EFFECT OF AN EDUCATIONAL INTERVENTION FOR HEALTHCARE PROVIDERS ON BODY MASS INDEX QUALITY MEASURES

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ABSTRACT

Increased body mass index (BMI) is associated with multiple complications and reducing BMI improves health. The Centers for Medicare & Medicaid Services (CMS) core quality measures (QMs) necessitate screening for out-of-range BMI at every visit and documenting a follow-up plan if one has not been documented within the previous six months. Historically, compliance rates at the project site have been low. Hence, the primary purpose of this study was to examine the effects of an educational intervention designed for healthcare providers on their documentation of body mass index (BMI) quality measure (QM) indicator in their patients’ medical records. Three providers in a Federally Qualified Health Center (FQHC) received an educational intervention about overweight and obesity status, including clinical practice guidelines, how to satisfy the BMI QM indicator within the electronic health record, and how to use an optional order set that includes CMS’s BMI QM indicator requirements. To evaluate the effect of the intervention de-identified patient data was analyzed prior to (Time 1), one-month after (Time 2), and two-months after (Time 3) the intervention. Providers evaluated the intervention and the optional order set via online surveys. Providers’ overall opinion of the BMI QM activity was that it was excellent ($M = 4$). There was a statistically significant increase in the percentage of patients with a BMI above the normal range with the BMI QM completion at Time 3 (95.5%) compared to Times 1 (63.4%) and 2 (73.6%), $\chi^2(2, N = 1549) = 134.55, p < .001$. All participants used and were very satisfied with the order set provided. This educational intervention designed for healthcare providers significantly increased documentation of the BMI
QM indicator in patient medical records. Therefore, it may be appropriate to implement the educational intervention at other FQHCs within the organization.
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# TABLE OF CONTENTS

Chapter I: Introduction........................................................................................................1
  Statement of the Problem.................................................................................................1
  Background and Significance of the Problem .............................................................2
  Organizational Needs Assessment..............................................................................6
  Research Question ......................................................................................................9
  Theoretical Framework ..............................................................................................10
  Evidence-Based Practice Model of Implementation.............................................11
  Definition of Terms ..................................................................................................14
  Conclusion ..................................................................................................................16

Chapter II: Review of the Literature .............................................................................17
  Search Criteria ...........................................................................................................17
  Critique and Synthesis of Evidence ...........................................................................19
  Rationale for Project ..................................................................................................30
  Conclusion ..................................................................................................................31

Chapter III: Methods ....................................................................................................32
  Design ..........................................................................................................................32
  Project Sponsor and Resources ..............................................................................33
  Human Subjects Review ............................................................................................33
  Population ...................................................................................................................34
  Procedures – Timeline ...............................................................................................35
  Instruments ................................................................................................................39
  Outcome Measurements and Data Analysis Plan ..................................................38
Conclusion ........................................................................................................... 41
Chapter IV: Results .............................................................................................. 43
   Analysis of Data .............................................................................................. 43
   Summary of Findings and Outcomes ............................................................... 55
Chapter V: Discussion and Conclusions ............................................................ 58
   Study Aims ..................................................................................................... 58
   Limitations ..................................................................................................... 61
   Implications for Practice, Education, Research, and Policy Dissemination ........ 64
   Recommendations for Nursing Practice and Further Study ......................... 66
Appendix A: Teaching Strategy and Learning Objectives .................................... 68
Appendix B: Order Set Templates ....................................................................... 69
Appendix C: Educational Activity Evaluation .................................................... 70
Appendix D: BMI Order Set Evaluation ............................................................... 72
Appendix E: Data Dictionary ............................................................................... 73
Appendix F: Reminder E-mail ........................................................................... 74
Bibliography ...................................................................................................... 75
LIST OF TABLES

Table 1: Comparisons of Characteristics of Patients at Three Times ..........................44
Table 2: Comparisons Across Time for Patients with BMI Above Normal ..................45
Table 3: Educational Intervention Evaluation ..................................................................46
Table 4: Evaluations by BMI Group for Ages 18-64 for All Times Combined ...............48
Table 5: Evaluations by BMI Group for Ages 65 and Older for All Times Combined ....50
Table 6: Evaluations by Age Group for Those with BMI of 25 or Higher for All Times Combined ......................................................................................................................51
Table 7: Predicting Provision of Handouts Using Logistic Regression ......................53
Table 8: Predicting Medication Orders Using Logistic Regression ............................54
Table 9: BMI Order Set Evaluation ................................................................................55
Chapter I: Introduction

Contemporary requirements established by the Centers for Medicare and Medicaid Services (CMS) promote the measurement of the quality of services healthcare providers deliver to their patients (CMS, 2015). Medicare, Medicaid, and many other insurers use reported quality measures (QMs) for incentive payments to encourage improvements in patient care outcomes (CMS, 2015). The QM for body mass index (BMI) is not consistently completed, thereby, overweight and obesity are underdiagnosed by healthcare providers despite the increased health risks for patients with these conditions (Kirk, Cramm, Price, Penny, & Jarvie, 2009). In order for Federally Qualified Health Centers (FQHC) to continue to receive full incentive payments, healthcare providers working in these centers must work towards improving QM. The purpose of this chapter is to present the background and significance of the problem, an organizational needs assessment, the research question, definition of key terms, and the theoretical framework and evidence-based practice model used to develop an intervention for healthcare providers to improve BMI quality measures.

Statement of the Problem

Overweight and obesity affects individuals from all age groups, races, socioeconomic levels, and educational levels. Obesity is a complex, chronic disease that affects more than one-third (37.9%) of American adults (Centers for Disease Control and Prevention (CDC), 2017b). The obesity rate between 1994 and 2014 increased from 22.3% to 37.9% in adults in the United States (US) (CDC, 2016, p. 221). The rate of overweight adults (including obese adults) in the US between 1994 and 2014 increased from 54.9% to 70.7% (CDC, 2016, p. 221). The prevention and management of obesity requires improved screening, diagnosis, intervention, and close follow-up practices to provide “effective, safe, efficient, patient-centered, equitable, and
timely care” (CMS, 2015, para. 3). CMS has created tools for healthcare providers to meet these quality standards referred to as “clinical QM” (CMS, 2015, para. 1). Healthcare providers must be educated about the significance of these measures, and more importantly, they must begin to appropriately screen and intervene when necessary to improve the health, wellness, and quality of life of their overweight and obese patients.

Background and Significance of the Problem

In the US, overweight and obesity is an epidemic. As of 2014, 70.7% were defined as overweight (including obese) with a BMI greater than 25, and over 35% of adults in America were considered obese with a BMI greater than 30 (CDC, 2017b). In the state of Idaho, statistics indicate a trend that obesity has increased significantly over the last 25 years. The current rate of obesity in the state is 29.6% compared to 9.3% in 1990 (Idaho Department of Health and Welfare, 2013).

The annual cost of obesity in the US is $147 billion (CDC, 2017a) and the estimated healthcare expense on obese patients is approximately 100% higher than for those with a healthy weight (Hammond & Levine, 2010). The individual cost for healthcare services is $1429 higher annually for the obese patient compared to a healthy weight patient (CDC, 2017a). Ensuring that QMs are completed not only benefits the patient, but there is also a financial incentive for healthcare providers who comply with the clinical guidelines. Insurance companies including Medicare, Medicaid, and many private insurance companies use the electronic data related to BMI QMs to provide payment incentives to providers (CMS, 2015).

Obesity increases the risk for many cardiovascular diseases and comorbidities including coronary artery disease, hypertension, stroke, type two diabetes, and hyperlipidemia. The cardiovascular conditions associated with obesity are among the leading causes of death in the
There is strong evidence to support that in overweight and obese patients, reduction of BMI reduces the risk of developing type two diabetes, stroke, and fatal cardiovascular disease (Jensen, et al., 2014). Additionally, reducing BMI can reduce hemoglobin A1c, cholesterol, blood pressure, type two diabetes and all-cause mortality (Jensen et al., 2014). The 2013 AHA/ACC/TOS Guidelines for the Management of Overweight and Obesity in Adults recommend healthcare providers counsel patients to begin lifestyle interventions which reduce BMI by three to five percent in order to reduce these risks (Jensen, et al., 2014).

The most cost effective and simple method of screening for overweight and obesity is the measure of BMI as it uses height and weight which are easily measured during an office visit (CDC, 2017c). Due to the poor sensitivity and specificity of BMI, there are some individuals in which the BMI does not accurately reflect body fat percentage such as those with a large muscle mass (Rothman, 2008). However, there is insufficient evidence from available research to support using waist circumference or alternative BMI cut-points based on age, sex, or race as substitute determinations for diagnosis of overweight and obesity (Jensen, et al., 2014). Clinical practice guidelines from AHA/ACC/TOS (Jensen, et al., 2014) recommend continued use of the current BMI cut-points for the diagnosis of overweight and obesity.

Socioeconomic status impacts obesity in the US, although differently for men and women. There is little difference in the prevalence of obesity in men in different socioeconomic classes, except those with a household income at or above 350% of the poverty level tend to have higher rates (32.9%) of obesity than those men with household incomes below 130% of the poverty level (29.2%; CDC, 2010). Women with income below 130% of the poverty level have
a much higher rate of obesity (42%) than women with incomes at or above 350% of the poverty level (29.0%; CDC, 2010).

Safety is a concern for the obese individual. Scace (2014) discussed several problems for obese individuals in the workplace, which contribute to incidents of injury and illness including: increased risk of heat stress, higher risk of falls, ill-fitting personal protective equipment due to body size, and excessive daytime sleepiness due to sleep apnea. These safety issues are not limited to the work-place, as they can occur anywhere, including at home.

Although there is empirical evidence supporting that a primary care provider’s weight loss advice contributes to a considerable difference on the patient’s attempts to lose weight (Rose, Poynter, Anderson, Noar, & Conigliaro, 2013), providers across the country consistently demonstrate low rates of documentation of screening (50%) diagnosis (30%) and intervention (37%) for overweight and obese patients (Ma, Xiao, & Stafford, 2009). These low rates of documentation occur even if weight loss information has been presented to the patient during the visit (Klabunde et al., 2014). Healthcare providers have a responsibility to address overweight and obesity with their patients so that the patient can fully understand the impact of these conditions on their health and related co-morbid conditions.

Advising patients about their unhealthy weight and providing interventions to assist them with their weight loss goals is also ethically responsible practice. Taking the positive step toward helping patients achieve a healthy weight is an act of beneficence. A healthcare provider with integrity, knowing that unhealthy weight can potentiate further harm, will provide their patients with the interventions to mitigate these conditions. It has been suggested that BMI is characterized as another vital sign, which, if out-of-range, is as equally important as an out-of-range blood pressure or oxygen saturation (Kirk et al., 2009).
There are legal implications associated with overweight and obesity. However, most states have no law regarding weight discrimination. According to Puhl and Heuer (2010), “this lack of protection for obese individuals allows discrimination in employment, education, and healthcare to persist, contributing to health disparities, morbidity, and mortality” (p. 1025). Providing interventions for overweight and obese patients may promote weight reduction thereby reducing risk for discrimination. A patient that does not have obesity addressed by his or her healthcare provider may have legal implications because when a healthcare provider’s “practice falls below acceptable standards of care and competence, this exposes [them] to litigation” (National Commission on Correctional Health Care, 2016, para. 9).

Clinical practice guidelines from AHA/ACC/TOS recommend evaluating BMI and providing an intervention and follow-up plan for those out-of-range at least every year (Jensen et al., 2014). The CMS core quality primary care measures include screening for out-of-range BMI at every visit and providing a follow-up plan in the chart during that visit unless a plan has been documented within the previous six months (CMS, 2016).

