosis of T2DM. Nearly 53% (*n* = 123) of the patients were diagnosed with T2DM treatment (Table 4.1).

Changes in Outcomes

The primary question for this project was based on HCP compliance with prescribing a statin and/or aspirin to patients who had a diagnosis of dyslipidemia, HTN, and/or T2DM and an ASCVD greater than or equal to 7.5%. Findings show that there were improvements from the pre-intervention phase to the implementation phase, while a slight decrease was noted from the implementation phase to the post-intervention phase. The secondary outcomes examined include the pattern of prescribing statins and/or aspirin, as well as comorbidities.

Primary Outcome: Compliance with CPGs.

During pre-intervention phase, data showed that the HCPs were compliant with prescribing a statin or aspirin for 47.4 % (*n* = 36) of the patients and non-compliant with 52.6% (*n* = 40) of the patients (Table 4.2). During the intervention, compliance increased nearly 20% with a compliance rate of 66.7% (*n* = 50). Post-intervention data revealed a slight drop in compliance to 63.9% (*n* = 53). Overall, HCPs were prescribing according to the CPGs for 59.4% (*n* = 139) of the patients (Figure 4.1).

Because compliance was measured as a nominal level variable, a cross tabulation *Chi*-square was computed to determine if there was statistically significant improvement (Cronk, 2018). Results showed a combined statistically significant improvement between all phases for compliance ($X^2 = 6.887$, $df = 2$, $p = 0.032$) (Table 4.3).

Secondary Outcomes: Prescribing Trends.

Secondary analysis for this EBP project focused on the prescribing preferences of the HCPs and the prevalence of comorbidities. According to this EBP project prescribers could prescribe a statin, aspirin, or both to at-risk patients. Descriptive statistics show there was a slight increase for prescribing statins and aspirin as the project progressed (Table 4.4). Fifty-five (23.6%) patients were prescribed a statin; while 34(14.5%) patients were prescribed an aspirin, 47(20%) were prescribed combination therapy of a statin and aspirin and 98(41.9%) of patients were not prescribed any medication therapy (Figure 4.2).

Table 4.2

Compliance/Non-compliance

Variable	Pre-intervention (n = 76)	Implementation (n = 75)	Post Intervention (n = 83)	Total (n = 234)
Compliant	36(47.4%)	50(66.7%)	53(63.9%)	139(59.4%)
Non-compliant	40(52.6%)	25(33.3%)	30(36.1%)	90(38.5%)

Figure 4.1 HCP Compliance with Prescribing Statin and/or Aspirin

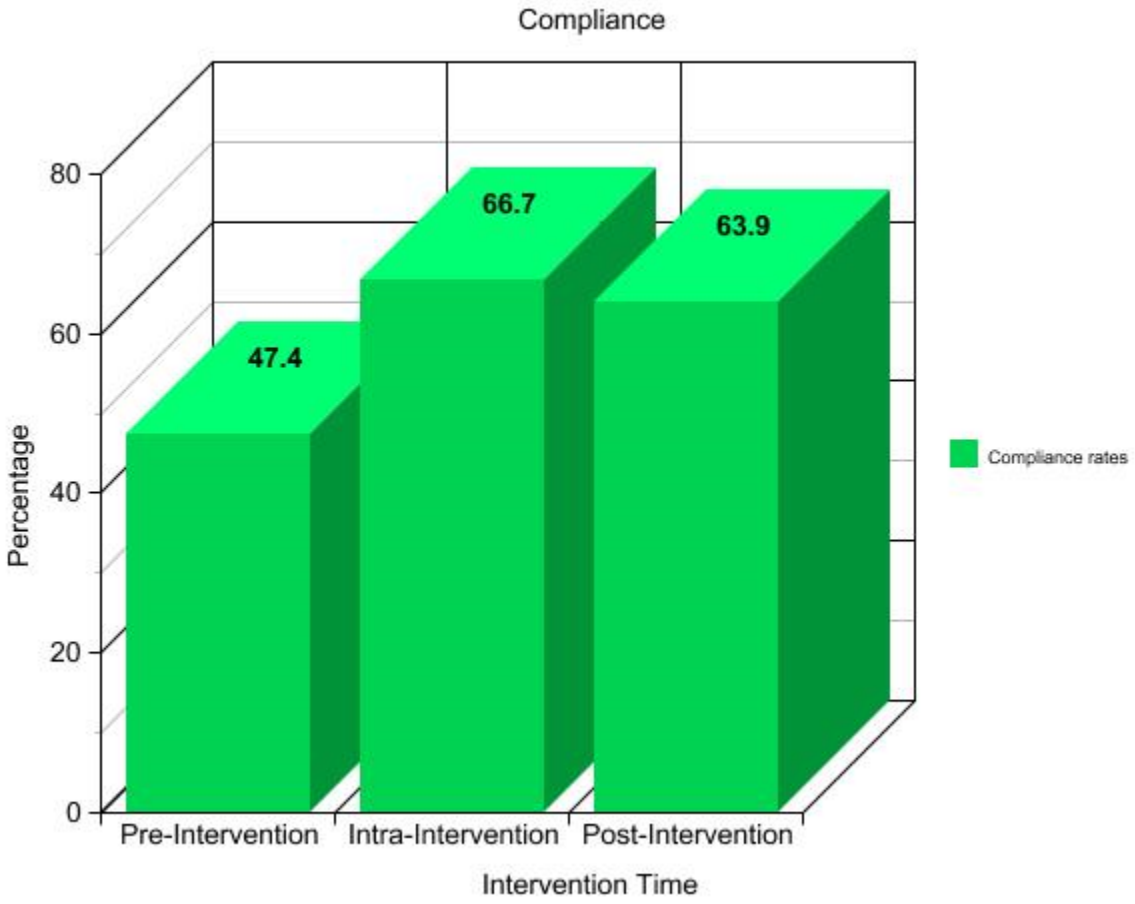


Table 4.3

Compliance Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	6.887[a]	2	.032

Table 4.4

Prescribing Trends

	Pre-intervention (*n* = 76)	Implementation (*n* = 75)	Post-intervention (*n* = 83)	Total (*n* = 234)
Statin	13(17.1%)	21(28.0%)	21(25.3%)	55(23.5%)
Aspirin	10(13.2%)	12(16.0%)	12(14.5%)	34(14.5%)
Combined	15(19.7%)	13(17.3%)	19(22.9%)	47(20%)
None	38(50.0%)	29(38.7%)	31(37.3%)	98(41.9%)

Figure 4.2 Prescription Preferences

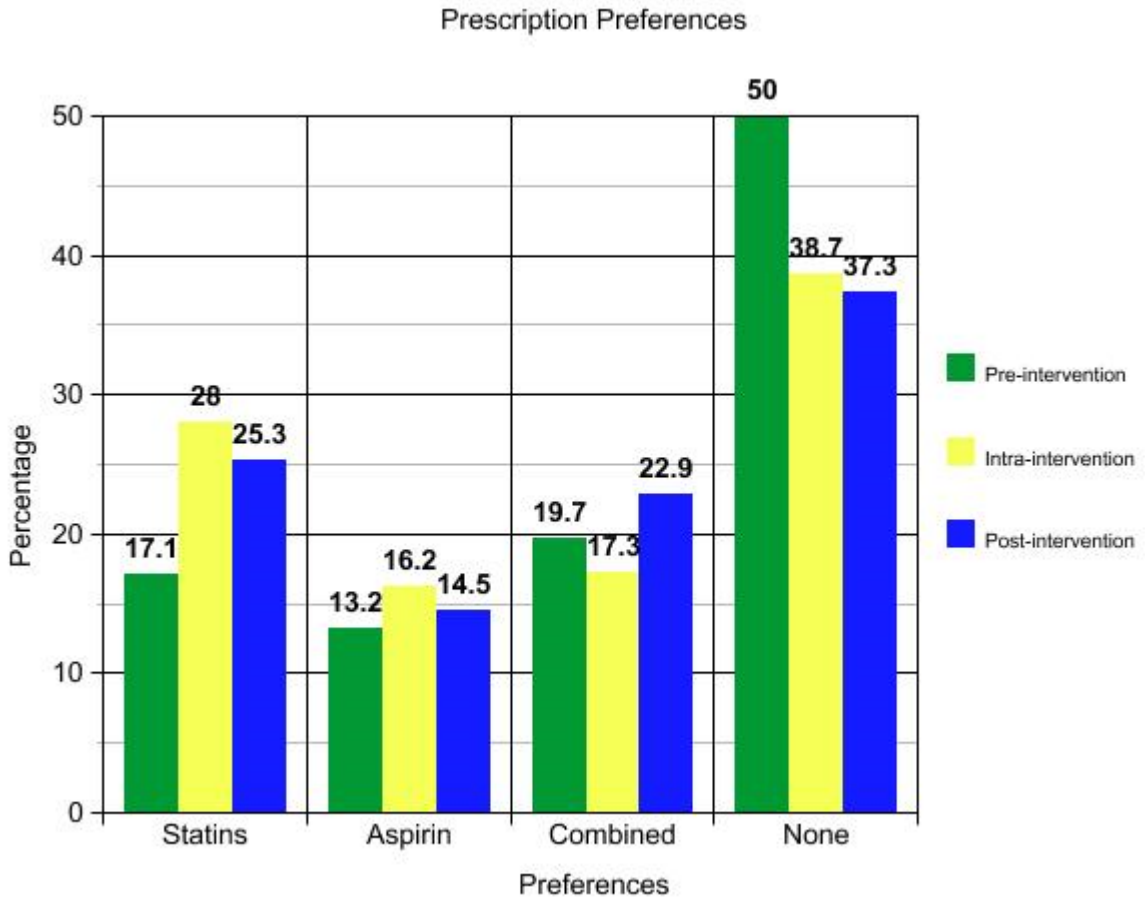
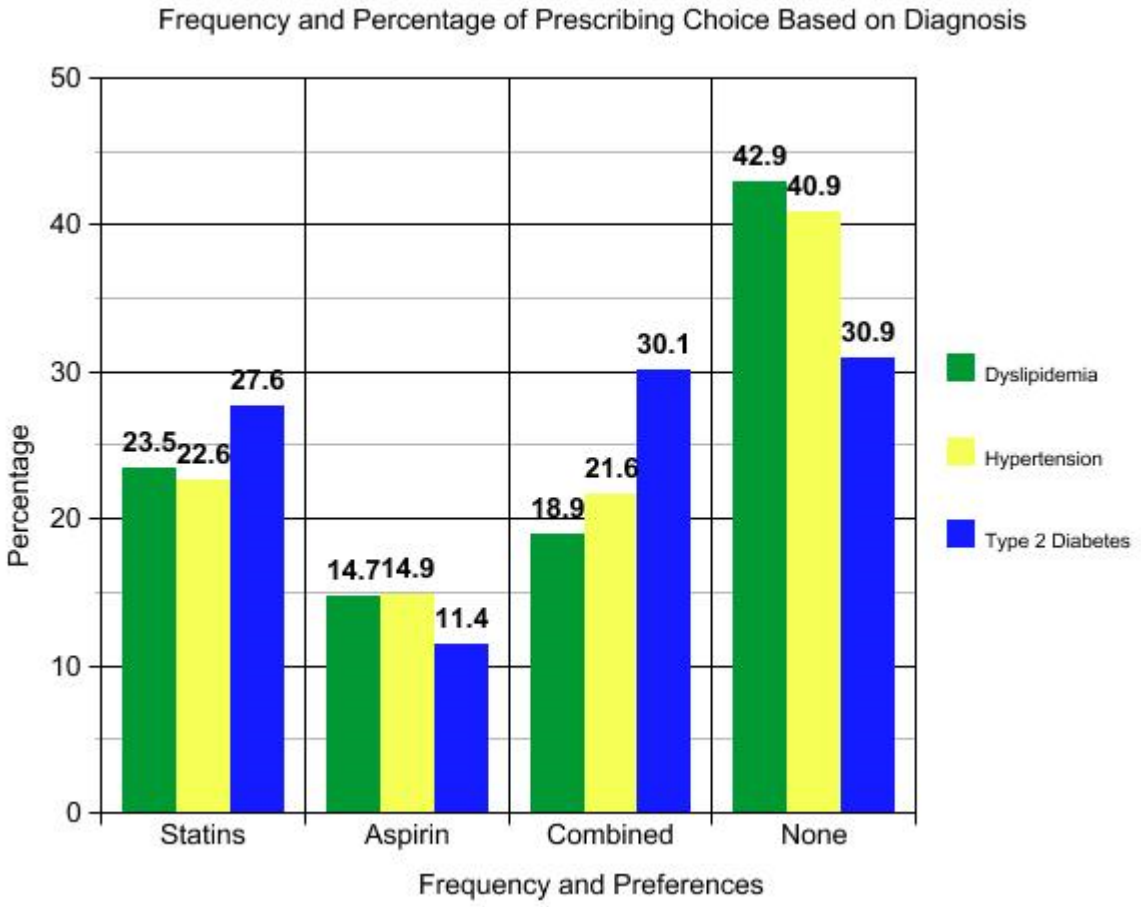