An educational intervention for healthcare providers at the FQHC where the current project was implemented, was performed in February 2016 and demonstrated improvements in the QM completion for colon cancer screening (M. Barnes, personal communication, [January 6] 2017). The rate of completion of the QM for colon cancer screening in January 2016 was 11% (M. Barnes, personal communication, [January 6] 2017). An educational intervention for the healthcare providers was presented in February 2016 and by December 2016 the rate of completion of the QM was 59.6% (M. Barnes, personal communication, [January 6] 2017). To address the current issue of overweight and obesity, an educational intervention for healthcare providers may be necessary in order to improve compliance with completion of the BMI QM.
The healthcare providers at the study site have demonstrated their readiness to learn and improve their QMs.

**Organizational Needs Assessment**

Located in the Northwest US is a FQHC, a non-profit organization, accepting all patients with or without insurance. Those who cannot afford to pay for services at this FQHC are provided care regardless of financial status. Of the approximately 8,000 patients served by this center there are many uninsured, underinsured and low-income patients, and a small population of homeless patients (M. Barnes, personal communication, [January 6] 2017). The medical providers in this clinic include: one medical doctor, one doctor of osteopathic medicine, and two advanced practice registered nurses. Each provider is responsible for ensuring that every patient has completed QM requirements at every visit, including the BMI requirement.

There are limited resources for patients within the small community where the study site is located. There is only one option for dietician referrals within the local area and many patients, with and without insurance, cannot afford the high cost of special services such as those provided by a dietician (M. Barnes, personal communication, [January 6] 2017). While some patients have an insurance policy that will cover these services, many insurance companies do not cover the cost. The clinic has a large number of uninsured patients, comprising 13% of the overall patient population at the clinic (M. Barnes, personal communication, [January 6] 2017). The *2013 AHA/ACC/TOS Guideline for the Management of Overweight and Obesity in Adults* recommend that healthcare providers prescribe on-site, high-intensity, frequent visits (more than 14 visits within six months) for lifestyle intervention (Jensen et al., 2014). Many patients have a difficult time paying their copay for each visit and cannot afford clinic visits as frequently as recommended for high quality care for obesity.
The 2013 AHA/ACC/TOS Guideline for the Management of Overweight and Obesity in Adults recommend that healthcare providers prescribe a reduced calorie diet (Jensen et al., 2014). Paying for healthy foods is often problematic for this population of patients. A considerable number of patients use the food bank as their primary source for groceries; however, patients often report there are few healthy options available on the shelves at the foodbank (M. Barnes, personal communication, [January 6] 2017). Thus, patients can become easily discouraged in their efforts to lose weight.

Due to time constraints as well as more pressing medical concerns, an out-of-range BMI is frequently overlooked as an active diagnosis requiring intervention and follow-up and may not be documented. The current practice at the FQHC is to discuss and chart an out-of-range BMI if the patient has a particular concern about their weight and requests information or assistance regarding this concern (M. Barnes, personal communication, [January 6] 2017). In general, there is minimal documentation in the medical record related to overweight or obesity. Documentation of a patient’s BMI by the medical assistant occurs at all patient visits to the clinic. The result is available for healthcare providers to view the BMI result within the vital signs section of the electronic health record. However, BMI is not managed in a similar manner to other vital signs results. For example, if a blood pressure (BP) is out-of-range, there is a protocol to re-check the BP at least once during the visit. If the BP remains out-of-range, a diagnosis of elevated BP or hypertension should be added to the medical record and a follow-up plan must be included. For out-of-range blood pressures, the quality management team evaluates reports on a regular basis to ensure that all providers are compliant with the blood pressure protocol.
Unlike the BP monitoring protocol, there is no such program in place for providers to be held accountable for following recommendations regarding overweight or obese patients. Rather, it is the provider’s discretion to document the diagnosis and plan. Although the quality management section of the electronic health record clearly indicates when BMI is out-of-range and requires intervention including scheduled follow-up at least every six months, compliance rates are low (M. Barnes, personal communication, [January 6] 2017). This does not follow clinical guidelines for practice and does not meet the BMI QM therefore it is important to address with the providers.

**Perceived Barriers**

Some of the barriers to implementing change in this clinic include provider resistance to change, lack of written educational resources for patients, and current processes for the evaluation of change or care improvement. There has been some resistance to change in current practice due to a perceived lack of time during the patient visit (M. Barnes, personal communication, [January 6] 2017). Discussing an out-of-range BMI with a patient is a sensitive topic that requires time and care. When more pressing issues, such as a respiratory problem or a significantly elevated blood pressure must be addressed, it may be difficult to accommodate a discussion about BMI. Healthcare providers may also lack appreciation for the impact that their counsel can have on patient outcomes. Additionally, healthcare providers may be concerned about patient resistance to discussions regarding weight management.

**Need for Change**

Healthcare providers at the FQHC may require education and systems-based changes to support improvements in practice. The organization values healthcare for all individuals. Schein (2010) asserts that the basic underlying assumptions within the organization will affect how the
members of the organization will behave. Staff members within this clinic are receptive to change when they are provided with evidence-based information to support the change, suggestions to improve workflow in order to accomplish the task, and when the changes are aligned with the mission and values of the organization (M. Barnes, personal communication, [January 6] 2017).

Prior to implementation of this study, there was no procedure within the clinic to inform providers of progress towards their goal of increased documentation and intervention for out-of-range BMI. However, the clinic does have a quality improvement (QI) team that includes a QI coach, a lead provider, the clinic administrator, the medical support supervisor, and representatives from the call center, front desk, and medical assistant team. The QI team meets weekly to monitor progress toward goals in many areas of QI throughout the clinic, including clinical QM. The QI coach role in the study includes the facilitation of the development and implementation of a plan to evaluate fulfilment of the criterion of QM in the electronic health record. Additionally, sustainability of the project may be accomplished by the QI coach by continuing to monitor the BMI QM completion rates and evaluating the effectiveness of the program by monitoring the changes in patients’ BMI over time.

**Research Question**

The first step when evaluating an opportunity to improve clinical practice is to determine a scholarly clinical question. The clinical question to be addressed for this scholarly project is: What is the effect of an educational intervention designed for healthcare providers in a FQHC on their documentation of BMI QM indicators in their patients’ medical records over two months?
Theoretical Framework

The theoretical framework for this project is the theory of planned behavior (Ajzen, 1991). This theory conceptualizes the multiple factors that cause individuals to perform certain behaviors. A person must first have intention before they will actually engage in a particular behavior. The person’s intent to perform the behavior is influenced by three factors: attitude toward the behavior, subjective norms, and perceived behavioral control (Ajzen, 1991). Using this theoretical framework as a guide, meaningful behavioral change can be created.

Attitude Toward the Behavior

Attitude toward the behavior is defined as “the degree to which a person has favorable or unfavorable evaluation or appraisal of the behavior in question” (Ajzen, 1991, p.188). Ajzen (1991) suggests that a person’s attitude is associated with their belief about the outcome. If the healthcare provider believes that a patient will not change their behaviors despite any education being provided, they will be less likely to intervene. Alternatively, if the provider perceives that their intervention may have positive outcomes, they will be more likely to intervene. A provider with limited time available during a visit can learn to take a moment to explain to the patient the importance of returning to the clinic to specifically address their weight. This change of attitude can facilitate an appropriate intervention, while still addressing any immediate concerns the patient may have regarding weight.

Subjective Norms

Social pressures, or the belief that peers are engaging positively in a particular behavior, effects whether or not the person participates (Ajzen, 1991). Without social pressure, it is far less likely that individuals will become involved. Healthcare providers must understand the importance of the need to intervene, document, and follow up with overweight and obese
patients. However, in order for them to be inclined to do so, they need to know that others (within the organization and/or nationally) are also intervening, documenting, and following up with their own patients and that it is an expected behavior.

**Perceived Behavioral Control**

The amount of difficulty that a person believes is required to perform a task is referred to as “perceived behavioral control” (Ajzen, 1991, p. 183). If a person believes they will be able to succeed at the task, they will be much more likely to do so. Healthcare providers may avoid the topic of weight because they believe that their efforts to effect change in the patient may be met with resistance, hurt feelings, or anger, requiring more time, energy, and persistence. However, if providers are able to understand that intervention does make a difference for patients, it may increase the likelihood of them performing the intervention.

**Summary**

The theory of planned behavior (Ajzen, 1991) is the theoretical framework to guide the development of an intervention to educate healthcare providers. The intervention addressed the importance of counseling and providing individualized interventions for overweight and obese patients. Appropriately documenting the interaction with the patient, and following up with the patient in a timely manner will be improved with improvements in the attitudes toward the behavior, subjective norms, and perceived behavioral control.

**Evidence-Based Practice Model of Implementation**

The Stetler model of evidence-based practice was used to guide and implement this project. The Stetler model describes five phases of implementation: preparation, validation, comparative evaluation/decision making, translation/application, and evaluation (National Collaborating Centre for Methods and Tools (NCCMT), 2011). Following this model, the
researcher was able to implement the project ensuring that evidence-based practice informed the planning and design of the study (NCCMT, 2011).

**Preparation**

In the preparation phase of the Stetler model, the project was developed (NCCMT, 2011). First, a problem was identified within the organization. The CMS core quality primary care measures included screening for out-of-range BMI at every visit and entering a follow-up plan in the chart during that visit if there was not a plan or interventions documented within the previous six months (CMS, 2016). The majority (74.5%) of adult patients seen in the clinic are overweight or obese and the FQHC site had low rates of completion (63.4%) of the BMI QM; therefore, a plan was developed to address this problem. A thorough search of research evidence was completed in this phase to support a practice change. The next step was to plan and design a team so that there was buy-in from participants and stakeholders during project implementation. The team collaborated on measurable goals for the project, created a timeline and measurable outcomes, and determined a manageable, efficient, and reasonable plan to accomplish the goal.

**Validation**

During the validation phase, the Stetler model recommends performing a thorough literature review (NCCMT, 2011). The literature review was conducted to evaluate evidence to support screening for BMI and increasing the percentage of patients for whom appropriate intervention by documentation in the electronic health record when the BMI is above normal range. The literature was critiqued and appropriate articles for inclusion were selected. Each individual study was evaluated in a table of evidence using the Strength of Recommendation Taxonomy (SORT) rating system of one, two, or three. Subsequently the body of evidence was
graded based upon quantity, consistency, and quality using the SORT algorithm and rating system of A, B, or C (Ebell et al., 2004).

**Comparative Evaluation/Decision Making**

In the comparative evaluation/decision making phase of the Stetler model, the literature was synthesized to evaluate similarities and differences in results (NCCMT, 2011). For this project, there were several themes in the literature addressing the different components of the research question. The full details of the implementation of this phase is in Chapter II, under “Review of the Literature”.

**Translation/Application**

The plan for change was created in the translation/application phase of the Stetler model (NCCMT, 2011). The model suggests using the previous steps to develop the research question. Additionally, in this phase, the research design, methods, and change strategies were developed and implemented (NCCMT, 2011). See Chapter III details the methodology utilized in the development of this research project.

**Evaluation**

Based on the Stetler model, the evaluation phase consisted of a review of the data from the project to guide the development of recommendations for further practice change and sustainability (NCCMT, 2011). Chapters IV and V contain further details on the evaluation of the project and recommendations for practice change.

**Conclusion**

The Stetler model of evidence-based practice is a conceptual model to guide the implementation of this translational research project involving the creation of an intervention to facilitate healthcare providers in a federally qualified health center meet the quality performance
measure for BMI (NCCMT, 2011). Reduction in BMI for overweight and obese patients may be possible if the project is implemented successfully. Following Stetler’s guidelines helps “practitioners assess how research findings and other relevant evidence can be applied in practice” (NCCMT, 2011, para. 2).

**Definition of Terms**

This study evaluated healthcare provider rates of completion of the CMS QM for BMI within the electronic health record. QMs, used by CMS as well as other payers, are “tools that help measure and track the quality of healthcare services provided by eligible professionals” (CMS, 2015, para. 1). BMI is defined as a person’s weight in kilograms divided by the square of height in meters (CDC, 2012). Adult individuals are considered to be overweight if their BMI falls between 25 and 29.9, and obese if their BMI is greater than or equal to 30 (CDC, 2012). However, the CMS BMI QM defines normal parameters for those age 65 years and older as a BMI greater than or equal to 23 and less than 30 (CMS, 2016). Insurance companies use the electronic data related to these measures to offer payment incentives to healthcare providers for delivering “effective, safe, efficient, patient-centered, equitable, and timely care” (CMS, 2015). The BMI QM evaluates the percentage of patients age 18 years and older for whom the healthcare provider has documented BMI within their electronic health record in the prior 6-month period and when the BMI is out-of-range, a follow-up plan of intervention has been documented during the patient encounter (CMS, 2016). The follow-up plan may include, but is not limited to, documentation of weight loss counseling, educational materials provided, referrals, or prescription or administration of a weight loss medication or dietary supplement (CMS, 2017).
The study was conducted in a FQHC which is an organization that “serve[s] an underserved area or population, offer[s] a sliding fee scale, provide[s] comprehensive services, [has] an ongoing quality assurance program, and [has] a governing board of directors” (United States Department of Health and Human Services (HHS), 2016, para. 1). For the purposes of this study, a healthcare provider is defined as a person who provides healthcare services to a patient such as a physician or an advanced practice registered nurse. The study site is a FQHC with one medical doctor (M.D.), one doctor of osteopathic medicine (D.O.), and two advanced practice registered nurses. All of the healthcare providers deliver family practice primary care services to individuals of all ages.

According to Merriam-Webster’s dictionary (2017), the medical definition of the term intervention is “the act or fact or a means of interfering with the outcome or course especially of a condition or process (as to prevent harm or improve functioning)” (para 1). The intervention in this study was designed to improve BMI screening, documentation rates for overweight and obese patients, and to increase the rate of completion of the BMI QM within the electronic health record. The educational intervention included a 30-minute PowerPoint presentation and handouts containing clinical practice guidelines and CMS’s QMs for primary care. The presentation and handouts were provided to all three healthcare providers eligible for the study during a regularly scheduled staff meeting. During the two-month course of data collection, an email was sent to all three healthcare providers every two weeks. The email contained a reminder to add overweight and obesity documentation in their charting for each patient with a BMI that is above the normal range for the patient’s age.
The QI coach is an employee of the federally qualified health center. Expected job duties of the QI coach include analysis of data from the electronic health record system and providing assistance in planning, implementation, and evaluation of all QI projects with the healthcare providers and staff at the study site. The QI coach also assists with training and encouraging all employees to improve efficiency and quality of care at the clinic level (M. Barnes, personal communication, [January 6] 2017).

Conclusion

In chapter one, the background and significance of the problem were explained, an organizational needs assessment was articulated, and the research question was described. Justification was provided for the theoretical framework and evidence-based practice model used to develop an intervention for healthcare providers. Definitions of key terms used in the research question were also described. The obesity epidemic is a problem that must be addressed. It has been shown that healthcare provider evaluation and intervention is effective in creating important health outcomes in this patient population (Rose et al., 2013).
Chapter II: Review of the Literature

This chapter provides the search criteria to find relevant research relating to BMI screening, intervention, documentation, and BMI educational interventions for healthcare providers. A thorough critique and synthesis of the pertinent evidence is presented. Additionally, this chapter provides the rationale for a translational scholarly project of an intervention to facilitate healthcare providers in a FQHC meet the quality performance measure for BMI.

Search Criteria

An electronic search of PubMed MEDLINE, the Cochrane Database of Systematic Reviews (Evidence Based Medicine Reviews), and Georgetown University’s One Search was performed using the search terms obesity, BMI, Body Mass Index, Medicare, screening, intervention, health education, quality measures, and documentation. An ancestry search of the references from applicable articles was completed to find additional relevant materials. Inclusion criteria: full-text, English language, human, last five years, and adult 18+ years. Exclusion criteria included: children, pregnant women, populations other than the population of interest, and healthcare specialties other than primary care (i.e., cardiology, rheumatology, gastroenterology, hepatology, pediatrics, urology, nephrology, epidemiology, obstetrics, or gynecology).

A search of PubMed MEDLINE with the search term obesity AND screening AND health education was performed resulting in nine articles. Filters utilized for this search included, free full-text available, five years, humans, English language, and adult 18+ years. None of the nine articles were applicable for inclusion in the review, however, an ancestry search
of the articles’ reference lists resulted in one article that met inclusion criteria, which was a retrospective cohort study (Hernandez-Boussard, Ahmed, & Morton, 2012). An additional search using the terms healthcare provider AND intervention AND body mass index resulted in 48 articles. Two of the articles were applicable for inclusion because of their relevance to the clinical question: one cross-sectional survey (Pool et al., 2015) and one randomized controlled trial (Driehuis et al., 2012).

A search of Cochrane Database of Systematic Reviews was performed with the search terms body mass index AND screening AND education returned 116 articles. There were 115 articles not applicable to this review as they did not meet inclusion criteria. After reviewing the articles, only one systematic review of randomized controlled trials was applicable to this search (Flodgren et al., 2010).

A search of Cochrane Database of Controlled Trials was performed using the search terms BMI AND documentation resulting in 15 articles. One article, a randomized controlled trial (Tang et al., 2012) was appropriate for inclusion.

Repeating the search strategy on Georgetown University’s One Search, the search terms BMI AND documentation resulted in 2,013 articles after application of the exclusions and filters. Filters included full-text, English language, peer-reviewed and scholarly journal articles, humans, last five years, and adults. In this search four applicable articles were found. One cross-sectional analysis (Ferrante, Piasecki, Ohman-Strickland, & Crabtree, 2009), one retrospective cohort study (Ren et al., 2016), one retrospective QI study (Farran, Ellis, & Barron, 2013), and one prospective cohort study (Barnes, Theeke, & Mallow, 2015) were obtained through this search.
An ancestry search of the references of the chosen articles led to the inclusion of one retrospective analysis (Gray, Picone, Sloan, & Yashkin, 2015), two cross-sectional, retrospective analyses (Aleem, Lasky, Brooks & Batsis, 2015; Bleich, Pickett-Blakely, & Cooper, 2011) and one meta-analysis (McTigue et al., 2003). The search resulted in a total number of 12 articles for inclusion in the literature review for evaluation and synthesis.

**Critique and Synthesis of Evidence**

A thorough review of the literature was performed and each study was evaluated individually using the Strength of Recommendation Taxonomy (SORT) rating system (Ebell et al., 2004). This rating system evaluates and grades individual studies and collective bodies of evidence to provide recommendation about the quality of that evidence. A group of studies, or body of evidence, is appraised as A, B, or C. A recommendation that is assigned an A-level rating is “based on consistent and good quality patient-oriented evidence” (Ebell et al., 2004, p. 62). If the information is “inconsistent or limited-quality patient-oriented evidence” it is assigned a B-level rating (Ebell et al., 2004, p. 62). “A C-level recommendation is based on consensus, usual practice, opinion, disease oriented evidence, or case series for studies of diagnosis, treatment, prevention, or screening” (Ebell et al., 2004, p. 62). Individual “levels of evidence ratings” range from one to three (Ebell et al., 2004, p. 62). A level one study is “good quality patient-oriented evidence”, level two studies have “limited quality patient oriented evidence”, and level three is “other evidence” (Ebell et al., 2004, p. 62).

There are several themes in the literature addressing the various components of the research question. Routine screening for BMI is recommended and intervention for out-of-range BMI produces positive results for patients. The study by Farran et al., (2013) validated the importance of using QMs to identify gaps in individual clinic’s reporting of BMI and to diagnose
patients that are overweight or obese. Overall, the body of literature indicates that education provided to healthcare providers can improve documentation rates, and positively impact interventions for patients.

**Screening for BMI**

Multiple studies evaluate the effects of screening for BMI on healthcare provider and patient behavior. Farran et al. (2013) found that when providers increased screening of overweight and obese individuals, improvements were made in the rates of diet and activity counseling. Furthermore, the documentation of diagnoses for overweight and obesity also increased.

A meta-analysis, performed by McTigue et al. (2003), summarized the evidence for the United States Preventive Services Task Force (USPSTF) recommendations for screening and interventions for obesity. Medical literature was reviewed to evaluate the effectiveness of obesity screening in adults. Randomized controlled trials (RCTs), systematic reviews, cohort, and non-randomized controlled studies were used in their analysis. The results of the meta-analysis did not identify any harms to screening or counseling for increased BMI. The meta-analysis limitation is that risks related to screening for BMI have not been studied, so there may be risk associated with stigmas related to obesity.

**Impact of Discussion of Weight Status with a Healthcare Provider**

Healthcare provider discussion of weight status with patients can have an impact on patient behavior. In a cross-sectional retrospective analysis, Pool et al. (2015) evaluated whether discussion of weight status with a physician had an effect on weight loss in patients who were overweight or obese. The authors used data from the National Health and Nutrition Examination Survey (NHNES) from 2005 to 2008. Subjects included adults between the ages of 20 and 64
with a BMI greater than 25. This study is a self-reported survey, and it included a question that asked if the patient had ever been told they were overweight by a healthcare provider. Unfortunately, the time period for this discussion was not specified for the past year. However, the final sample included 5054 participants and results indicated overweight and obese individuals were more likely to have lost five to 10 percent of their body weight in the last year if they were informed by their healthcare provider that they were overweight.

The study by McTigue et al. (2003), showed healthcare provider counseling lead to an average weight loss of three to five kilograms. A study by Pool et al. (2015) found an intervention as simple as a healthcare provider’s discussion of weight status with patients is associated with clinically significant weight loss. In the study by Tang et al., (2012) most patients reported that after they received weight loss counseling by their healthcare provider, 93% had increased motivation to lose weight and 90% were making progress towards their goals.

In another study, Driehuis et al. (2012) performed a randomized controlled trial evaluating lifestyle counseling by an advanced practice registered nurse on physical activity and diet, compared with usual care by a general practitioner over three years. A total of 455 overweight or obese subjects with hypertension or hyperlipidemia were included in the study; 119 subjects withdrew prior to completing the study. There were no significant differences in physical activity or diet found between the two groups after three years. Limitations of the study include self-report from patients and potentially, overestimation of their lifestyle changes on the self-report questionnaire. At the conclusion of the study, all participants were more active and had a healthier diet compared to the beginning of the study. Results of the study revealed, even in patients who had only one meeting with their provider to discuss baseline weight, improvement was observed with physical activity as well as diet.
Healthcare Provider Documentation of Obesity

It has been shown that although many healthcare providers report they are documenting appropriately regarding obesity, a significant percentage of patient charts are lacking the correct documentation (Aleem et al., 2015). A cross-sectional, retrospective analysis (Aleem et al., 2015) compared provider self-reported obesity documentation to their actual documentation of obesity in the electronic health record. A total of 51 providers responded to the survey, yielding a response rate of 91%. Most healthcare providers (74.4%) reported they diagnosed obesity and addressed the disease with patients. However, review of the medical records, including a total of 21,945 clinic visits, revealed that while BMI was documented 93% of the time, only 27% of patients meeting the criteria for obesity had documentation of the diagnosis in their chart. This study was limited to a rural area with little ethnic diversity and it is noted that while the healthcare provider may not have documented the discussion and diagnosis, this does not mean it was not occurring. The authors assert “strategies for accountable care organizations to address this epidemic using evidence-based intervention are critically needed” (Aleem et al., 2015, p. 412).

Intervention for Overweight and Obesity

Interventions for overweight and obesity are well defined by the CDC (2015) and the USPSTF (2012). The evidence shows increased BMI is associated with multiple complications and reducing BMI both reduces risks of comorbid conditions and mortality, as well as improves current health (McTigue et al., 2003). In multiple studies, various interventions for increased BMI (pharmacotherapy, surgery, or a lifestyle counseling intervention) produced positive results (Driehuis et al., 2012; McTigue et al., 2003; Pool et al., 2015). Study results indicate patients
self-report a change in their behavior when their healthcare provider discusses their overweight or obesity status with them (Pool et al., 2015).