Table 4.5

Frequency and Percentage of Prescribing Choice based on Diagnosis

	Dyslipidemia (*n* = 217)	Hypertension (*n* = 208)	T2DM (*n* = 123)
Statin	51(23.5%)	47(22.6%)	34(27.6%)
Aspirin	32(14.7%)	31(14.9%)	14(11.4%)
Combined	41(18.9%)	45(21.6%)	37(30.1%)
None	93(42.9%)	85(40.9%)	38(30.9%)

Figure 4.3 Frequency and Percentage of Prescribing Choice based on Diagnosis



Descriptive statistics were used to breakdown HCP prescription preference for each at-risk category used for this project to prevent primary CVD. Prescription preference include statin only, aspirin only or a combination of both based on patient's diagnosis and ASCVD risk factor.

Dyslipidemia. Stone et al. (2013) recommends initiating a statin in patients who have a primary LDL-C of 190mg/dl with no 10-year ASCVD risk factor or patients who have an LDL-C greater than or equal to 70 mg/dl through less than or equal to 189 mg/dl with a 10-year ASCVD risk factor greater than or equal to 7.5%. Dyslipidemia was analyzed using descriptive statistics about patients whose chart audits revealed 217 had a LDL-C greater than or equal to 70mg/dl (Table 4.5). Analysis of HCPs prescription preference revealed that 51(23.5%) were patients treated with statin alone, 32(14.7%) aspirin alone, and 41(18.9%) treated with a statin and aspirin; while 93(42.9%) of patients with dyslipidemia did not receive appropriate medication therapy (Figure 4.3).

Hypertension. Whelton et al. (2018) and Arnett et al. (2019) recommend initiating statin therapy in patients who have a diagnosis of HTN and a 10% or greater 10-year ASCVD risk factor. Descriptive statistics revealed 208 patients were being treated for HTN. Thirty-seven (22.6%) patients in this diagnosis category were treated with a statin only, 31(14.9%) patients received an aspirin only, and 45(21.6%) patients were prescribed both a statin and an aspirin regimen; while 85(40.9%) did not receive either medication therapy. Table 4.5 and Figure 4.3 display the frequency and percentage of prescribing choice based on diagnosis.

Type II Diabetes Mellitus. Stone et al. (2013) recommended that patients who have a diagnosis of T2DM and a 10-year ASCVD risk factor of greater than or equal to 7.5% should be prescribed a moderate or high intensity statin. Data showed 123 patients had diagnosis of T2DM. Of these, 34(27.6%) patients were prescribed statins, 14(11.4%) of the patients were prescribed aspirin, and 37(30.1%) patients received a combined treatment regimen of a statin and an aspirin; while, 38(30.9%) of patients with T2DM did not receive appropriate medication.

Table 4.5 and Figure 4.3 displays the frequency and percentage of prescribing choice based on diagnosis.

Instrument Reliability and Validity

The reliability and validity of the PCE instrument has been established (Emdin et al., 2016 and Khalili et al., 2015). Cronk (2018) states instruments must be tested for reliability before determining validity. Validity of the PCE was tested using the Pearson correlation. A Pearson correlation was calculated examining the relationship between patient's ASCVD and HCP compliance. No correlation was found ($r = -0.079$, $p > 0.01$). See Table 4.6 for the validity correlation table.

Significance

Significance and interpretation of the results is vital to determine whether implementation of the EBP project successfully changed practice. There was a statistically significant improvement in HCP compliance to prescribing a statin and/or aspirin in patients who were diagnosed with dyslipidemia, HTN, and/or T2DM. Descriptive statistics were calculated regarding statin and aspirin prescribing throughout this EBP project. Statistics showed improved HCP compliance with prescribing both statins and aspirin as the project progressed. Data did not show a provider preference for either statins or aspirin.

Table 4.6
Validity Correlations

		What is the patients ASCVD?	Is the provider compliant?	Is the patient currently on a statin?	Is the patient currently taking aspirin?
What is the patient's ASCVD?	Pearson Correlation	1	-.079	-.097	-.074
	Sig. (2-tailed)		.231	.137	.260
	N	234	234	234	234
Is the provider compliant?	Pearson Correlation	-.079	1	.727**	.492**
	Sig. (2-tailed)	.231		.000	.000
	N	234	234	234	234
Is the patient currently on a statin?	Pearson Correlation	-.097	.727**	1	.212**
	Sig. (2-tailed)	.137	.000		.001
	N	234	234	234	234
Is the patient currently taking aspirin?	Pearson Correlation	-.074	.492**	.212**	1
	Sig. (2-tailed)	.260	.000	.001	
	N	234	234	234	234

**. Correlation is significant at the 0.01 level (2-tailed).

CHAPTER 5

DISCUSSION

Doctor of nursing prepared nurses demonstrate expertise when evaluating EBP projects by discussing statistical significance and providing recommendations for future implications. This provides information for future EBP projects and evidence-based bedside care. Providing insights about the framework, strengths, and limitations about the current project saves time for future nurses who to attempt a different path. The purpose of this EBP project was to alter standard practice among HCPs, thereby improving adherence to CPGs for prescribing a statin and/or aspirin among patients who have been diagnosed with dyslipidemia, HTN, and/or T2DM and have a 10-year ASCVD risk factor of greater than or equal to 7.5%, thereby potentially preventing primary CVD in these at-risk patients. It answers the PICOT question: "For healthcare providers in a primary care setting, does incorporating a multi-modal approach that involves education, using computer-generated paper reminders at point of care, visual cues, and ongoing feedback about prescribing performance improve the initiation of medication therapy for the prevention of primary CVD in at-risk adult patients over a 7-week period?" This chapter presents a culmination of this EBP project.

Explanation of Findings

Primary Outcome

Data analysis showed there was a statistically significant increase ($X^2 = 6.887$, $df = 2$, $p = 0.032$) in the prescribing of a statin and/or aspirin in at risk patients when using a multi-modal approach for prescribing a statin and/or aspirin in at-risk patients. There was a nearly 20% increase with HCPs prescribing statins and/or aspirin in at-risk patients from the pre-intervention phase to the implementation phase of this EBP project. However, a slight decrease was noted with compliance prescribing a statin and/or aspirin from the intra-intervention phase 66.7% compliance to the post-intervention phase 63.9% compliance. These findings are congruent with

findings of a previous study completed by Arditi et al. (2017) showing that computer generated reminders delivered on paper moderately improved CPG compliance; however, the authors did not report if improvement continued during the post-intervention phase of any of the research they reviewed. Fiks et al. (2015) reports that 11% of HCPs who used the CDS tool during the implementation phase trial period did not use it afterwards. These findings are congruent with this EBP project in that there was slight drop in adherence rates from the implementation phase to the post-intervention phase.

It has been shown that when computer reminders are combined with other interventions, slight improvements with the adherence continued to improve when computer reminders are used (Shojania et al, 2009). Even more improvements were noted when hard stops are used in the ERM system (Shojania et al., 2009). When reminders are placed in computer systems, CPG adherence will increase (Zahanova et al., 2017). When general practitioners used the electronic optional guidelines as a tool to refer patients to specialize care continued to use it during the evaluation phase (Rokstad et al., 2013); however it has also been suggested that highlighted printed reminders were unsuccessful in improving HCPs responsiveness (Hendrix et al., 2015). These results are not congruent with the findings from this EBP project because there was an increase in compliance when using the paper reminders combined with other cues.

In this EBP project, the issue with using the recommended best practice of computer reminders was an organizational barrier. If computer reminders could be placed in the EMR system, with or without hard stops, higher compliance rates with CPGs may have been achieved. This approach would have eliminated reliance on medical assistants, who were resistant to the added responsibility of completing the PCE. The prompt would have automatically filled in all the data necessary to run the PCE and provided HCPs with patients 10-year ASCVD risk factor.

Despite not using computer prompts, the improvement of compliance with CPGS by HCPs from the pre-intervention phase to the implementation phase are primarily attributed to the multi-modal intervention. However, there are some other factors that could also explain the increased compliance. For example, the project liaison is an employee at the project site and was very supportive when resistance to completing the PCEs was met. The PL taught the project liaison how to complete the PCEs; however, it is uncertain if the project liaison began completing the PCEs for patients encountered. The PL was present at the project site more often to ensure patients who met the requirements for having PCEs completed and given to the HCP were complete. The PL also helped performed PCEs and provide them to the HCPs to ensure successful implementation of the this EBP project.