The study by McTigue et al. (2003), showed interventions including behavioral therapy, counseling, pharmacotherapy, and surgery all had a beneficial effect on weight loss. The literature contains five level-one studies (Driehuis et al., 2012; McTigue et al., 2003; Pool et al., 2015; Tang et al., 2012) and one level-two study (Flodgren et al., 2010), all in support of continued, routine intervention for overweight and obesity. However, one level-two study showed negative effects including decreased preventive care services when this advice is followed (Hernandez-Boussard et al., 2012).

Results of a study by Hernandez-Boussard et al. (2012) revealed while an obese patient may receive screening, obesity education, and diagnosis, other interventions such as cancer screening, tobacco cessation education, injury prevention counseling, and psychological referral were missed. The authors highlight the importance of addressing all preventive measures for the obese individual and not strictly focusing on weight.

**Educational Interventions for Healthcare Providers**

Intervention to increase healthcare provider knowledge related to the diagnosis and treatment of overweight and obese patients can improve not only the healthcare provider rates of BMI QM completion but also may have an effect on patient outcomes (Farran et al., 2013). The components of the intervention for healthcare providers in this study was created based on the results found in literature. Healthcare providers may benefit from continuing education regarding interventions (Ferrante et al., 2009), appropriate documentation (Tang et al., 2012), and requirements for meeting QMs (Farran et al., 2013). Additionally, healthcare providers may require further education regarding use of the electronic health record for documentation of
diagnosis and intervention for obesity (Ren et al., 2016; Aleem et al., 2015). It has been suggested that improved education for healthcare providers regarding obesity is required to improve understanding of the obese patient (Ferrante et al., 2009).

A retrospective analysis, performed by Farran et al. (2013), reviewed and collected data from 420 office visit notes (210 patient charts pre-intervention and post-intervention) from three separate clinics to evaluate whether healthcare providers improved adherence to overweight and obesity treatment guidelines after a continuing education intervention. The intervention involved education related to the National Heart Lung and Blood Institute’s 1998 overweight and obesity guidelines as well as training on how to implement changes into practice with a template in the electronic health record, with minor changes in the clinic practice flow. The study evaluated healthcare providers’ documentation of: height, weight, BMI, waist circumference, diagnosis of overweight or obesity, and behavioral recommendations. Limitations included a lack of generalizability and reduced reliability and validity as only one individual performed all data collection. Results did show a statistically significant increase in documentation of BMI and diagnoses of overweight and obesity and interventions such as diet and exercise plans. “Care delivered to overweight/obese adults is systematically accessible through identifying measurable quality indicators derived from the clinical guidelines” (Farran et al., 2013, p. 154).

Ren et al. (2016), performed a retrospective cohort study to evaluate the effect of didactic lectures on provider documentation of counseling for obesity. As part of a two-stage intervention for internal medicine residents, participants were initially provided with data about their collective performance and the need for improvement. The number of residents included in the study was not provided. In the second stage of the intervention, residents were provided two
sessions, two weeks apart, of educational intervention regarding documentation and the importance of providing patient education for obesity. The duration of the education sessions was not provided. The participants were provided with feedback after a review of their own medical record documentation and counseling rates. Researchers reviewed patient charts from the month prior to and one month following the interventions. During the study, 278 patients with a BMI greater than 30 were seen in the clinic. Of the 139 patients seen prior to the intervention, 48% ($N = 67$) had obesity documentation in their chart. Following the intervention, 50% ($N = 70$) of the patients had documentation of obesity charted which was not a statistically significant change ($p = 0.72$). Logistic regression models were used to analyze the effect of the intervention on documentation and counseling adjusting for different patient characteristics as well as resident sex and training level. The results indicated that there was no difference before and after the intervention on healthcare provider documentation and counseling for overweight and obesity with or without adjusting for variables (both $p > 0.05$). There were several limitations to this study including the short length (only one month pre- and one month post-intervention), not having alerts or reminders to the providers regarding increased BMI in patients, and that only one small clinic was used for the assessment, limiting generalizability. Study authors state that the length of the presentation may have been too short. This study shows a multi-faceted approach including both continuing education and an increased electronic health record alert system may be necessary to improve results.

A meta-analysis by Flodgren et al. (2010) reviewed six randomized controlled trials comparing routine care with interventions directed towards changing healthcare provider behavior or the organization of care to encourage weight loss in overweight and obese adults. The study design was different in each of the included studies. The randomized controlled trials
involved 246 healthcare providers and 1324 overweight or obese patients. Results showed the various educational interventions for healthcare providers were associated with weight reduction in their patients (by 1.2kg, 95%CI -0.4 to 2.8kg). However, the included studies had inconsistent results and resulted in moderate unexplained homogeneity ($I^2 = 41\%$).

In a prospective cohort study Barnes, et al. (2015) evaluated a clinical practice change to “increase provider adherence to national clinical practice guidelines for the diagnosis and treatment of obesity in adults” (p. 300). Support staff received education about how to measure height and weight and how to document this data appropriately in the chart. An educational session was presented to healthcare providers regarding barriers to addressing obesity and clinical practice guidelines. During the session, the healthcare providers discussed past patient issues with obesity intervention. A reminder system was implemented and patient education materials were given to healthcare providers. A project manager met with staff and providers once weekly throughout the project. All health records for adult patients age 18 to 64 were included for possible review and 100 records were randomly selected for the study.

Selection bias may have occurred in this study as it was completed at only one location and a control group was not utilized, possibly leading to a sample selection that is not representative of the population as a whole (Barnes et al., 2015). The lack of a control group and the intervention provided at only one location also limits the generalizability of the study results. The study did not include an evaluation of the healthcare providers’ perception of the intervention. While primary care providers in this study did increase their documentation rates for diagnosis (from two to four) and intervention (from two to six) the results were not significant. However, rates of documentation of BMI in patient charts by medical assistants did improve by 13% which was significant ($p = <0.01$). The authors recommend future studies to
evaluate the care of patients with obesity and identify effective interventions to overcome healthcare provider barriers and improve quality of care. Authors also suggest that it may be beneficial to have an on-site full-time project director available to providers who may have questions about new changes being implemented (Barnes et al., 2015).

The literature regarding educating providers about the importance of screening, intervention, and follow up for overweight and obesity is mixed (Flodgren et al., 2010) and several recommendations are made for further study in this area. A level-two study found that provider education increased documentation of diagnosis and intervention for out-of-range BMI (Farran et al., 2013). One level-one prospective cohort study resulted in only a slight increase in documentation rates for providers after educational intervention for providers and staff but the results were not statistically significant (Barnes et al., 2015). In a level-two meta-analysis, Flodgren et al. (2010) found mixed results regarding provider compliance with guidelines for BMI screening and intervention after an educational intervention, and a level-two prospective cohort study found that there was no improvement in provider documentation after intervention (Ren et al., 2016). Based on the literature review using the SORT method (Ebell et al., 2004), the use of an obesity and documentation education intervention for healthcare providers receives a grade B recommendation.

**Relationship between Patient Characteristics and Healthcare Provider Practices**

Healthcare providers may have different practice patterns for patients with different characteristics. Hernandez-Boussard, et al. (2012), performed a retrospective analysis to evaluate whether obese patients receive the same care as patients of normal weight. The National Ambulatory Medical Care Survey (NAMCS) was used to review multiple preventive service measures from 2005-2007. Millions of patient charts (N = 866,415,856) from around the
country were included in the review. Limitations included using aged data, data taken from only one encounter, and data that was based on physician self-reports. Patients identified by their healthcare provider as overweight or obese were significantly more likely to receive diet, exercise, and weight management education as compared to their normal weight counterparts. However, overweight and obese individuals in the study were significantly less likely to receive cancer screenings, tobacco and injury prevention education, and psychotherapy referrals than normal weight patients. This study highlights the differences in preventative care screening between normal weight and obese or overweight individuals.

A level-two cross-sectional, retrospective analysis by Bleich et al. (2011) studied the practices of healthcare providers as well as predictors of their practice in relation to obese patients. The records of 2,458 patients from the 2005 NAMCS were reviewed for the study. The variables used in this study included: race, ethnicity, gender, age, region, and health insurance, patient co-morbidity risk status, obesity class, physician specialty, and characteristics of the clinical encounter (visit type, seen before by practice, and time spent with provider). The results were analyzed using multivariate logistic regression with binary outcomes. The study found women (OR = 1.54; 95% CI: 1.14, 2.09), young adults (age 18-28: OR = 2.61; 95% CI 1.37, 4.97), and severely obese individuals (BMI >35 and <40: OR = 2.08; 95% CI: 1.53, 2.83; BMI >40: OR = 4.36; 95% CI: 3.09, 6.16) were significantly more likely to receive a diagnosis of obesity in their medical record. Additionally, the majority of obese patients included in the study had no diagnosis of obesity and did not receive any counseling related to their weight. This study highlights the importance of including patient characteristics in the evaluation of overweight and obesity management to screen for differential treatment by healthcare providers.
Farran et al. (2013) evaluated patient characteristics in addition to documentation of quality indicators to assess for possible effects on the quality of care provided to overweight and obese patients. Completeness scores for healthcare provider documentation of diagnosis and intervention for overweight or obesity did not vary significantly by BMI, gender, or age following an educational intervention. Similarly, Flodgren et al. (2010) suggests that research should include patient demographics for improved understanding of results.

**Order Sets**

Order sets within the electronic health record may assist healthcare providers with diagnosis, intervention, and documentation for overweight and obese patients. In the level-three retrospective analysis performed by Farran et al. (2013), a template in the electronic health record increased healthcare provider documentation of BMI, diagnoses of overweight and obesity, and interventions such as diet and exercise plans.

In a level-one randomized controlled trial (Tang et al., 2012), an electronic health record tool was created and evaluated to determine whether or not healthcare providers would increase the frequency of recognizing overweight and obese patients. The study was also intended to evaluate whether or not the tool impacted counseling regarding weight loss. A total of 40 physicians participated in this study in one clinic with more than 60,000 patient visits per year. An alert was created to notify physicians of an overweight or obese patient based on their BMI. A template was also available so that counseling could be managed through individual goals and action plans with the patient. The provider could select a target weight, choose specific strategies for weight control, assess the patient’s confidence, and determine whether or not the patient would be able to complete the selected plan. Once the template was complete, an order set was made available in the diagnosis and plan section in the patient’s chart.
There were limitations to this study. First, only one clinic was used so, results are not generalizable. Second, patients self-reported their outcomes, so the results may not be accurate. Finally, control group participants were not interviewed about their experience with physicians that did not have the prompt, template, and order set available so the change may not be solely due to the electronic health record changes. However, physicians reported diagnosing patients they did not realize were overweight or obese. Additionally, those that had the electronic health record alert were more likely to diagnose and intervene for overweight and obesity. When surveyed about their perception of the tool, physicians reported that they often did not use the tool due to lack of time. When they did use the tool to help counsel overweight and obese patients, they had significantly higher documentation rates for diagnosis (97%) and plan (98%). Additionally, providers reported the tool improved their counseling effectiveness (Tang et al., 2012).

**Rationale for Project**

Gaps in the research include limited and conflicting data on the effects of healthcare provider education for screening, diagnosis, intervention, and documentation of BMI. To improve health outcomes in patients with overweight and obesity, healthcare provider adherence to the recommended national obesity clinical practice guidelines and completion of BMI QMs must be improved. This project created an educational intervention and an electronic health record order set to address gaps in research such as missed opportunities for preventive care screening and the importance of meeting QMs related to BMI. An educational intervention for healthcare providers receives a grade B recommendation, using the SORT criteria (Ebell et al., 2004).
A level-three cross-sectional survey by Ferrante, et al. (2009) and a level-two meta-analysis (Flodgren et al., 2010) support the evaluation of patient characteristics to assist in evaluation of study results related to overweight and obese patients. The secondary purpose of this study, to explore the relationship between patient characteristics and healthcare provider BMI QM indicator documentation in patients’ medical records, receives a Grade B recommendation, based on the literature review using the SORT method (Ebell et al., 2004).

The use of support tools for providers to help address out-of-range BMI is also supported in the literature with a level-one randomized controlled trial (Tang et al., 2012), a level three retrospective analysis (Farran et al., 2013), as well as a level-two meta-analysis of six randomized controlled studies (Flodgren et al., 2010). The tertiary purpose of this study, to evaluate an optional-use order set created for providers to simplify the process of documenting patient BMI QM indicators in patients’ medical records, receives a Grade B recommendation, based on the literature review using the SORT method (Ebell et al., 2004).

**Conclusion**

Chapter two provided a review of the literature, the search criteria to locate relevant research relating to the subject and the elements of the study questions. Further, a critique and synthesis of the evidence was presented. Additionally, the overall body of evidence related to implementing a translational research project involving the creation of an intervention for providers in a FQHC to meet the quality performance measure for BMI was appraised as a B-level SORT recommendation (Ebell et al., 2004). This chapter concluded with the provision of strong rationale for a project that will provide training for healthcare providers in a FQHC to increase interventions for out-of-range BMI and to improve the rate of completion of the BMI QM within the practice.
Chapter III: Methods

This chapter will define the study methods of an educational intervention regarding BMI QM for healthcare providers at a FQHC. The design of the project is described and information provided about resources utilized and the organization sponsoring the project. The plan for the protection of human subjects is defined and the population thoroughly described. A timeline for the implementation of the project, as well as the procedures and instruments to implement the project, are provided. Lastly, the outcome measurements and evaluation methods are explained.

Design

The primary aim of this quasi-experimental, time series design project was to study the effects of an educational intervention designed for three healthcare providers in a FQHC on their documentation of body mass index (BMI) QM indicators in their patients’ medical records. The secondary aims were to: (a) explore the relationship between patient characteristics and healthcare provider BMI QM indicator documentation in patients’ medical records, and (b) evaluate an optional-use order set created for providers to simplify the process of documenting patient BMI QM indicators in patients’ medical records. A time-series design was chosen to evaluate the sustainability of the intervention over time. The research questions addressed in the project were as follows:

1. What effect does an educational intervention designed for healthcare providers in a Federally Qualified Health Center have on their documentation of BMI QM indicators in their patients’ medical records?
2. Is there a relationship between patient characteristics and provider documentation of BMI QM indicators in the patients’ medical records?
3. How often do providers utilize an optional-use electronic order set designed to simplify the process of BMI QM indicator documentation in the patient’s medical record and how satisfied are they with the order set?

**Project Sponsor and Resources**

While there is minimal cost associated with this project, the FQHC sponsored the study providing staff support, the electronic health record system, and a QI coach. Additional resources required included time from the QI coach for data extraction as an honest broker for the study and 30 minutes of healthcare provider time during the staff meeting for the educational intervention.

**Human Subjects Review**

Approval from the Georgetown University Institutional Review Board (IRB) was obtained prior to implementing the project. Additionally, the Chief Medical Officer of the FQHC provided written authorization to perform the study; there were no additional requirements. All guidelines for research involving human subjects, including the ethical principles of respect for persons, beneficence, and justice, were followed throughout the project period (World Medical Organization, 1996). The study intervention involved no more than minimal risk to healthcare provider participants, as they were the same as those they would experience in the daily performance of their regular employment. The emails sent to healthcare provider participants announcing the *Educational Activity Evaluation* and the *BMI Order Set Evaluation* surveys included informed consent information. Both emails explained that completion of the survey implied consent and stated, “Participation in this study is entirely voluntary at all times”. Therefore, no signed consent was collected from the healthcare providers, nor was any demographic or Internet Protocol (IP) address information collected from
the healthcare providers, as either would eliminate the anonymity of the survey. As the remainder healthcare provider participation in the project was part of the expected job duties for healthcare providers at the FQHC, no further consent was required from the healthcare provider participants. The benefit to healthcare provider participation in this project was continued education on overweight and obesity guidelines and additional tools to promote BMI QM completion requirements.

This study used de-identified data of electronic health record information, therefore, no requirement for consent from patients was necessary. As all patient data, as well as participating healthcare provider information from the healthcare providers’ charts, was de-identified prior to receipt by the principal investigator, there was no risk to patients. Data collected included only the information required for the study and contained no information that would fall within the 18 categories of protected health information as defined in the Safe Harbor method for de-identification of data (HHS, 2015). In order to protect the data collected, the information was sent by the QI coach, via secured, password protected, interoffice email, to the principal investigator. Any information stored on a computer, was secured with a password, known only to the principal investigator.

**Population**

Power analysis using a significance level of .05, desired power of .80, and a small anticipated effect size, yielded a needed sample size of 969 patient records. The study included two groups of data; healthcare provider survey data and patient records from the electronic health record. The inclusion criteria for healthcare providers were:

1. Healthcare providers employed currently and during the previous 2 months in the FQHC.
2. Currently providing direct patient care as an advanced practice registered nurse, medical doctor, or doctor of osteopathic medicine.

Healthcare providers excluded from the study include:

1. Principal investigator

Inclusion criteria for patients whose data was collected from patient medical records in this study were as follows:

1. Adult patients 18 years of age or older
2. Patients that experienced an office visit with one of the three participating healthcare providers in the FQHC within the two months prior to the educational intervention or the two months after the intervention.

Patients of participating providers excluded from the study include:

1. Patients with a diagnosis of pregnancy during the data collection period
2. Patients with a diagnosis of terminal illness or palliative care as documented in their problem list within the electronic health record (the electronic medical record used in the study allows for these terms to be selected as a diagnosis in the problem list)
3. Patients without a documented weight on the day of their encounter with the participating provider.

**Procedures – Timeline**

The intervention began in May 2017, with an educational presentation for three participating healthcare providers practicing in an FQHC in the Northwest US. The clinic is part of a larger healthcare system that serves more than 54,000 patients annually at 12 separate locations. Healthcare providers at this location provide family practice primary care services. To
answer the primary research question, the principle investigator provided a 30-minute educational PowerPoint presentation during a regularly scheduled, mandatory staff meeting. The presentation included: the background and significance of the obesity problem; how to identify patients with out-of-range BMI; the meaning and significance of the CMS core QMs for Primary Care, particularly the BMI QMs; an outline of the required elements for completion of the BMI QM; and the workflow for completion of BMI QM from monitoring the quality management tab in the electronic health record through documentation. Educational materials provided to attendees included the 2013 AHA/ACC/TOS Guideline for the Management of Overweight and Obesity in Adults, the CMS core quality measures for primary care, the American Association of Clinical Endocrinologists (AACE) Algorithm for the Medical Care of Patients with Obesity and information regarding how to properly satisfy the BMI QM (see Appendix A for details).

During the educational presentation, providers were introduced to an optional use order set (i.e. an order set they may choose to use, but were not required to use), to document patient BMI QM indicators in the electronic health record. The optional-use order set was created by the PI utilizing the CMS BMI QM indicator requirements and 2013 AHA/ACC/TOS Guideline for the Management of Overweight and Obesity in Adults to facilitate the documentation of patient BMI QM indicators in the electronic health record (see Appendix B for full order set). The following items were provided in the order set:

1. Space to enter the current BMI
2. Goal set during the encounter for amount of weight loss within a specified amount of time
3. Orders for interventions including dietary counseling or lifestyle education
4. Follow-up expectations
5. Handouts regarding healthy lifestyles, BMI information, and diet

6. Referrals to dietician and/or a bariatric specialist.

The participants were able to easily adjust the order set for their individual patient needs by adding or deleting items as needed for each patient encounter. While there are many more items that could be added to the order set (such as medication orders or referrals to occupational therapist, physical therapist, exercise physiologist, or mental health professional), only the most commonly used referrals were added on to the order set. This intervention was intended to remind providers of all required components for the CMS QM while minimizing charting time within the system.

The learning objectives for the 30-minute educational intervention were that participants would be able to: understand the background and significance of the problem of overweight and obesity; identify patients with out-of-range BMI; provide appropriate, individualize patient intervention for overweight and obesity using clinical practice guidelines; describe the meaning and significance of the CMS core QMs for Primary Care, particularly the BMI QMs; outline the required elements for completion of the BMI QMs; use the newly created order sets for overweight and obesity to quickly document patient weight loss goals, interventions provided, and follow up plan; explain the workflow for completion of BMI QM from monitoring the quality management tab in the electronic health record through documentation. See Appendix A for further details about the educational intervention.

Following the educational intervention, an email was sent to the providers requesting they evaluate the educational intervention via a short online survey (see Appendix C for the full Educational Activity Evaluation survey). At the end of the two-month data collection period,
providers were sent an additional email with a link to another five-minute online survey designed to evaluate the optional order set (see Appendix D for the full BMI Order Set Evaluation survey).

As there was a possibility that provider education could impact service to patients, in addition to collecting data from the providers about the educational intervention and optional-use order set via the two surveys, de-identified data from the patients of the three participating providers was analyzed. Change in provider completion of BMI QM indicators in patients’ medical records was evaluated. De-identified patient data collected as part of regular patient care during the two months prior to the intervention was compared to de-identified patient data collected as part of regular patient care one month and two months following the intervention. Relationship between patient demographic characteristics and provider completion of BMI QM indicator in the patient’s medical record was evaluated.

Patient data for the study were extracted from the electronic health record by the QI coach as a part of regular job duties. Some of the essential duties and responsibilities of the QI coach at the FQHC include: "supports and coaches QI at the clinic level; analyzes and displays data for QI efforts; and acts as an electronic record system resource to colleagues at designated site" (M. Barnes, personal communication, [January 6] 2017). The QI coach was involved in the study as an honest broker and did not have any other role in the research.

The percentage of adult patients seen by participating providers in the two months prior to the educational intervention for whom the BMI QM indicator had been completed in the patient’s medical record was measured at the beginning of the project. The percentage of adult patients seen by participating providers for whom the BMI QM indicator had been completed in the patient’s medical record was then evaluated one month following the educational intervention, and again two months following the educational intervention. The de-identified
patient data collected and analyzed in this study at all three time periods included: BMI, whether or not the BMI QM indicator was completed (yes or no), age, gender, race, ethnicity, whether or not a handout was provided to the patient (yes or no), whether or not the patient was referred to a nutritionist or dietitian (yes or no), whether or not the patient was referred to a bariatric specialist (yes or no), and whether or not a medication was ordered associated with the diagnosis of overweight or obesity (yes or no). The patient BMI, whether or not the BMI QM indicator was completed (yes or no), and patient demographic characteristic information were collected in order to evaluate research questions one and two. See Appendix E for the full data dictionary. Any educational materials and referrals documented by the healthcare provider in the patient’s medical record was collected to provide an in-depth evaluation of how the QM was completed by providers.

Throughout the two-month period following the educational intervention, participating healthcare providers were provided with bi-weekly (twice monthly) email reminders regarding the BMI QM indicators. See Appendix F for full email verbiage.

**Instruments**

Multiple tools were utilized in the implementation and evaluation of the intervention. An electronic health record system was used for the collection of data. Two surveys were created, one to evaluate the educational intervention and another to assess the order set developed for healthcare providers.

**Validity/Reliability**

Patient height and weight were measured using a weight scale and a stadiometer as part of routine medical care at the FQHC. The height and weight of every patient, except those who refused height or weight measurement during their appointment, were entered into
the electronic health record by medical assistants, and the BMI was automatically calculated and placed into the vital signs section of the chart. All patients, except those in a wheelchair, used the same scale. Patients in a wheelchair used the same wheelchair scale in the office. The weight scale is calibrated yearly to ensure reliability (M. Barnes, personal communication, [January 6] 2017). The QM for BMI was automatically deemed as completed in the electronic health record during a patient encounter when a patient of at least 18 years of age with an out-of-range BMI had documentation of overweight or obesity, as well as an intervention, such as a referral to a dietician or weight loss handouts from the provider, within the past six months from the date of service. The QM for BMI can also be manually completed if there is documentation in the chart from an outside provider that completed any of the qualifying interventions for the patient.