While there was a slight drop in compliance from the intervention phase (66%) to the post-intervention phase (63%). Some other factors that could explain this drop include: (a) lack of oversight by the PL, (b) disagreement with CPGs, (c) non-compliance by patients because of medication side effects, (d) HCP not appreciating statins because of side effects, and (e) prescribing contraindications based on patient factors. Despite the slight drop, compliance during the post intervention phase remained well above the pre-intervention phase (46%). This provides evidence that the multi-modal intervention had some lingering effect on the prescribing compliance of the HCPs.

Secondary Outcomes

Prescribing trends. The secondary outcome focuses on the prescribing trends of HCPs. The PL calculated the prescribing trends of HCP for the prevention of primary CVD in at-risk patients. Prescribing of statins, aspirin, or both by the HCPs slightly increased from pre-intervention to post-intervention. However, it was noted, there was no difference in prescribing preferences between the pre-intervention, implementation, or post-intervention phase related to statin, aspirin, or both (Table 4.4).

Comorbidities. The incidental findings question for this EBP project was "how many patients in the clinic where this EBP project was conducted and whose charts were audited had multiple co-morbidities?" The purpose of this question was two-fold: (a) to compare this data to the national and state average, and (b) to evaluate the need for future DNP projects to be performed in the community. When considering these purposes within the context of this EBP project, it is important to keep in mind that patients in the sample were primarily African American.

Dyslipidemia, HTN and T2DM are risk factors for primary cardiovascular disease (CDC, 2012, 2017; Healthy People 2020, 2014). Oftentimes, HCPs care for patients who have multiple co-morbidities. In this EBP project, 38% (n = 89) of patients had a diagnosis of dyslipidemia, HTN, T2DM and an ASCVD greater than or equal to 7.5%. Forty-one percent (n = 96) of patients had a diagnosis of HTN, T2DM and an ASCVD greater than or equal to 7.5%. While, 43% (n = 101) had a diagnosis of dyslipidemia, T2DM and an ASCVD greater than or equal to 7.5%. Seventy-six percent (n = 178) had a diagnosis of dyslipidemia, HTN and an ASCVD greater than or equal to 7.5%. Although there appears to be an alarming number of patients at this project site with multiple co-morbidities that can lead to further health complications it is misleading because the population chosen were patients with a history of dyslipidemia, HTN, and T2DM. It is important to note that, although data is reported about individuals with dyslipidemia, HTN, and T2DM, selection bias exists in this EBP project. No data exist that depicts the national or states level of individuals with multiple comorbidities.

Health disparities. Data from this EBP project shed light on the urgency to prevent primary cardiovascular disease in these at-risk patients, most all of whom were African American. In a survey conducted by the CDC (2017d) health disparity was measured by asking patients if they had ever been informed by their HCP that they had one of the risk factors for primary CVD.

Dyslipidemia. Health disparity data collection was conducted by asking patients if they had ever been informed by their HCP that they had one of the risk factors for primary CVD (CDC, 2017b). According to the America's Health Rankings (2018a), in 2018 there was a decrease in the number of individuals who were diagnosed with dyslipidemia in the US (34.1%) and in Indiana (33%). Dyslipidemia was noted to increase with age nationally and in Indiana. Approximately 41% of individuals ages 45-64 in the U.S. and 41.7% of those in Indiana have a diagnosis of dyslipidemia; while those 65 and over 51.7% in the US and 54.1% in Indiana. African American rank number three 30.8% US and 28.5% in Indiana for being diagnosed with dyslipidemia with American Indian/Alaskan Native and the Asian population ranking higher. Selection bias exist; therefore, the PL is unable to compare the data from this EBP project to the national or state average. Doctor of nursing practice nurses must be aware that it is recommended patients be started on a statin in the current CPGs if they have a LDL-C of 190 or greater and if they have a LDL 70-189mg/dl and an 10-year ASCVD of 7.5% or greater.

HTN. According to the CDC (2017c), 29.0% of individuals in the United States and 48.6% in Indiana had a diagnosis of HTN. The prevalence of HTN increases with age and is higher among African Americans. Data reveal that 7.5% of adults aged 18–39 (CDC, 2017c) while American Health Ranking (2018c) reports 14.1% among 18-44 in the US and 16.2% in Indiana, 33.2% among those aged 40–59 (CDC, 2017c). American Health Ranking (2018c) reports in ages 45-64 40.5% in US while 44.6% in Indiana and 63.1% among those aged 60 and over have HTN (CDC, 2017c) while 60.5% of individuals over 65 in the US and 62.8% in Indiana have a diagnosis of HTN**.** Racial disparity was noted with patients diagnosed with HTN. Approximately 41% of African Americans in the U.S. while 45.6% in Indiana was noted to have HTN (America's Health Rankings, 2018c), 29.7% of Caucasians, 28.7% of Asians and 27.3% of Hispanics (CDC, 2017c). Hypertension has a crucial role in the prevention of primary CVD. DNP prepared nurses must prescribe the appropriate antihypertensive medications to patients, discuss lifestyle changes and initiate a statin for preventative measures.

T2DM. Diabetes diagnosis have shown an increase every year since 2011 (CDC, 2017d). Centers for Disease Control (2017d) reports that 30.3M(9.4%) individuals had diabetes and these statistics increase with age. Seventeen percent of individuals age 45-64 years and 25% older individuals older than 65 have a diagnosis of diabetes (CDC, 2017d). African Americans make up 12.7% which is the second highest prevalence nationality with American Indians and Alaska Native first at (15.1%) (CDC, 2017d). Approximately 12% of US individuals have a diagnosis of diabetes (America's Health Rankings, 2018b). As with HTN, diabetes diagnosis increases based on age. Individuals aged 18-44 2.9% in the US while 3.2% in Indiana, aged 45-64 14.5% in the US vs 16% in Indiana and individuals older than 65 who have a diagnosis of diabetes 22.6% vs 24.4%. African Americans in the US with diabetes are 14.3% while 14.8% in Indiana (America's Health Rankings, 2018b). Doctor of nursing practice prepared nurses with the inclusion of patients, must maintain a hemoglobin A1C of less than 6.5 mg/dl to prevention T2DM from occurring or control T2DM levels.

Health disparity for this EBP project. Statistics for these health disparities may be higher in the region of the Midwestern region this EBP project was conducted because it was conducted in a low socioeconomic and low-income urban community. This area has no healthy grocery stores; therefore, patients are limited in what they can buy if they do not have transportation out of their community. The community has numerous fast-food and unhealthy restaurants in the area but no healthy options. Others may be on a fixed-income and must choose between healthy eating, medication, or shelter. Although, patients can exercise in their homes or walk around their neighborhoods, they may not feel safe. There is only one fitness center in the community but is not fully equipped with proper exercise equipment.

Another aspect that must be considered is patient compliance. Patients may be in denial about the diagnosis they were given by their HCPs. Patients may be accustomed to eating in a particular manner and are not willing to change. They are not willing to take medications prescribed to them because of medication side effects, disbelief in the diagnosis, or affordability.

Lack of health literacy or lack of understanding about medications, diagnoses are contributing factors that play a role in the health disparities in this community. Lack of insurance and lack of trust with the healthcare system can account for another reason for the increase amount of health disparities in this community.

Doctor of nursing practice prepared nurses are in a unique position to assist with combating these health disparities in this community. Doctor of nursing practice practitioners must educate patients about their risk for primary CVD. Several EBP projects can be initiated from information provided in the findings. An extension of this EBP project can involve examination of patient compliance with taking prescribed statins and/or aspirin. There has been a substantial amount of data evaluating the use of cellular phone and medication compliance. For example, Palmer, Barnard, Perel, and Free (2018) conducted a study about preventing primary CVD in at-risk patients through medication adherence using mobile devices. Doctor of nursing practice prepared nurses can setup a health fair in the community or at a church to evaluate patient's risk for health disparities. The DNP prepared nurse can setup exercise sessions at the church or in a community center that is easily accessible for individuals in this community.

New CPGs (Arnett et al., 2019) for the prevention of primary CVD were recently released. It is imperative that DNP prepared nurse practitioners are aware and knowledgeable of these CPGs to prevent primary CVD in at-risk patients. The CPGs state that a discussion regarding moderate-intensity statin should be initiated in patients who are considered borderline risk primary CVD (have a PCE of 5% to less than 7.5%) and a LDL-C of greater than or equal to 70 mg/dl to less than 190 mg/dl (Arnett et al., 2019). However, patients who are intermediate risk (PCE of greater than or equal to 7.5% to less than 20% and a LDL-C of great than or equal to 70 mg/dl to less than through less than 190 mg/dl) must have a moderate intensity statin initiated (Arnett et al., 2019). Patients who are high risk (PCE greater than or equal to 20% and a LDL-C of great than or equal to 70 mg/dl to less than 190 mg/dl) must have a statin initiated,

but the researchers do not state whether the statin should be moderate or high intensity (Arnett et al., 2019). Patients who have a LDL-C greater than or equal to 190 mg/dl regardless of risk factors should have a high-intensity statin initiated (Arnett et al., 2019). Discontinuing the routine use of aspirin for the prevention of primary CVD is recommended in patients older than 70 years old because the risk of bleeding outweighs the benefits (Arnett et al., 2019). However, patients 40-70 years of age and who have a high ASCVD risk factor and a low risk of bleeding can continue aspirin daily if recommended by their HCP. Doctor of nursing practice nurse practitioners must consider all factors when considering sources of information when patients present to their office with information they have heard or read. Information heard from the news or friends can be misconstrued; therefore, it is imperative that DNP nurse practitioners are well informed of CPGs and educate patients with facts of information presented. DNP prepared nurses must also consider the risk versus benefits ratio when prescribing medications to patients.

Theoretical Framework

Kotter's 8-Step framework (Kotter, 2012) was used to guide this EBP project. Kotter's framework focuses on leading change in organizations; however, it has been utilized in several settings including nursing. When using Kotter's (2012) 8-step change model it must be understood that it is broken down into three phases. Phase one is the defrost phase which the transformation process is occurring which includes steps 1-4, phase two is the introduction and implementation of new changes which includes steps 5-7, and phase three includes continuing the change process and anchoring it in place to make it stick.

Strengths in the theory that it is detailed and guides one through the process of each step by providing examples of successes and failures to change. Kotter (2012) clearly advises users of the change model that attempts to skip steps will result in failure to change practice. "The first step in putting together the kind of team that can direct a change effort is to find the right membership" (Kotter, 2012, p. 57). While there is evidence showing that reminders

included in EMR systems improves adherence by HCPs (Fiks et al., 2015; Rokstad et al., 2013; Shojania et al., 2009; Zahanova et al., 2017), individuals at the organization where this EBP project was conducted did not allow the PL to make changes to the EMR system. The PL was informed that changes would disrupt the entire organization including outpatient physician offices. Therefore, the PL had to implement computer-generated reminders printed on paper. This process included setting up a coalition to lead to project. This was discussed and demonstrated with the medical assists about completing the PCEs, which generate the 10-year ASCVD risk factors. Prior to implementation, the PL established a sense of urgency by providing education to all the team players of the project. Education was provided about the prevalence and cost of CVD in the U.S. The second step, creating the guiding coalition, proved to be a challenge for the PL. At the beginning of the project, the medical assistants stated they would assist with the project by completing the PCEs. This was a major aspect of this EBP project because without this information, the HCPs would not know whether their patients needed a statin/aspirin prescription. Medical assistants were the gatekeepers of this EBP project. As the PL progressed through the next steps by developing the vision and strategy and communicating the change vision to the team players, medical assistants were initially excited and happy to perform the task. However, during the implementation phase of this project the medical assistants resisted the change by not wanting to run the 10-year ASCVD calculations using the PCE. During week two of this EBP project, the medical assistants did not run any PCEs. Kotter (2012) states that reinforcement of previous phases needs to occur as one progresses to other phases. In response, the PL reinforced previous steps by reeducating the medical assistants on the importance and urgency of this EBP project in this community. During the next step, to empower board-based actions the PL educated and encouraged the medical assistants to replace the status-quo by completing the PCEs (Kotter, 2012). The PL continued to empower the medical assistants through encouragement and motivation by informing the

medical assistants that they are a part of a great project that will help with patient outcomes and prevent primary CVD in at-risk patients.

Afterwards, the momentum increased, the medical assistants began performing the PCEs again; however, the PL began coming to the site more often to ensure the PCE were being performed and assisting with the PCE. Despite these efforts, resistance began shortly afterwards. Based on the chart audits and the weekly collection of the printed computer-generated reminders printed on paper, the PL knew whether the PCEs were being performed. Ivers et al. (2009) suggested that important improvements are noticed in patient outcomes when audit and feedback are used; therefore, the PL provided weekly feedback in letter format on the progress of the EBP project and how many patients received medication to prevent primary CVD. Kotter (2012) stated, when generating short term wins, plans should be made for improvements and wins must be celebrated visually when creating change. An incentive of monthly lunches was provided twice during this EBP project to celebrate short-term wins of the PCE being performed and the goal of the project being met because audits revealed HCPs were prescribing a statin and/or aspirin to at-risk patients. In a study to evaluate incentive effectiveness on lipid levels the researchers found that financial incentives were more successful when patients and physicians jointly worked to decrease lipid levels in which both received an incentive (Asch et al., 2015). When working independently to receive an incentive for decreasing lipid levels there was not much success (Asch et al., 2015). It must be explained that when providing incentives for short-term wins, it means that the project is progressing well but has not made it to fruition. Although the lunch incentives did not improve the resistance met by the medical assistants, the PL would continue to generate short-term wins if this EBP project was performed again because it shows appreciation.

Steps seven which are consolidating gains and producing more change, and eight anchoring new approaches in the culture (Kotter, 1996, 2012) were not established for this project. During week seven of the project, the physician called the PL into the office and

informed the PL that the medical assistants could no longer perform the PCEs. The project was abruptly ended because of the resistance and complaints from the medical assistants and the office manager. If the PL had to complete this EBP project again, Kotter's 8-step change theory would be used again; however, the PL would not rely so heavily on the medical assistants as the gatekeepers to perform the PCE for at-risk patients. The PL would work harder and be more convincing to the stakeholders that best evidence shows computer reminders placed in EMR systems is the best evidence for improved patient outcomes and HCP adherence with prescribing a statin (Fiks et al., 2015; Rokstad et al., 2013; Shojaina et al., 2009; Zahanova et al., 2017).

The timeframe of this project did not make this theoretical framework conducive for this EBP project because it was completed in 7 weeks. Kotter's (2012) theoretical framework may have been successful if the EBP project would have been conducted over 12 weeks as originally planned. Therefore, with the ability to utilize best evidence-based practice in the EMR to ensure HCP adherence to prescribing a statin and/or aspirin, a longer timeframe would also be considered.

EBP Framework

Promoting Action on Research Implementation in Health Services framework was utilized as the EBP framework to guide this EBP project. According to Kitson et al. (1998), evidence, context, and facilitation leads to successful implementation of moving research to practice. The PARiHS framework was a staple for this EBP project. It helped the PL focus on the literature and discover the best strategies to change the practice of HCPs following CPGs for the prevention of primary CVD in at-risk patients. However, the context and culture of the site where the project was conducted was not conducive for this project. The context lacked appropriate leadership to establish effective teamwork amongst team players to assure this practice change. Evaluation was provided on a weekly basis through feedback in a letter to each HCP and medical assistant about the success and/or necessary improvements.

Facilitation was established by providing an educational session about the importance of primary prevention of CVD. Facilitation is similar to Kotter's step 2 establishing a guiding coalition which is establishing the key players to move this EBP project forward. Resistance ensued during the implementation phase of this project by the medical assistants. This resistance made the PL go to the project site more often to ensure the PCEs were being performed. The PL provided another educational session with the medical assistants to empower them with the knowledge and to understand of the urgency of this EBP project. A holistic approach for facilitation was attempted by providing the medical assistants with what was needed for the successful implementation of this EBP project. If the PL had to conduct this EBP project again, the PARiHS would be utilized again. With the proper leadership and the right gatekeepers, research can be moved to clinical practice. Doctor of nursing practice nurses must understand that plans may not always lineup accordingly but with continued effort change can be made and the PARiHS model has all the tools to assist with successful implementation.

Strengths and Limitations of the EBP Project

Strengths

The prevalence and cost of CVD, as well as the CPG recommendations about prevention of CVD, was established with education. Knowledge was established, as a result of the education provided about the PCE and the meaning of the 10-year ASCVD calculation. Although, this EBP project was met with resistance by the medical assistants, there was improvement of compliance with prescribing statins and/or aspirin to at-risk patients (see Table 4.2). With the implementation of this EBP project, HCPs are aware of CPGs to prevent CVD in at-risk patients. Healthcare providers are aware of the PCE to calculate patients 10-year ASCVD risk factor to evaluate if a statin is necessary for at-risk patients. Based on the number of patients with multiple co-morbidities, HCP can emphasize medication compliance, healthy diet and exercise with their patients at each point of care visit. Healthcare providers can ensure

patients bring in their medication bottles at each point of care visit to ensure medications are being taken and patient do not have any questions about medications.

Limitations

Change is inevitable in whatever establishment one is employed; however, it is one of the most difficult tasks to achieve. There were two major limitations to this project: (a) resistance to using computer generated reminders in the EMR, and (b) resistance by the medication assistants to performing the PCEs.

The inability to utilize best practice evidence which is creating hard stop computer prompts in the EMR system as a reminder for HCP to prescribe a statin and/or aspirin in at-risk patients was a limitation for the EBP project. This implementation would improve adherence with CPG recommendation to prevent primary CVD. Resistance with the medical assistants performing PCEs would not have presented a problem and the project would have had greater success rates with prescribing a statin and/or aspirin. Staff at this facility have established a routine. The staff did not prefer any new tasks that hindered that routine. This EBP project encountered resistance from the medical assistants to perform the PCEs to obtain patients 10-year ASCVD risk factor as time progressed. The project site did not have many employees to assist with completing the PCEs. Another consideration is that the clinical site is a walk-in clinic. On physician days, this site can see approximately 50 patients per day; therefore, the medical assistants expressed they did not have time to run the PCEs. The limited timeframe of 7 weeks to complete this EBP project was a limitation.

Implications for the Future

When EBP projects are completed, DNP practitioners should give thoughtful consider to providing recommendations about practice, theory, education, and research. Informing others about these implications is vital for establishing strategies to assist with following CPGs.

Practice

Doctor of nursing practice nurses must consider establishing a protocol to utilize the PCE for the prevention of primary CVD in at-risk patients. It would behoove organizations to implement hard stops in the electronic medical records which automatically input the data once the PCE is clicked. This would assist with HCPs to assess whether a statin is indicated for the primary prevention of CVD. It must also be considered that a best practice alert be established as a 5-year reminder about repeating the PCE. Doctor of nursing practice nurses must not pick and choose which CPGs are best for their clients but be open to all evidence-based CPGs. They must remain vigilant that all patients are unique and if a side effect occurs in one patient it does not mean it will occur in another patient.

Doctor of nursing practice nurse practitioners have an important role as educators. Doctor of nursing practice practitioners must educate patients on the importance of medication adherence and possible health disparities that will can occur from not complying with medications. Oftentimes, medication compliance is an issue because of lack of education of what to expect. Therefore, patients must be educated about what side effects to expect when taking statins or aspirin. When patients are educated about what side effects to expect they are more inclined to comply with medications. It is important to establish safe open provider/patient relationships, so patients feel comfortable telling their clinician when issues with medications arise. It is essential that DNP prepared practitioners evaluate issues encountered with medications at each point of care visits. When issues are encountered with patients taking a medication it is the HCPs responsibility to begin an alternative therapy to ensure the prevention of primary CVD.

Comorbidities are plaguing the community where this EBP project was conducted. These comorbidities will lead to primary CVD if not addressed properly. Placing DNP prepared nurses in a position to establish programs to assist patients with preventing comorbidities that lead to primary CVD is a suggestion that will combat comorbidities. Doctor of nursing practice prepared practitioners can create community health and wellness fairs, educational sessions,

group programs, and complete home phone calls to combat the comorbidities that lead to primary CVD in the community where this EBP project was conducted. Consideration must be given to all participants when attempting to establish change because each party plays a vital aspect to bringing successful change to an establishment.

Theory

One role of the DNP practitioner is to find the best theories to guide EBP projects. As stated above, Kotter's (2012) 8- step change model was not conducive to this EBP project because of the time constraints. Kotter's (2012) states, in his 8-step change model, failure to change is because individuals do not take the time to continually reinforce early stages as the change process moves to the next step. It is essential that step one through four are foundationally set before the new changes can be successfully implemented (Kotter, 2012). The PL educated and reinforced the purpose and importance of this EBP project as a sense of urgency in step five empowering broad-band action. The medical assistants expressed an issue with the high number of patients being seen in the office on the days the physician was in the office; however, the PL noticed the PCEs were not being performed when the physician was not in the office. This led to the PL coming into the office more frequently to assist with completing PCEs, but change was met with resistance. The medical assistants were resistant to change because of the status-quo established at this project site and lack of leadership from the office manager and the physician not being acceptive of statin treatment in patients because of the side effects. Although, Kotter's 8-step change model was not successful at this project site, there a high probability that it would have been successful if hard stop computer reminders were placed in the EMR system for HCP's to order a statin and/or aspirin to prevent primary CVD in at-risk patients.