The Educational Activity Evaluation survey was developed by the PI and adapted from the American Academy of Family Physicians’ (AAFP) CME Evaluation Form Template, which is a guideline for use when creating educational activity evaluations (AAFP, 2017). To evaluate the usefulness of and provider satisfaction with, the optional-use order set available to participants in the study, the Order Set Evaluation survey was also created by the PI. Both the educational activity survey and the order set survey were reviewed by three doctorally prepared, advanced practice registered nurses who established face validity. Revisions to the surveys were made based on feedback received from the reviews.

**Outcome Measurements and Data Analysis Plan**

The outcome measures for this project included:

1. BMI QM indicator completion for each patient encounter during the 2 months before, one month after, and two months after the educational intervention.
2. Healthcare provider evaluation of the educational intervention.

3. Healthcare provider use and evaluation of the BMI QM indicator optional-use order set.

4. Relationship between patient demographic characteristics and healthcare provider BMI QM indicator documentation in patients’ medical records

A codebook (see Appendix E) was used to record data from the collected patient characteristics. For example, gender for example, was entered as Male = 0, Female = 1. All data were entered into IBM SPSS for Windows, version 24.0, for analysis using logistic regression and chi square tests. Specifically, the effect of the educational intervention on provider BMI QM indicator completion in their patients’ medical records was analyzed by chi-square analysis at three time periods; once prior to the educational intervention and two time periods after the intervention. Descriptive statistics were used to describe the Educational Activity Evaluation. The second aim of the relationship of patient demographics to BMI QM indicator completion was analyzed via chi-square analysis and logistic regression. Data relevant to the third and final aim of satisfaction with the BMI electronic order set were analyzed using descriptive statistics.

Conclusion

In this chapter, specific study methodology to conduct this DNP project was described. The methods used to create an educational intervention for healthcare providers at a FQHC were defined. A description of the design and implementation of the project as well as the framework used was provided. The project resources and the sponsoring organization were explained. An appropriate plan for the protection of human subjects was reviewed and the population or participants in the study were defined. The project was evaluated using
IBM SPSS for Windows, version 24.0 data analysis software and all data collected were
secured throughout the evaluation period.
Chapter IV: Results

This chapter will provide an analysis of the data from the scholarly research project. Data analyzed include demographics and findings related to the primary, secondary, and tertiary aims. A summary of the findings and outcomes is presented.

Analysis of Data

Sample Demographics

Three healthcare providers participated in the study with a total of 2,078 patient encounters included in the analysis (Table 1). There were 992 patient encounters in the two-month period pre-educational intervention (Time 1). Five hundred and sixty-eight patient encounters occurred in the first month following the intervention (Time 2) and 518 encounters occurred in the second month following the intervention (Time 3). Of the 2,078 patient encounters analyzed, 1,549 (74.5%) patients had a BMI in the overweight or obese range. The majority (55.8%) of patients were 40-65 years, 10.8% were 65 and over, and 33.8% were 18-39 years old. There were no significant differences in the patient characteristics of age, gender, race/ethnicity, or BMI across the three time points. This indicates the patient samples were comparable at the three times data were collected. Therefore, it is unlikely differences in BMI QM completion, referrals, medications, and provision of educational handouts, should they exist, were due to differences in these patient characteristics.
Table 1

Comparison of Characteristics of Patients at Three Times

<table>
<thead>
<tr>
<th></th>
<th>Total $n = 2078$</th>
<th>Time 1 $n = 992$</th>
<th>Time 2 $n = 568$</th>
<th>Time 3 $n = 518$</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean Age ($SD^a$)</td>
<td>46.72 (14.88)</td>
<td>46.03 (14.91)</td>
<td>47.08 (14.86)</td>
<td>47.65 (14.80)</td>
<td>.106</td>
</tr>
<tr>
<td>Mean BMI ($SD^a$)</td>
<td>32.16 (9.25)</td>
<td>32.11 (9.23)</td>
<td>32.40 (9.59)</td>
<td>32.00 (8.90)</td>
<td>.753</td>
</tr>
<tr>
<td>Gender $^b$</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>706 (34.0)</td>
<td>352 (35.5)</td>
<td>186 (32.7)</td>
<td>168 (32.4)</td>
<td>.379</td>
</tr>
<tr>
<td>Female</td>
<td>1,372 (66.0)</td>
<td>640 (64.5)</td>
<td>382 (67.3)</td>
<td>350 (67.6)</td>
<td></td>
</tr>
<tr>
<td>Race $^b$</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.587</td>
</tr>
<tr>
<td>White</td>
<td>2,007 (97.3)</td>
<td>959 (97.3)</td>
<td>552 (97.9)</td>
<td>496 (96.9)</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>55 (2.7)</td>
<td>27 (2.7)</td>
<td>12 (2.1)</td>
<td>16 (3.1)</td>
<td></td>
</tr>
<tr>
<td>Ethnicity $^b$</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.640</td>
</tr>
<tr>
<td>Hispanic</td>
<td>40 (1.9)</td>
<td>22 (2.2)</td>
<td>9 (1.6)</td>
<td>9 (1.78)</td>
<td></td>
</tr>
<tr>
<td>Not Hispanic</td>
<td>2,033 (98.1)</td>
<td>968 (97.8)</td>
<td>558 (98.4)</td>
<td>507 (98.3)</td>
<td></td>
</tr>
<tr>
<td>BMI $^b$</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.831</td>
</tr>
<tr>
<td>under 25</td>
<td>454 (21.8)</td>
<td>213 (21.5)</td>
<td>122 (21.5)</td>
<td>119 (23.0)</td>
<td></td>
</tr>
<tr>
<td>25-29.9</td>
<td>512 (24.6)</td>
<td>251 (25.3)</td>
<td>138 (24.3)</td>
<td>123 (23.7)</td>
<td></td>
</tr>
<tr>
<td>30-34.9</td>
<td>452 (21.8)</td>
<td>219 (22.1)</td>
<td>124 (21.8)</td>
<td>109 (21.0)</td>
<td></td>
</tr>
<tr>
<td>35-39.9</td>
<td>318 (15.3)</td>
<td>145 (14.6)</td>
<td>83 (14.6)</td>
<td>90 (17.4)</td>
<td></td>
</tr>
<tr>
<td>40 and above</td>
<td>342 (16.5)</td>
<td>164 (16.5)</td>
<td>101 (17.8)</td>
<td>77 (14.9)</td>
<td></td>
</tr>
<tr>
<td>BMI Above $^b$</td>
<td>1,549 (74.5)</td>
<td>746 (75.2)</td>
<td>425 (74.8)</td>
<td>378 (73.0)</td>
<td>.630</td>
</tr>
<tr>
<td>Normal $^b, c$</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

$^a$Compared using one-way ANOVA  
$^b$Compared using Chi square test of Independence  
$^c$BMI Above normal is defined as BMI of 25 or greater for those 18-64 and 30 or greater for those 65 and older

Primary Aim

The primary purpose of this project was to study the effects of an educational intervention designed for healthcare providers on their documentation of body mass index (BMI) QM indicators in their patients’ medical records. If the BMI is above normal range, documentation of a follow-up plan or intervention for overweight or obesity must be entered into the patient chart in order to complete the BMI QM. As the focus of the project is provider documentation and intervention for patients with a BMI above normal, the analyses in Table 2 were restricted to overweight and obese patient data.
Using a Chi square test of independence, there was a statistically significant increase in the percentage of patients with completion of the BMI QM across time, $\chi^2(2) = 134.55$, $p < .001$ (Table 2). At Time 1 the BMI QM was completed for 63.4% of patients, at Time 2 the BMI QM was completed for 73.6% of patients, and at Time 3 the BMI QM was completed for 95.5% of patients. A statistically significant increase in the percentage of patients who were provided handouts occurred across time, $\chi^2(2) = 44.47$, $p < .001$. At Time 1, only 54.8% of patients were provided handouts; the percentage increased to 66.6% at Time 2, and 74.3% at Time 3. There was also a significant increase in the percentage of patients for whom medications were ordered across time, $\chi^2(2) = 7.32$, $p = .026$. At Time 1 medications were ordered for 1.7% of patients, at Time 2 medications were ordered for 1.9% of patients, and at Time 3 medications were ordered for 4.2% of patients. However, the percentage of patients who received medication orders remained very low. There was no statistically significant change in referrals to nutritionists or bariatric referrals across all time points. At all times, a very small percentage of overweight or obese patients received bariatric referrals.

<table>
<thead>
<tr>
<th>Table 2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Comparisons Across Time for Patients with BMI Above Normal</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>BMI QM Completed</td>
</tr>
<tr>
<td>Nutritionist Referral</td>
</tr>
<tr>
<td>Bariatric Referral</td>
</tr>
<tr>
<td>Handout Provided</td>
</tr>
<tr>
<td>Medication Ordered</td>
</tr>
</tbody>
</table>

$^a$BMI Above normal is defined as BMI of 25 or greater for those 18-64 and 30 or greater for those 65 and older  
$^b$Comparisons made using Chi square test of independence
Educational intervention evaluation. The three healthcare provider participants evaluated the educational intervention (Table 3). The “Educational Activity Evaluation” contained 12 questions; most of the questions were Likert-style, and a few were open-ended.

Table 3

<table>
<thead>
<tr>
<th>Educational Intervention Evaluation (N = 3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Question</td>
</tr>
<tr>
<td>----------</td>
</tr>
<tr>
<td>What was your overall opinion of the BMI Quality Measures activity?</td>
</tr>
<tr>
<td>I understand the background and significance of the problem of obesity.</td>
</tr>
<tr>
<td>I am able to identify patients with out of range body mass index.</td>
</tr>
<tr>
<td>I am able to provide appropriate, individualized patient intervention for overweight and obesity using clinical practice guidelines.</td>
</tr>
<tr>
<td>I understand the meaning and significance of the Centers for Medicare and Medicaid Services core quality measures for Primary Care, particularly the BMI quality measures.</td>
</tr>
<tr>
<td>I am able to outline the required elements for completion of the BMI quality measures.</td>
</tr>
<tr>
<td>I will be able to use the newly created order sets for overweight and obesity to quickly document patient weight loss goals, interventions provided, and follow-up plan.</td>
</tr>
<tr>
<td>I can describe the workflow for completion of BMI quality measure from the monitoring the quality management tab in the electronic medical record through documentation.</td>
</tr>
<tr>
<td>Did you feel the BMI Quality Measures activity was:</td>
</tr>
<tr>
<td>1 = Too basic</td>
</tr>
</tbody>
</table>

The survey also assessed the participants’ level of understanding of the expected learner
outcomes for the activity on a four-point scale of agreement with the statements (1 = disagree, 4 = agree). Participants also reported they were able to understand the background and significance of the problem ($M = 4$), identify patients with out-of-range BMI ($M = 4$), and provide appropriate interventions ($M = 4$). However, they did score slightly lower ($M = 3.667$) on other questions.

Three open-ended questions were also included in the Educational Intervention Evaluation. When asked “What did you like most about this BMI Quality Measures Activity?” participants responded with: “Well presented, and informative”; “Finding out our measures on weight management are being met, but are not meeting all required parameters. Finding out that we need to make follow-up appointments, referrals etc. to address properly”; and “The medication handout.” When asked what they like least about the educational intervention, participants identified a “Lack of time.” When asked for specific suggestions of how to improve the educational intervention, the suggestion was “More discussion time.”

**Secondary Aim**

The relationship between patient characteristics (age, gender, race, ethnicity, and BMI) and provider BMI QM completion in patients’ medical records was examined. Using chi square tests of independence, evaluations by BMI category were analyzed separately for those under age 65, and those 65 years and older, due to the differing definitions of normal BMI. Normal weight for those under age 65 is considered a BMI of 18 to 24.9, while for those aged 65 and older, normal BMI is 23 to 29.9 (CMS, 2016). Logistic regression was then used to explore associations between patient characteristics and specific follow-up interventions.
Evaluations by BMI group for ages 18-64. There were statistically significant differences in the BMI QM completion status, as well as all of the interventions, by BMI category for those aged 18 to 64 when evaluating all three times combined. See Table 4.

**Table 4**

<table>
<thead>
<tr>
<th>BMI Group</th>
<th>under 25 %</th>
<th>25-29.9 %</th>
<th>30-34.9 %</th>
<th>35-39.9 %</th>
<th>40 &amp; over %</th>
<th>p*</th>
</tr>
</thead>
<tbody>
<tr>
<td>n = 411</td>
<td>n = 437</td>
<td>n = 398</td>
<td>n = 294</td>
<td>n = 323</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BMI QM Completed</td>
<td>97.1</td>
<td>67.5</td>
<td>75.4</td>
<td>77.9</td>
<td>77.4</td>
<td>&lt; .001</td>
</tr>
<tr>
<td>Nutritionist Referral</td>
<td>0.2</td>
<td>0.7</td>
<td>1.8</td>
<td>5.1</td>
<td>4.6</td>
<td>&lt; .001</td>
</tr>
<tr>
<td>Bariatric Referral</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1.2</td>
<td>1.2</td>
<td>.001</td>
</tr>
<tr>
<td>Handout Provided</td>
<td>28.2</td>
<td>52.6</td>
<td>63.3</td>
<td>68.7</td>
<td>70.0</td>
<td>&lt; .001</td>
</tr>
<tr>
<td>Medication Ordered</td>
<td>0.2</td>
<td>1.1</td>
<td>3.5</td>
<td>0.7</td>
<td>4.6</td>
<td>&lt; .001</td>
</tr>
</tbody>
</table>

*aChi square test of independence

**BMI quality measure completion.** Completion of the BMI QM, as shown in Table 4, was significantly higher for those with BMI’s under 25 than for those 25 and over, \( \chi^2 (4) = 119.9, \) \( p < .001, \) with 97.1% of normal weight patients compared to 75.0% of those who are overweight or obese. Similarly, at Time 1, the QM was completed for 96.4% of normal weight patients compared with 65% of overweight and obese patients, \( \chi^2 (4) = 92.6, \) \( p < .001. \) At Time 2, the QM was completed for 95.4% of normal weight patients and 74.9% of overweight and obese patients, \( \chi^2 (4) = 38.0, \) \( p < .001. \) At Time 3, the QM was completed for 98.6% of all patients with BMIs under 40 and dropping to 86.1% for those with BMI of 40 or higher, \( \chi^2 (4) = 32.3, \) \( p < .001. \)

**Referrals.** Nutritionist referrals were significantly more likely to be made for patients age 18 to 64 who had a BMI of 35 or higher, \( \chi^2 (4) = 32.8, \) \( p < .01. \) The pattern appeared to be similar at each of the individual time periods, but it was not possible to conduct chi square
analysis because of failure to meet assumptions for adequate cell size. Of the 42 referrals to a nutritionist, all but 11 were made for patients with BMI of 35 or greater.

Bariatric referrals were quite rare, failing to meet minimum cell sizes for the chi square test even in the combined sample. Bariatric referrals were only made for those with BMI of 40 or higher. By comparing all those with BMI under 40 to those with BMI of 40 or above, minimum cell size was met, and the differences in bariatric referrals were statistically significant, \( \chi^2 (1) = 30.5, p < .001 \).

**Educational handouts.** Handouts were significantly more likely to be given to patients under age 65 who were overweight or obese than to those with BMI under 25 (normal or underweight), \( \chi^2 (4) = 182.8, p < .001 \). With all times combined, less than one third of normal or underweight patients received handouts (28.2%), compared to approximately one half (52.6%) of those with BMI between 25 and 29.9, and nearly 70% of those with BMI of 35 or higher.

**Medication orders.** With all times combined, medication orders differed significantly by BMI category for those age 18 to 64, \( \chi^2 (4) = 27.1, p < .001 \), with those with a BMI under 25 least likely to be prescribed medication (0.2%), and those with a BMI over 40 most likely to be prescribed medication (4.6%). This pattern was manifest at each time period, although the cell size assumption for chi square analysis was not met for the individual time periods. There were higher medication rates for those with BMI between 30 and 34.9, and lower rates for those with BMI between 35 and 39.9.

**Evaluations by BMI group for ages 65 and older.** Evaluations by BMI group for those 65 and older were also compared (Table 5). For this age group, the two lowest BMI categories are considered normal weight. Nevertheless, there were some differences in interventions within these two categories. For example, handouts were less likely to be provided to patients with
BMI of 34.9 or less, compared to those with a BMI of 35 or above \((p = 0.031)\). Nutritionist referrals were ordered for 7% of those with a BMI less than 25, but to none of those in the 25-29.9 group. It should be noted that the small number of patients in the 65 and over age group did not meet adequate cell size for many of the chi square analyses; therefore, significance levels should be interpreted with caution.

Patterns for older adults were similar to that for younger adults. BMI QM completion was higher for those with lower BMIs than for those with higher BMIs. Educational handouts were more likely to be provided to those with higher BMIs. Bariatric referrals were only made to those with BMIs of 40 or higher.

Table 5

<table>
<thead>
<tr>
<th>Evaluation by BMI Group for Ages 65 and Older for all Times Combined</th>
<th>under 25</th>
<th>25-29.9</th>
<th>30-34.9</th>
<th>35-39.9</th>
<th>40 &amp; over</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMI Quality Measure Completion</td>
<td>93.0</td>
<td>98.7</td>
<td>75.9</td>
<td>83.3</td>
<td>63.2</td>
</tr>
<tr>
<td>n = 43</td>
<td>n = 75</td>
<td>n = 54</td>
<td>n = 24</td>
<td>n = 19</td>
<td></td>
</tr>
<tr>
<td>Nutritionist Referral</td>
<td>7.0</td>
<td>0.0</td>
<td>3.7</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Bariatric Referral</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>10.5</td>
</tr>
<tr>
<td>Handout Provided</td>
<td>39.5</td>
<td>54.7</td>
<td>59.3</td>
<td>79.2</td>
<td>63.2</td>
</tr>
<tr>
<td>Medication Ordered</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>5.3</td>
</tr>
</tbody>
</table>

Chi square test of independence

**Evaluations by age groups for those with BMI of 25 or higher.** While CMS has defined “normal” weight differently for those age 65 and older, it appears from the available data that the healthcare providers in this sample were not treating older patients differently (Table 6). Because those with BMI under 25 differ significantly from those with higher BMI in BMI QM completion and referrals \((p = 0.002)\), even for those over 65 for whom normal weight is defined differently, age differences in interventions were compared for those with BMI of 25 or higher.
BMI quality measure completion. There were statistically significant differences in completion of the BMI QM by age group at Time 1, $\chi^2(2) = 12.7$, $p < .002$, with the highest rate among those over 65 years old (80.8%). This pattern continued at Time 2, although it was no longer statistically significant. At Time 3, BMI QM completion for all ages was over 90% and varied little by age.

Referrals. Age differences in referrals to nutritionists were significant only when all times were combined, $\chi^2(2) = 7.7$, $p < .021$. Middle-aged patients (between 40 and 64 years old) were more likely to receive nutritionist referrals than younger or older patients. As noted above, small cell sizes for nutritionist referrals failed to meet the assumptions for a chi square test; thus, results should be interpreted with caution.

There was a trend for bariatric referrals to be more frequent for those over 65 years old than for younger patients, $\chi^2(2) = 4.9$, $p < .085$. The pattern holds at all times, but fails to reach statistical significance. The rarity of bariatric referrals led to small cell sizes; therefore, caution should be used in interpreting significance levels.

Educational handouts. There were no significant differences by age in whether or not handouts were provided, $\chi^2(2) = 3.3$, $p = 0.192$, and this pattern was the same at all three time
periods. Younger patients were significantly more likely to receive medication orders, $\chi^2 (2) = 6.2, p = .045$; this trend was evident at all three times and those over 65 years old were least likely to be given medication orders.

**Evaluations by gender for those with BMI of 25 or higher.** There were few differences by gender in treatment of patients with an elevated BMI. Males and females were equally likely to have the BMI QM completed, to receive nutritionist referrals, bariatric referrals, and handouts. These patterns were similar at all three time periods. Only for medications ordered was there a difference, with females more likely to be ordered medication, $\chi^2 (1) = 8.3, p = .004$. The pattern was similar across all three time periods, but failed to reach significance.

**Evaluations by race for those with BMI of 25 or higher.** There were no statistically significant differences in the interventions by race or ethnicity. It should be noted, however, that the sample was overwhelmingly white (97.4%) and non-Hispanic (98.0%). With such unequal group sizes, Type II errors may be more likely; that is, differences that actually exist between groups may not be identified. For example, bariatric referrals and medication orders were only given to white patients. It should be noted that bariatric referrals were quite rare (0.4% for white patients) so there may have been no non-white patients of the 42 in this sample that were bariatric candidates. Similarly, for medications, 2.4% of white patients and 0% of non-white patients received medication orders.

**Evaluations by ethnicity for those with BMI of 25 or higher.** Results for ethnicity were similar to race. There were no significant differences in interventions between Hispanics and non-Hispanics; however, there were only 33 Hispanics identified in the sample. Only non-Hispanics received bariatric referrals and medication orders.
Exploring the use of follow-up interventions using logistic regression. Binary logistic regression explored associations between patient characteristics and the dichotomous outcomes of: (a) educational handout provided, and (b) medication ordered. Referrals to nutritionists and bariatric referrals were too rare to include in the model. Results of the logistic regression models are reported in Tables 7 and 8. It should be noted that models with interactions between age and BMI, age and female, and BMI and female were run first. If an interaction was not significant, it was dropped from the final model. The racial and ethnic make-up of the sample was too homogeneous (almost entirely white, non-Hispanic patients) to include race or ethnicity in the model.

Table 7

<table>
<thead>
<tr>
<th>Variable</th>
<th>B</th>
<th>SE</th>
<th>p</th>
<th>OR</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMI</td>
<td>0.097</td>
<td>0.012</td>
<td>&lt;.001</td>
<td>1.10</td>
<td>[1.08, 1.13]</td>
</tr>
<tr>
<td>Age</td>
<td>-0.006</td>
<td>0.003</td>
<td>.060</td>
<td>0.99</td>
<td>[0.99, 1.00]</td>
</tr>
<tr>
<td>Female</td>
<td>1.261</td>
<td>0.431</td>
<td>.003</td>
<td>3.53</td>
<td>[1.52, 8.22]</td>
</tr>
<tr>
<td>Time 2</td>
<td>0.438</td>
<td>0.111</td>
<td>&lt;.001</td>
<td>1.55</td>
<td>[1.25, 1.92]</td>
</tr>
<tr>
<td>Time 3</td>
<td>0.563</td>
<td>0.115</td>
<td>&lt;.001</td>
<td>1.76</td>
<td>[1.40, 2.20]</td>
</tr>
<tr>
<td>BMI x Female</td>
<td>-0.045</td>
<td>0.014</td>
<td>.001</td>
<td>0.96</td>
<td>[0.93, 0.98]</td>
</tr>
</tbody>
</table>

Note: CI = confidence interval for odds ratio (OR).