The PARiHS model (Kitson et al., 1998) was conducive for this EBP project; however, the PL was unable to move research to practice. The culture of the project site is task driven any deterring from the original tasks was not conducive. There was a lack of leadership at this

project site which is necessary for success implementation. When resistance was met, the leaders did not tell the medical assistants to continue the project but instead sided with the medical assistants which lead to the EBP projects abrupt ending. The inability to implement the best evidence-based practice for this EBP project hindered the evidence portion of the PARiHS model elements. Lack of facilitation of the organization to incorporate computer reminders into the EMR system for this EBP project was another reason for unsuccessful implementation. The process of incorporating computer reminders into the EMR system would have made implementation easier and facilitation would have been achieved. When using the PARiHS framework all elements and many of the subelements must be in place to ensure successful implementation. With the implementation of the best EBP the PL would use the PARiHS framework again.

Research

Research regarding aspirin and statins have changed since the inception of this EBP project. Therefore, prescribing practices should be updated with most recent recommendations used. It is recommended that future research could focus on patient compliance with taking a statin as prescribed be evaluated as an outcome. Another recommendation is that when a similar project is implemented at a larger clinical site, comparisons between NP and physician prescribing patterns also be evaluated to determine who is more compliant with following CPGs to prevent primary CVD in at-risk patients. It is also recommended that this project be changed to include hard stops in the electronic medical records system to alert practitioners to complete the PCE to obtain 10-year ASCVD risk factors and initiate a statin for at-risk patients as recommended in the latest CPGs. The PL recommends conducting post-intervention collection data from medical records of patients who had the PCE completed during the implementation phase instead of randomly selecting patients.

Researchers postulated that CPGs were not being adhered to because they were too long and confusing (Alexander et al., 2016; Barth et al., 2016; McKee et al., 2017). It must be

noted that the researchers for the *2019 ACC/AHA Guidelines on the Primary Prevention of CVD* created a *Guidelines Made Simple* version for ease of use and readability for HCPs and patients. The *Guidelines Made Simple* version will help with the barriers (Alexander et al., 2016; Barth et al., 2016; McKee et al., 2017) of HCPs adhering to CPGs. The *Guidelines Made Simple* version was decreased from 89 pages to 17 pages and flowcharts are present for each at-risk category for ease of flow. These flowsheets (Appendix B) can be printed out and placed in each examination room as a reminder for DNP prepared practitioners to utilize and follow the recommended CPGs for better patient outcomes. The *Guidelines Made Simple* version will assist DNP prepared practitioners educate patients about the most recent recommendations available for the prevention of primary CVD.

The validity and reliability of the PCE has been questioned by several researchers because it provides an overestimated 10-years ASCVD risk factor score in certain populations (Emdin et al., 2016; Khalili et al., 2015). The authors of these studies suggest calculating 10-year ASCVD scores improves after recalibration of the PCE (Emdin et al., 2016; Khalili et al., 2015). Although, the criticisms are founded, the AHA and ACC continues to advise the use of the PCE for the calculation of patients 10-year ASCVD every 5-years. In the *2019 ACC/AHA Guidelines on the Primary Prevention of CVD*, (Arnett et al., 2019) recommend continuing to utilize the PCE although it is known to overestimate and underestimate patients 10-year ASCVD risk factor. Therefore, patients who have a borderline or intermediate risk factor for primary ASCVD must have other risks evaluated prior to initiating statin therapy.

Education

It is imperative that schools of nursing educate nurses in leadership skills which include transformational change. It must be ingrained in nursing students early that change is difficult to establish when organizations and individuals in the organization are accustomed to practices being status-quo. Nursing is an innovate field of study which needs nurses who are willing to champion the challenge of change. For example, Fridman (2014) conducted a lived-experience

study about oncology nurse's experiences with EBP project. During this project several themes were noted. A nurse stated that she felt empowered by the process of challenging the status quo; while, another was mesmerized by the EBP project process – she stated, she had never participated in an EBP project because she only had her bachelor's degree. For example, schools of nursing could incorporate a class that pairs undergraduate senior students with a DNP student to collaborate on an EBP project. This will expose undergraduate students to the DNP process and prepare them to be the change agents nursing needs to incorporate research to practice.

In nursing graduate curricula, pharmacology and assessment classes can include a discussion about CPGs to prevent CVD in all patients. Students are then exposed to the idea of the PCE and the ability to download the application to their mobile devices. Doctor of nursing practice prepared students are in a unique position to learn about the health disparities that plague the community where they live. Service projects can be completed to combat, educate and empower individuals of the community to change to a healthy lifestyle.

An educational PowerPoint was used to provide a since of urgency and share the vision for this EBP project. The educational sessions were performed separately because the HCPs rotate between two offices. Initially, all team players were excited to be assisting in this EBP project. Questions were answered, and the PL was available to answer questions throughout the implementation phase and daily during the first week. Education about HCPs not adhering to CPGs, statistics about CVD, and CPG implementation strategies can be used in various formats. Various educational formats can be used by the DNP practitioner to provide education about the latest evidence-based CPGs. Educational formats available include PowerPoints in Health stream, face to face education, or lunch and educate. All staff members need to be included in the education about preventing primary CVD and the best strategies to create a successful change. If resistance occurs during the educational stage, it needs to be addressed at that time so that cohesiveness can be established, and all fears and hesitancies are

addressed. Successful implementation is curial, and it begins with education and getting all stakeholders on board.

Conclusion

Computer-generated reminders printed on paper and provided to the HCP at point of care visits showed a 20% improvement in compliance with HCP prescribing a statin and/or aspirin to at-risk patients despite resistance by the gatekeeper. Clinical decision support systems and EMR alert systems have been shown to be the best intervention for HCPs to adhere to recommended guidelines. Results from this EBP project reveal that it is critical for DNP practitioners to use the best evidence available when conducting EBP projects. Organizations must remove factors which prevent the use of best practice by settling for other options, they may introduce unintended barriers to achieving the best possible patient care. The Kotter's (2012) change model and PARiHS (Kitson et al., 1998) model was used to guide this EBP project to provide the necessary tools and guidance to bring this project to fruition successfully. When using Kotter (2012) 8-step change model, establishing a strong coalition who knows and understands the vision and goals of the EBP project is essential. Dependability, accountability, and responsibility lie with the gatekeepers and therefore, they are able to impede the progress of the EBP project. Successful implementation of an EBP project relies on the gatekeeper but more importantly the stakeholder's willingness to incorporate the best evidence-based practice for change to occur.

It is imperative that the primary prevention of CVD is important to every DNP prepared practitioner. Doctor of nursing prepared practitioners must remain vigilant life-long learners because of the fast-paced innovative changes in healthcare. Education and knowledge about the latest evidence-based CPGs for the prevention of primary CVD in at-risk patients is essential. Doctor of nursing prepared practitioners must consider strategies to improve CPG implementation for improved patient outcomes.

Doctor of nursing practice prepared nurses are empowered to make change occur for the betterment of their patients. These nurses must educate patients about risk factors for primary CVD and its prevention. Patients should have a choice about whether they would like to begin a new medication regimen once educated about mechanism of action, side effects, and lifestyle changes. Doctor of nursing practice prepared practitioners in congruence with the patient must provide effective and efficient care by using the latest EBP for the best patient outcomes.

REFERENCES

Alexander, P. E., Li, S. A., Tonelli, M., & Guyatt, G. (2016). Canadian primary care physicians' attitudes toward understanding clinical practice guidelines or diabetes screening. *Canadian Journal of Diabetes, 40*(6), 580-585. doi:10.1016/j.jcjd.2016.05.018

America's Health Rankings. (2018a). *Annual report -high cholesterol.* Retrieved from https://www.americashealthrankings.org/explore/annual/measure/High_Chol/state/IN

America's Health Rankings. (2018b). *Annual report - diabetes.* Retrieved from https://www.americashealthrankings.org/explore/annual/measure/Diabetes/state/IN

America's Health Rankings. (2018c). *Annual report - hypertension*. Retrieved from https://www.americashealthrankings.org/explore/annual/measure/Hypertension/population/hypertension_Urban/state/IN

Arditi, C., Rege-Walther, M., Durieux, P., & Burnand, B. (2017). Computer-generated reminders delivered on paper to healthcare professionals: Effects on professional practice and healthcare outcomes. *Cochrane Database of Systematic Reviews, 7,* 1-107. doi:10.1002/14651858.CD001175.pub4.

Arnett, D. K., Blumental, R. S., Albert, M. A., Buroker, A. B., Hlmmelfarb, C. D. Goldberger, Z. D.,…Zlaelan, B. (2019). 2019 ACC/AHA Guideline on the Primary Prevention of Cardiovascular Disease: Guidelines made simple a selection of tables and figure. Retrieved from http://www.onlinejacc.org/sites/default/files/additional_assets/guidelines/Prevention-Guidelines-Made-Simple.pdf

Asch, D., Troxel, A. B., Stewart, W. F., Sequist, T. D., Jones, J. B., Hirsch, A. M. G.,…Wang, W. (2015). Effect of financial incentives to physicians, patients, or both on lipid levels: A randomized clinical trial. *Journal of the American Medical Association, 314*(18), 1926-1935.

Barth, J. H., Misra, S., Aakre, K. M., Langlois, M. R., Watine, J., Twomey, P. J., & Oosterhuis, W. P. (2016). *Clinical chemistry and laboratory medicine, 54*(7), 1133-1139.

Bender, B. G. (2014). Can health care organizations improve health behavior and treatment adherence? *Population Health Management, 17*(2), 71-78. doi:10.1089/pop.2013.0045

Boyer, E. L. (1990). *Scholarship reconsidered: Priorities of the professoriate.* Princeton, NJ: The Carnegie Foundation for the Advancement of Teaching. Retrieved from https://files.eric.ed.gov/fulltext/ED326149.pdf

Bradbury, E. (2014). Integrated care communities: putting change theory into practice. *Journal of Integrated Care, 22*(4), 132-141.

Centers of Disease Control and Prevention. (2012). *Heart disease risk factors*. Retrieved from https://www.cdc.gov/heartdisease/risk_factors.htm

Centers of Disease Control and Prevention. (2017a). *Conditions that increase the risk for heart disease*. Retrieved from https://www.cdc.gov/heartdisease/conditions.htm

Centers of Disease Control and Prevention. (2017b). *High cholesterol facts.* Retrieved from https://www.cdc.gov/cholesterol/facts.htm

Centers of Disease Control and Prevention. (2017c). *Hypertension prevalence and control among adults: United States, 2015-2016.* Retrieved from https://www.cdc.gov/nchs/products/databriefs/db289.htm

Centers of Disease Control and Prevention. (2017d). *National diabetes statistics report: Estimates of diabetes and its burden in the United States.* Retrieved from https://www.cdc.gov/diabetes/pdfs/data/statistics/national-diabetes-statistics-report.pdf

Chism, L. A. (2016). *The doctor of nursing practice: A guidebook for role development and professional issues* (3rd ed.). Burlington, MA: Jones & Bartlett Learning.

Cronk, B. C. (2018). *How to use SPSS: A step-by-step guide to analysis and interpretation* (10th ed.). New York, NY: Taylor & Francis.

Dang, D., & Dearbolt, S. (2018). *Johns Hopkins nursing evidence-based practice: Models and guidelines* (3rd ed.). Indianapolis, IN: Sigma Theta Tau International.

Eckel, R. H., Jakicic, J. M. Ard, J. D., de Jesus, J. M., Miller, N. H., Hubbard, V. S., Lee, I.,…Yanovski, S. Z. (2014). 2012 AHA/ACC guideline on lifestyle management to reduce cardiovascular risk: A report of the American college of cardiology/American heart association task force on practice guidelines. *Circulation, 129*(2)*,* S76-S99. doi: 10.1161/01.cir.0000437740.48606.d1

Emdin, C. A., Khera, A. V., Natarajan, P., Klarin, D., Baber, U., Mehran, R., … Kathiresan, S. (2016). Evaluation of the pooled cohort equation for prediction of cardiovascular risk in a contemporary prospective cohort. *American Journal of Cardiology, 119*(6), 881-885. doi:10.1016/j.amjcard.2016.11.042

Fiks, A. G., Zhang, P., Localio, A. R., Khan, S., Grundmeier, R. W., Karavite, D. J., … Forrest, C. B. (2015). Adoption of electronic medical record-based decision support for otitis media in children. *Health Services Research, 50*(2), 489-513. doi:10.1111/1475-6773.12240

Flodgren, G., Hall, A. M., Goulding, L., Eccles, M. P., Grimshaw, J. M., Leng, G. C., & Sheppard, S. (2016). Tools developed and disseminated by guideline producers to promote the uptake of their guidelines. *Cochrane Database of Systematic Reviews,* (8)*,* CD010669. doi:10.1002/146518558.CD010669.pub2

Fridman, M. (2014). Oncology nurses and the experience of participation in an evidence-based practice project. *Oncology Nursing Forum, 41*(4), 382-388.

Fox, C. S., Golden, S. H., Anderson, C., Bray, G. A., Burke, L. E., de Boer, I. H., … American Diabetes Association. (2015). Update on prevention of cardiovascular disease in adults with type 2 diabetes mellitus in light of recent evidence: A scientific statement from the American Heart Association and the American Diabetes Association. *Diabetes Care, 38*(9), 1777-1803. doi:10.1161/cir.0000000000000230

Garza, L., Dols, J., & Gillespie, M. (2017). An initiative to improve primary prevention of cardiovascular disease in adults with type II diabetes based on the ACC/AHA (2013) and ADA (2016) guidelines. *Journal of the American Association of Nurse Practitioners, 29*(10), 606-611. doi:10.1002/2327-6924.12492

Goff, D. C., Lloyd-Jones, D. M., Bennett, G., Coady, S., D'Agostino, R. B., Gibbons, R., … Wilson, P. W. F. (2013). 2013 ACC/AHA guideline on the assessment of cardiovascular risk: A report of the American College of Cardiology/American Heart Association task force on practice guidelines. *Journal of the American College of Cardiology, 129*(25), S49-S73. doi:10.1161/01.cir.0000437741.48606.98

Healthy People 2020. (2014). *Heart disease and stroke*. Retrieved from https://www.healthypeople.gov/2020/topics-objectives/topic/heart-disease-and-stroke

Hendrix, K. S., Downs, S. M., & Carroll, A. E. (2015). Pediatricians' responses to printed clinical reminders: Does highlighting prompts improve responsiveness? *Academic Pediatrics, 15*(2), 158-164.

Ivers, N., Jamtvedt, G., Flottorp, S., Young, J. M., Odgaard-Jensen, J., French, S. D., … Oxman, A. D. (2012). Audit and feedback: effects on professional practice and healthcare outcomes. *Cochrane Database of Systematic Reviews, 6,* 1-229. doi:10.1002/14651858.CD000259.pub3

Jeffery, R. A., To, M. J., Hayduk-Costa, G., Caeron, A., Taylor, C., Zoost, C. V., & Hayden, J. A. (2015). Interventions to improve adherence to cardiovascular disease guidelines: A systematic review. *BMC Family Practice, 16*(147), 1-15. doi:10.1186/s12875-015-0341-7

Jensen, M. D., Ryan, D. H., Apovian, C. M., Ard, J. D., Comuzzie, A. G., Donato, K. A., … Yanovsdi, S. Z. (2013). AHA/AAC/TOS guideline for the management of overweight and obesity in adults: A report of the American College of Cardiology/American Heart Association task force on practice guidelines and the obesity society. *Circulation, 129*(2), S102-S138.

Jun, J., Kovner, C. T., & Stimpfel, A. W. (2016). Barriers and facilitators of nurses' use of clinical practice guidelines: An integrative review. *International Journal of Nursing Studies, 60,* 54-68.

Khalili, D., Asgari, S., Hadaegh, F., Steyerberg, E. W., Rahimi, K., Fahimafar, N., & Azizi, F. (2015). A new approach to test validity and clinical usefulness of the 2013 ACC/AHA guideline on statin therapy: A population-based study. *International Journal of Cardiology, 184*, 587-594. doi:10.1016/j.ijcard.2015.03.067

Kitson, A., Harvey, G., & McCormack, B. (1998). Enabling the implementation of evidence based practice: A conceptual framework. *Quality in Health Care, 7*(3)*,* 149-158.

Kotter, J. P. (1995). Leading change: Why transformation efforts fails. *Harvard Business Review.* Retrieved from https://hbr.org/1995/05/leading-change-why-transformation-efforts-fail-2

Kotter, J. P. (1996). *Leading change.* Boston, MA: Harvard Business School Press.

Kotter, J. P. (2012). *Leading change.* Boston, MA: Harvard Business School Press.

Langton, N., Khan, K. M., & Lusina, S. J. (2010). FIFA's football for health: Applying Kotter's eight-step programme for transformational change to a mass participation activity. *British Journal of Sports Medicine, 44*(8), 537-539.

Li, Y. (2018). Evidence Summary, Evidence implementation strategy: Audit and feedback. *Joanna Briggs Institute EBP database,* 1-2.

McKee, G., Kerins, M., Hamilton, G., Hansen, T., Hendriks, J., Kletsiou, E., … Fitzsimons, D. (2017). Barriers to ESC guideline implementation: Results of a survey from the European Council on Cardiovascular Nursing and Allied Professions (CCNAP). *European Journal of Cardiovascular Nursing, 16*(8), 678-686. doi:10.1177/1474515117710097

Melnyk, B. M., & Fineout-Overholt, E. (2015). *Evidence-based practice in nursing & healthcare: A guide to best practice* (3rd ed.). Philadelphia, PA: Wolters Kluwer Health.

Mork, A., Krupp, A., Hankwitz, J., & Malec, A. (2018). Using Kotter's change framework to implement and sustain multiple complementary ICU initiatives. *Journal of Nursing Care Quality, 33*(1), 38-45.

National Heart, Lung, and Blood Institute [NHLBI]. (2017). *Know the differences: Cardiovascular disease, heart disease, coronary heart disease.* Retrieved from https://www.nhlbi.nih.gov/sites/default/files/media/docs/Fact_Sheet_Know_Diff_Design.508_pdf.pdf

Palmer, M. J., Barnard, S., Perel, P. & Free, C. (2018). Mobile phone-based interventions for improving adherence to medication prescribed for the primary prevention of cardiovascular disease in adults. *Cochrane Database of Systematic Reviews, Issue 6. Art. NO.: CD012675.* Doi: 10.1002/14651858.CD012675.pub2

Pantoja, T., Green, M. E., Grimshaw, J., Denig, P., Durieux, P., Gill, P., … Leniz, J. (2014). Manual paper reminders: Effects on professional practice and health care outcomes (Protocol). *Cochrane Database of Systematic Reviews, 9,* CD0011174. doi:10.1002/14651858.CD001174.pub3

Regan, M. E. (2017). Implementing an evidence-based clinical decision support tool to improve the detection, evaluation and referral patterns of adult chronic kidney disease patients in primary care. *Journal of the American Association of Nurse Practitioners, 29*(12), 741-753.

Rokstad, I. S., Rokstad, K. S., Holmen, S., Lehmann, S., & Assmus, J. (2013). Electronic optional guidelines as a tool to improve the process of referring patients to specialized care: An intervention study. *Scandinavian Journal of Primary Health Care, 31*(3), 166-171. doi:10.3109/02813432.2013.824155

Rycroft-Malone, J. (2004). The PARiHS framework-a framework for guiding the implementation of evidence-based practice. *Journal of Nursing Care Quality, 19*(4), 297-304.

Shojania, K. G., Jennings, A., Mayhew, A., Ramsay, C. R., Eccles, M. P., & Grimshaw, J. (2009). The effects of on-screen, point of care computer reminders on processes and outcomes of care. *Cochrane Database of Systematic Reviews,* (3)*,* CD001096. doi:10.1002/14651858

Small, A., Gist, D., Souza, D., Dalton, J., Magny-Normilus, C., & David, D. (2016). Using Kotter's change model for implementing bedside handoff: A quality improvement project. *Journal of Nursing Care Quality, 31*(4), 304-309.

Stone, N. J., Robinson, J. G., Litchtenstein, A. H., Merz, C. N. B., Blum, C. B., Eckel, R. H., … Wilson, P. W. F. (2014). 2013 ACC/AHA guideline on the treatment of blood cholesterol to reduce atherosclerotic cardiovascular risk in adults: A report of the American College of Cardiology/American Heart Association task force on practice guidelines. *Circulation, 129*(25), S1-S85. doi:10.1161/01.circ.0000437738.63583.7a

United States Preventive Services Task Force [USPSTF]. (2016). Statin use for the primary prevention of cardiovascular disease in adults: US preventive services task force recommendation statement. *Journal of the American Medical Association, 316*(19), 1997-2007.

Wheeler, T. R., & Holmes, K. L. (2017). Rapid transformation of two libraries using Kotter's eight steps of change. *Journal of the Medical Library Association, 105*(3), 276-281.

Whelton, P. K., Carey, R. M., Aronow, W. S., Casey, D. E., Collins, K. J., Himelfarb, C. D., … Wright, J. T. (2018). 2017 ACC/ AHA/ AAPA/ ABC/ ACPM/ AGS/ APhA/ ASH/ ASPC/ NMA/ PCNA guideline for the prevention, detection, evaluation, and management of high blood pressure in adults: A report of the American College of Cardiology/American Heart Association task force on clinical practice guidelines. *Journal of the American College of Cardiology, 71*(6), e127- e248. doi:10.1016/j.acc.2017.11.006

Zahanova, S., Tsouka, A., Palmert, M. R., & Mahmud, F. H. (2017). The iSCREEN electronic diabetes dashboard: A tool to improve knowledge and implementation of pediatric

clinical practice guidelines. *Canadian Journal of Diabetes, 41*(6), 603-612. doi:10.1016/j.jcjd.2016.12.012

BIOGRAPHICAL MATERIAL

Mrs. Sharnita L. Rice obtained her Bachelor of Science in Nursing from Purdue University Calumet in 2007. She began her career working in the emergency department at a hospital in Indianapolis, IN. Sharnita expanded her emergency nursing experience to include travel nursing and has worked in such places as Tucson, AZ, Manhattan, New York and St. Thomas, Virgin Islands. After five years of working in the emergency department, she expanded her knowledge to include critical care working in the Intensive Care Unit where she is currently employed. In 2015, she began her pursuit of graduate studies to obtain her Doctor of Nursing Practice degree from Valparaiso University. While pursuing her DNP, Sharnita obtained her Critical Care Registered Nurse certification in 2016, Master of Science in Nursing Education in 2018. She was inducted into the Zeta Epsilon Chapter of the Sigma Theta Tau International Honor Society in 2018. Sharnita is a member of the America Association of Critical Care Nurses, Society of Nurses in Advanced Practice, Coalition of Advanced Practice Nurses of Indiana, and the America Association of Nurse Practitioners. Sharnita is passionate about the primary prevention of comorbidities and starting her business Voices and Visions of Hope, Inc. which will help empower sexual assault survivors find their voice.

ACRONYM LIST

ACC: American College of Cardiology

ACR: Albumin/Creatinine Ratio

ADA: American Diabetes Association

AHA: American Heart Association

ASCVD: Artherosclerotic cardiovascular disease

BMI: Body Mass Index

CDC: Centers for Disease Control

CDS: Clinical Decision Support

CDSS: Clinical Decision Support Systems

CHD: Coronary Heart Disease

CINHAL: Cumulative Index to Nursing and Allied Health Literature

CPG: Clinical Practice Guidelines

CVD: Cardiovascular Disease

DASH: Dietary Approaches to Stop Hypertension

DBP: Diastolic Blood Pressure

DNP: Doctor of Nursing Practice

EBP: Evidence-based Practice

EMR: Electronic Medical Record

FNP: Family Nurse Practitioners

GP: General Practitioner

HCP: Healthcare Providers

HDL: High-density Lipoprotein

HIPPA: Healthcare Insurance Portability and Accountability Act

3-hydroxy-3-methyl-glutaryl-coenzyme A reductase inhibitor: statin

HTN: Hypertension

IRB: Institutional Review Board

JBI: Joanna Briggs Institute

JHNEBP: Johns Hopkins Nursing Evidence Based Practice

JNC-8: 8th Joint National Committee

LDL-C: Low-density Lipoprotein Cholesterol

MeSH: Medical Subject Headings

NIHCE: National Institute for Health and Care Excellence

NHLBI: National, Heart, Lung and Blood Institute

PARiHS: Promoting Action on Research Implementation in Health Services Framework

PCE: Pooled Cohort Equation

PCP: Primary Care Physician

PICOT: Patient/Problem, Intervention, Comparison, Outcome, Time

PL: Project Leader

PRISMA: Preferred Reporting Items for Systematic Reviews and Meta-analyses

RCT: Randomized Control Trial

SBP: Systolic Blood Pressure

SI: Successful Implementation

SIGN: Scottish Intercollegiate Guidelines Network

T2DM: Diabetes Mellitus Type 2

USB: Universal Serial Bus

USPSTF: United States Preventive Services Task Force

WHO: World Health Organization

Appendix A

Table 1A

Summary of the Evidence

Author(s), Year, Publication	Purpose	Method	Setting/Sample	Design	Findings Analysis	Level of Evidence	Grade of Evidence
Arditi, C., Rege-Walther, M., Durieux, P., & Burnand, B. (2017). Cochrane Database of Systematic Reviews.	To evaluate the effects of computer-generated reminders delivered to HCPs on paper improved on quality of care and patient outcomes.	Literature search of nine databases, Reference checking and citation chasing	Sample: 35 studies which focused on healthcare providers	Systematic Review	Computer-generated reminders delivered on paper moderate-certainty slightly improves quality of care by 6.8% in terms of guideline prevention and disease management guideline compliance. Reminders alone improved quality of care by 11%. Reminders with other interventions by 4%.	II	A
Fiks, A. G., Zhang, P., Localio, A. R., Khan, S., Grundmeier, R. W., Karavite, D.	Characterize patterns of adoption of the clinical decision support (CDS), assess the impact of	Reviewed 100 charts Extracted	Setting: Pediatric physician offices Sample: 16 practices 108 clinicians	Prospective Cohort study and Comparison study	CDS system was used 21% by clinicians and 17% of eligible otitis media visits. Clinicians who received	I	A

J.,…Forrest, C. B. (2013). Health Research and Educational Trust	performance feedback on adoption, and measure the impact of CDS use on guideline adherence.		41,391 visits		feedback adhered to CPGs increased 9.0% compared to others.		
Flodgren, G., Hall, A. M., Goulding, L., Eccles, M. P. Grimshaw, J. M., Leng, G. C., & Shepperd, S. (2016). Cochrane Database of Systematic Reviews	Evaluated the effects of guideline implementation tools developed by producers of guidelines to improve usage of their guidelines.	Systematic review of evidence from several database searches	Sample: Healthcare professionals in all 4 studies Health system mangers Policy makers	Systematic Review	Tools created by guideline producers probably improves adherence and implementation of guidelines.	I	A
Hendrix, K. S., Downs, S. M., Carroll, A. E. (2015). Academic Pediatrics.	Does yellow highlighting prompts in a clinical decision support system improve the responsiveness of physicians.	Physicians in two offices received CDSS generated yellow highlighted prompts 2 offices prompts were not highlighted when presented to physicians.	Setting: 4 urban primary care pediatrician clinics Sample: 7 prompts included for randomization 4 high-priority non-randomized prompts were highlighted each time	RCT	2237 randomized prompts 62% did not respond to highlighted prompts 61% did not respond to prompts not highlighted There was not statistical difference in	I	A

		High priority prompts were always highlighted			responsiveness of physicians from highlighting prompts or high priority reminder prompts and not highlighting prompts. (OR 1.056; 95% CI; *P*= .259).		
Ivers, N., Jamtvedt, G., Flottorp, S., Young, J. M., Odgaard-Jensen, J., French, S. D.,…Oxman, A. D. (2012). Cochrane Database of Systematic Reviews.	To assess the effects of audit and feedback on the practice of healthcare professionals and patient outcomes and to examine factors that may explain variation in the effectiveness of audit and feedback.	Literature search of several databases	Sample: 140 Audit and feedback RCTs Healthcare professionals responsible for patient care. Postgraduate healthcare professionals	Systematic Review	Small improvements in professional practice were found with audit and feedback. Improvement pertained to the baseline performance and feedback was provided.	I	A
LI, Y. (2018). Joanna Briggs Institute	What is the best available evidence regarding the effectiveness of audit and feedback in promoting evidence implementation?	Searching the literature and databases for systematic reviews which focused on audit and feedback.	N/A	Systematic Review	After carefully considering practitioners audit and feedback by itself or cohabited with other strategies can elicit change in practice among practitioners.	I	A

Regan, M. E. (2017). Journal of American Association of Nurse Practitioners	Develop an evidence-based quality improvement intervention for primary care providers (PCP) through the delivery of evidence-based guidelines at point-of-care.	An algorithm and chronic kidney disease (CKD) tool was developed in the EMR based on the NKF-KDOQI guidelines and supporting evidence. Pre-intervention: Knowledge surveys and baseline data was collected. Chronic kidney disease educational intervention and tutorial on clinical decision support tool was presented to participants then sent via email. A go live reminder email was sent.	Setting: PCP offices Sample: 11 PCP offices 80 PCPs • 55 physicians • 17 NPs • 8 PA's	Comparison study	Survey's: 19 PCP's did not take the pretest and baseline survey. Knowledge: increased Lab diagnostic (Z=-2.00, p=.046) CKD stage interpretation (Z=-2.83, p=.005) CKD patient assessment (Z= -2.41, p=.024) No significant change between CKD familiarity scores (p > .05)	III	B

Rokstad, I., S., Rokstad, K. S., Holmen, S., Lehmann, S., Assmus, J. (2013). Scandinavian Journal of Primary Health Care	Does incorporating an electronic optional guideline tool in the standardized referral template used by general practitioners when referring patients to specialized care could improve outpatient referral appropriateness?	Electronic optional guideline tool was created for referral Inclusion: Sleep apnea Chronic obstructive pulmonary disease Lung tumors of the lung	Setting: Bergen and the Department of Thoracic Medicine at Haukeland University Hospital Sample: 210 general practitioners (GP) Intervention group: 93 GPs Control group: 117 GPs	Intervention Study	The intervention yielded 1080 new referrals of which 70% were from GPs. Time: 34% shorter in the intervention group – 82 used of these used the tool.	II	B
Shojania, K. G., Jennings, A., Mayhew, A., Ramsay, C.R., Eccles, M. P., & Grimshaw, J. (2009). Cochrane Database of Systematic Reviews.	To evaluate the effects on processes and outcomes of care attributable to on-screen computer reminders delivered to clinicians at the point of care.	Literature search of several database and bibliographies of key articles.	Sample: 28 studies RCT Quasi-RCTs	Systematic Review	4.2% improvement on adherence to computer reminders 3.3% medication ordering 3.8% vaccinations 3.8% for testing Computer-generated reminders at point of care has a small to modest	II	A

					improvement in provider behavior.		
Zahanova, S., Tsouka, A., Palmert, M. R., & Mahmud, F. (2017). Canadian Journal of Diabetes.	Evaluate the impact of a computerized point-of-care decision support system on clinical practice guideline knowledge and adherence.	iSCREEN used as a clinical decision support system integrated into the electronic health record as a reminder to clinicians of diabetic patients. Retrospective chart review of and questionnaire pre- and post-implementation A total of 50 charts was reviewed (25 prior and 25 post iSCREEN integration.	Setting: Diabetic clinic Sample: 50 adolescents' charts	Retrospective study	Surveys collected: 58 Pre-intervention 31 Post-intervention 27 Questions Knowledge: Pre Post-intervention 11% improvement in overall scores (p=0.06) Utilizing current resources: 5-point Likert scale Nephropathy (p=0.03) and retinopathy (p=0.04) initial screening increased and under and over screening decreased.	III	B

			No change in thyroid function test screening or dyslipidemia. Appropriated HTN screening at baseline	

Appendix B

Clinical practice guideline flowsheet

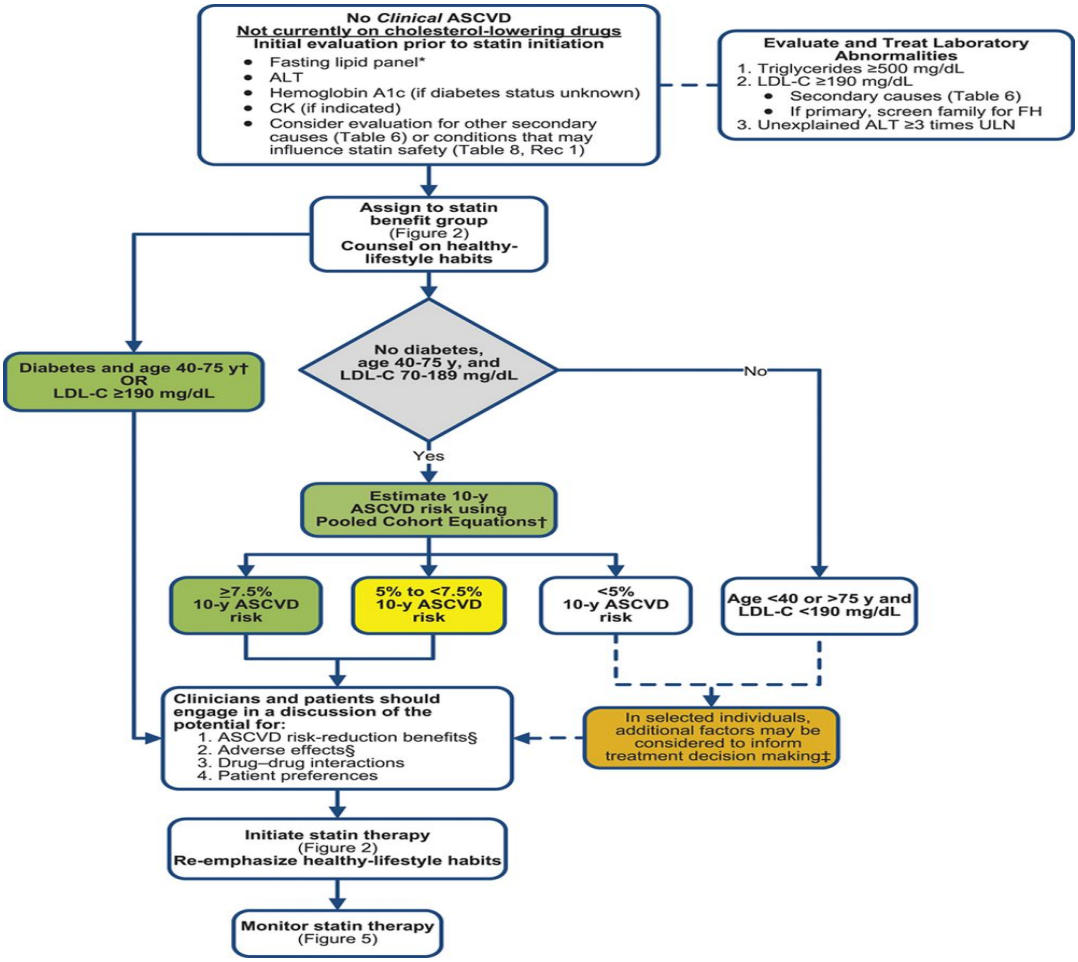


Figure 4. Initiating Statin Therapy in Individuals Without *Clinical* ASCVD. Colors correspond to the Classes of Recommendation in Table 1. *Fasting lipid panel preferred. In a nonfasting individual, a non–HDL-C level ≥220 mg/dL could indicate genetic hypercholesterolemia that requires further evaluation or a secondary etiology. If nonfasting triglycerides are ≥500 mg/dL, a fasting lipid panel is required. †The Pooled Cohort Equations can be used to estimate 10-year ASCVD risk in individuals with and without diabetes. A downloadable spreadsheet enabling estimation of 10-year and lifetime risk for ASCVD and a Web-based calculator are available at http://my.americanheart.org/cvriskcalculator and http://www.cardiosource.org/en/Science-And-Quality/Practice-Guidelines-and-Quality-Standards/2013-Prevention-Guideline-Tools.aspx. ‡For those in whom a risk assessment is uncertain, consider factors such as primary LDL-C ≥160 mg/dL or other evidence of genetic hyperlipidemias; family history of premature ASCVD with onset <55 years of age in a first-degree male relative or <65 years of age in a first-degree female relative, high-sensitivity C-reactive protein ≥2 mg/L; CAC ≥300 Agatston units or ≥75th percentile for age, sex, and ethnicity (for additional information, see http://www.mesa-nhlbi.org/CACReference.aspx); ABI <0.9; or lifetime risk of ASCVD. Additional factors that may aid in individual risk assessment could be identified in the future. §1) Potential ASCVD risk-reduction benefits. The absolute reduction in ASCVD events from moderate- or high-intensity statin therapy can be approximated by multiplying the estimated 10-year ASCVD risk by the anticipated relative-risk reduction from the intensity of statin initiated (~30% for moderate-intensity statin or ~45% for high-intensity statin therapy). The net ASCVD risk-reduction benefit is estimated from the number of potential ASCVD events prevented with a statin, compared to the number of potential excess adverse effects. 2) Potential adverse effects. The excess risk of diabetes is the main consideration in ~0.1 excess cases per 100 individuals treated with a moderate-intensity statin for 1 year and ~0.3 excess cases per 100 individuals treated with a high-intensity statin for 1 year. In RCTs, both statin-treated and placebo-treated participants experienced the same rate of muscle symptoms. The actual rate of statin-related muscle symptoms in the clinical population is unclear. Muscle symptoms attributed to statin therapy should be evaluated (see Table 8, Safety Recommendation 8). ABI indicates ankle-brachial index; ALT, alanine transaminase; ASCVD, atherosclerotic cardiovascular disease; CAC, coronary artery calcium; CK, creatine kinase; FH, familial hypercholesterolemia; LDL-C, low-density lipoprotein cholesterol; MI, myocardial infarction; RCT, randomized controlled trial; and ULN, upper limit of normal.

Stone NJ, Robinson JG, Lichtenstein AH, Bairey Merz CN, Blum CB, Eckel RH, Goldberg AC, Gordon D, Levy D, Lloyd-Jones DM, McBride P, Schwartz JS, Shero ST, Smith SC Jr, Watson K, Wilson PWF. 2013 ACC/AHA guideline on the treatment of blood cholesterol to reduce atherosclerotic cardiovascular risk in adults: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines. *Circulation*. 2014;129(suppl 2):S1–S45

Appendix C

Open Access Consent Page

Stone NJ, et al.
2013 ACC/AHA Blood Cholesterol Guideline

This document was approved by the American College of Cardiology Board of Trustees and the American Heart Association Science Advisory and Coordinating Committee in November 2013.

The online-only Data Supplement is available with this article at http://circ.ahajournals.org/lookup/suppl/doi:10.1161/01.cir.0000437738.63853.7a/-/DC1.

The American Heart Association requests that this document be cited as follows: Stone NJ, Robinson J, Lichtenstein AH, Bairey Merz CN, Blum CB, Eckel RH, Goldberg AC, Gordon D, Levy D, Lloyd-Jones DM, McBride P, Schwartz JS, Shero ST, Smith SC Jr, Watson K, Wilson PWF. 2013 ACC/AHA guideline on the treatment of blood cholesterol to reduce atherosclerotic cardiovascular risk in adults: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines. *Circulation.* 2013;00:000–000.

This article is copublished in the *Journal of the American College of Cardiology.*

Copies: This document is available on the World Wide Web sites of the American College of Cardiology (www.cardiosource.org) and the American Heart Association (my.americanheart.org). A copy of the document is available at http://my.americanheart.org/statements by selecting either the "By Topic" link or the "By Publication Date" link. To purchase additional reprints, call 843-216-2533 or e-mail kelle.ramsay@wolterskluwer.com.

Expert peer review of AHA Scientific Statements is conducted by the AHA Office of Science Operations. For more on AHA statements and guidelines development, visit http://my.americanheart.org/statements and select the "Policies and Development" link.

Permissions: Multiple copies, modification, alteration, enhancement, and/or distribution of this document are not permitted without the express permission of the American Heart Association. Instructions for obtaining permission are located at http://www.heart.org/HEARTORG/General/Copyright-Permission-Guidelines_UCM_300404_Article.jsp. A link to the "Copyright Permissions Request Form" appears on the right side of the page.

(*Circulation.* 2013;00:000–000.)

***Circulation* is available at http://circ.ahajournals.org**

DOI: 10.1161/01.cir.0000437738.63853.7a

Appendix D

Confirmation Email for Consent to Publish

VALPARAISO UNIVERSITY

Sharnita Rice <sharnita.rice@valpo.edu>

RE: AHA Request: 15057-Valparaiso University-Sharnita Rice- 05.24.2019

3 messages

Jamie Page <jamie.page@heart.org>
To: Sharnita Rice <sharnita.rice@valpo.edu>

Fri, May 24, 2019 at 7:13 AM

Good Morning, Sharnita,

Thank you for providing the link to the article that you were using. This happens to be one of the few Open Access articles that the AHA has published so that changes everything. If you follow the terms & conditions of the highlighted section below, then you may use the figure, itself, in your thesis, according to this article information:

© 2013 The Expert Panel Members. The Journal of the American College of Cardiology is published on behalf of the American College of Cardiology Foundation by Elsevier Inc.; Circulation is published on behalf of the American Heart Association, Inc., by Wolters Kluwer. This is an open access article under the terms of the Creative Commons Attribution Non-Commercial-NoDervis License, which permits use, distribution, and reproduction in any medium, provided that the Contribution is properly cited, the use is non-commercial, and no modifications or adaptations are made.

I am sorry for any confusion and if you have any questions, please let us know.

Sincerely,

Jamie

COPYRIGHT PERMISSION REQUEST FORM:

http://copyright.heart.org

Ms. Jamie Page
Copyright Permissions Specialist
CEO/Legal Department
American Heart Association
7272 Greenville Ave.| Dallas | TX | 75231
O 214.706.1131 | Fax: 214.373.9818