Educational handouts. As BMI increased, the likelihood of receiving an educational handout increased significantly, after controlling for age, gender, and time. The amount of the increase differed by gender. For females, each increase in BMI increased the odds of receiving a handout by 5% (OR = 1.05); for males, it increased 10% (OR = 1.10), after controlling for age and time. However, this result cannot be seen directly in the results above, but can be calculated directly from them. For females, the coefficient for the interaction, -0.045, was added to the coefficient for BMI, 0.097, giving a coefficient of 0.052. This was then exponentiated to arrive at OR for females of 1.05. Females were significantly more likely than males to receive
handouts. After adjusting for the interaction between gender and BMI and controlling for age and time, females were 3.37 times more likely than males to receive handouts and the calculated $\eta^2$ value of 0.14 indicated a large effect size. Furthermore, handouts were significantly more likely to be provided at Time 2 (1.6 times more likely), and Time 3 (1.8 times more likely), than at Time 1.

**Table 8**

*Predicting Medication Orders Using Logistic Regression*

<table>
<thead>
<tr>
<th>Variable</th>
<th>$B$</th>
<th>SE</th>
<th>$p$</th>
<th>OR</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMI</td>
<td>0.038</td>
<td>0.015</td>
<td>.009</td>
<td>1.04</td>
<td>[1.01, 1.07]</td>
</tr>
<tr>
<td>Age</td>
<td>-0.029</td>
<td>0.012</td>
<td>.012</td>
<td>0.97</td>
<td>[0.95, 0.99]</td>
</tr>
<tr>
<td>Female</td>
<td>1.256</td>
<td>0.536</td>
<td>.019</td>
<td>3.51</td>
<td>[1.23, 10.03]</td>
</tr>
<tr>
<td>Time 2</td>
<td>-0.023</td>
<td>0.449</td>
<td>.959</td>
<td>0.98</td>
<td>[0.45, 2.36]</td>
</tr>
<tr>
<td>Time 3</td>
<td>0.822</td>
<td>0.373</td>
<td>.028</td>
<td>2.27</td>
<td>[1.09, 4.73]</td>
</tr>
</tbody>
</table>

Note: CI = confidence interval for odds ratio (OR).

**Medication orders.** Medication orders significantly differed by BMI, age, and gender, after controlling for the effects of the other variables in the model. The results of the model indicated medication orders increased 4% for each point increase in BMI. Medication orders decreased by 3% for each increase of year in age. Females were 3.51 times as likely as males to receive medication orders and the calculated $\eta^2$ value of .14 indicated a large effect size. There was no difference in medication orders between Times 1 and 2, but at Time 3, medication orders were 2.27 times more likely to be issued than at Time 1 ($\eta^2 = .05$).

**Tertiary Aim**

Two months after the intervention, healthcare provider participants completed a survey to evaluate the optional-use electronic order set (Table 9). Participants reported using the order set an average of 78.3% of the time during the study period. Participants reported they were very
satisfied with the documentation/notes and orders (referrals and education) sections of the order set ($M = 4$), and found both sections to be very relevant ($M = 4$).

Two open-ended questions revealed the participants liked the order set because it “was simple and easy to use.” Another participant said they “created [their] own order sets to use so that it met [their] requirements as well.” When asked for suggestions about how to improve the order set participants said “Nothing” and “None at this time.”

### Table 9

<table>
<thead>
<tr>
<th>Question</th>
<th>Scale</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>How satisfied were you with the documentation/notes section of the order set?</td>
<td>1 = Very dissatisfied 4 = Very satisfied</td>
<td>4</td>
</tr>
<tr>
<td>How relevant did you find the documentation/notes section of the order set?</td>
<td>1 = Not at all relevant 4 = Very relevant</td>
<td>4</td>
</tr>
<tr>
<td>How satisfied were you with the orders (referrals and education) section of the order set?</td>
<td>1 = Very dissatisfied 4 = Very satisfied</td>
<td>4</td>
</tr>
<tr>
<td>How relevant did you find the information in the orders (referrals and education) section of the order set?</td>
<td>1 = Not at all relevant 4 = Very relevant</td>
<td>4</td>
</tr>
</tbody>
</table>

### Summary of Findings and Outcomes

#### Primary Aim

Sample data was collected from a total of 2,078 patient charts during 2 months prior to the educational intervention, one month following the intervention, and again two months after the intervention. The study sample included 1,549 (74.5%) patients with a BMI in the overweight or obese range. There were no significant differences in the patient characteristics (age, gender, race/ethnicity, BMI) by time. More patients (95.5%) had the BMI QM completed two-months after the educational intervention than during the two-month period before the educational intervention (63.4%), or even one month after the intervention (63.4%). After the intervention, the percentage of patients who were provided educational handouts significantly
increased. Significantly more patients (4.2%) received medication orders two-months after the intervention when compared to the two-months before the educational intervention (1.7%) or one-month after the intervention (1.9%). Only a small percentage of overweight or obese patients received bariatric referrals before and after the intervention.

**Educational intervention.** The healthcare providers who participated in the educational intervention activity rated the quality as “excellent”. All of the healthcare providers rated the activity as “just right” and the only suggestion given for how to improve the educational intervention was to have more discussion time.

**Secondary Aim**

In patients age 18 to 64, completion of the BMI QM was significantly higher for those with a normal weight (97.1%) than for those who were overweight or obese (75.0%). Nutritionist referrals were significantly more likely to be made for patients age 18 to 64 with BMI of 35 or higher at any time during the study. Bariatric referrals were only made for those with BMI of 40 or higher. When evaluating all times combined, approximately one half (52.6%) of patients who were overweight, and nearly 70% of patients with BMI of 35 or higher, received educational handouts.

When the data was analyzed by age groups, there were several age discrepancies noted. In patients with a BMI of 25 or greater, patients age 65 and older were more likely to have the BMI QM completed (80.8%) compared to patients in other age groups. Middle-aged patients (between 40 and 64 years) were more likely to receive nutritionist referrals than younger or older patients. Additionally, younger patients were significantly more likely to receive medication orders at any time during the study.
The results of the logistic regression showed educational handouts were 1.8 times more likely to be provided to patients two months after the intervention than they were prior to the intervention. Females were 3.37 times more likely to receive educational handouts, and 3.51 times more likely to receive medication orders, than males in the study.

**Tertiary Aim**

Participants used the order set an average of 78.3% of the time during the study period. The participating healthcare providers indicated that they were “very satisfied” with the order set and that the order set was “very relevant”. No suggestions of ways to improve the order set were given.
Chapter V: Discussion and Conclusions

This chapter will present a discussion of findings and limitations of the study. Implications for education, research, and policy dissemination will be addressed. And finally, recommendations will be provided related to nursing practice.

Study Aims

Primary Aim

Despite clinical practice guidelines, CMS recommendations, payment incentives from insurance companies, and most importantly, the increased risks to patients, overweight and obese patients have been under-diagnosed by healthcare providers (CMS, 2016; Kirk et al., 2009). The rate of BMI QM completion for healthcare provider participants at the study site in the two months prior to the intervention was 63.4%. In this study, an educational intervention designed for three healthcare providers in a FQHC resulted in significantly improved rates of completion of the BMI QM in patient charts, meaning diagnosis and documentation rates were increased. The results are consistent with the study by Farran et al. (2013) in which providers increased documentation of overweight and obesity as well as counseling. Additionally, this intervention positively impacted the number of educational handouts and medication orders provided to patients with a diagnosis of overweight or obesity.

The provider educational interventions performed by Ren et al (2010) and Barnes et al. (2015) did not result in a significant change in healthcare provider behavior. Ren et al. (2010) suggested interventions for healthcare providers should focus on incorporating the information learned during the session into how it will be practically applied by the participants. The educational intervention created for this study was intended to increase provider awareness of the problem, educate them about the implications of obesity in relation to other conditions the
patient may be experiencing, and provide a way to address the problem with patients without significantly increasing the healthcare provider workload. Additionally, Ren et al. (2010) did not provide electronic health record alerts, reminders to participating healthcare providers, or order sets to help providers with the changes. Barnes et al. (2015) recommended an on-site project director available to providers as a support when the changes are implemented. The presence of a QI coach at the study site to answer questions and act as a resource, reminders, and order sets provided for participants in this study may have positively impacted the results. No studies were found, in the literature review, evaluating provider satisfaction with the educational intervention.

**Secondary Aim**

Inclusion of patient demographics or characteristics in studies evaluating healthcare provider interventions is essential in order to adequately assess the results and generalizability of the study (Flodgren et al. 2010). This study resulted in multiple findings associated with patient demographics or characteristics. Results suggest that BMI QM completion was not affected by race, ethnicity, or gender. Furthermore, those over 65 years old were more likely to have the measure completed prior to the intervention, but it was not a factor following the intervention. This result is different from the Bleich et al. (2011) study which found female gender and young age were both positively associated with a diagnosis of obesity. However, Farran et al. (2013) found no difference before and after the educational intervention based on gender, BMI, or age. These differences may be due to geographic location differences, differences in healthcare provider attitudes or bias, or the homogeneity of the project’s sample.

Patients with a BMI of 40 or higher were the only individuals included in this study to receive bariatric referrals at any time. While it is appropriate for patients in this weight category to receive bariatric referrals, it is also recommended for patients with a BMI equal to or greater
than 35 (AACE, 2016). No previous studies were identified which evaluated bariatric referral as an outcome based on BMI.

At all time periods included in the study, nutritionist referrals were significantly more likely to be made for patients with BMI of 35 or higher in patients age 18 to 64. No studies were found that evaluated nutritionist referrals in relation to BMI. However, this is consistent with the Bleich et al. (2011) study which found that individuals with BMI greater than 35 were more likely to receive weight-related counseling than those with a BMI less than 35.

In this project females were over three times more likely than their male counterparts to receive medications and handouts during. While Bleich et al. (2011) did not review prescribed medications or educational handouts specifically in their study, this project’s results are consistent with Bleich et al.’s finding that females were more likely than men to receive weight reduction, diet, and exercise counseling from their healthcare providers.

Bariatric referrals and medication orders were only provided to non-Hispanics during this study. Bleich et al. (2011) found no differences diagnosis of obesity or weight, diet, or exercise counseling based on race/ethnicity. The difference in findings may be explained by the small number of Hispanics in this project’s sample, the rarity of these two interventions, and the limited number of non-white patients in this project’s sample. Furthermore, in the Aleem et al. (2015) study, most of the healthcare provider respondents reported they never prescribe weight loss medications and infrequently refer patients for bariatric surgery.

**Tertiary Aim**

The order set provided to participants in this study included a place to document the diagnosis of overweight or obesity, attachments (referrals to dietitian and bariatric specialist and educational handouts), as well as a template to guide the healthcare provider counseling during
the visit. Order sets that include diagnosis and appropriate intervention materials such as referrals and educational handouts for patients have been shown to increased healthcare provider documentation rates (Tang et al., 2012). The FQHC healthcare provider participants were “very satisfied” with the template as well as the included attachments and they also responded that these items were “very relevant”. This is consistent with the Tang et al. (2012) findings in which the providers indicated the order set improved their counseling effectiveness. On average, between the three healthcare provider participants, the order set was used 78.3% of the time during the study period. This is significantly higher than the Tang et al. (2012) results in which the order sets were used only 10.7% of the time. The difference may be due to the presence of the quality improvement coach and the reminders sent to healthcare providers as the use of these interventions was not mentioned in the Tang et al. (2012) study.

Limitations

There are multiple limitations to this study. The study was performed at only one site and the patient sample was homogenous as it was overwhelmingly white (97.4%) and non-Hispanic (98.0%) which significantly limits generalizability of the results. The small healthcare provider participant sample size \((n = 3)\) and the healthcare provider type included in the project’s sample were additional threats to generalizability. While this project included healthcare providers from a variety of different roles (advanced practice registered nurse, medical doctor, and doctor of osteopathic medicine), it did not include a physician assistant.

The duration of the study following the intervention was only two months. Therefore, it is possible that the results may not be sustained in the long-term. Furthermore, BMI QM are based on clinical practice guidelines and therefore assume completing the measures will have a positive effect on patient outcomes. The short project duration also made it impossible to
evaluate whether or not the change in healthcare provider participant behavior had any effect on patient outcomes such as weight, BMI, blood pressure, or hemoglobin A1c.

As the data collected was de-identified, the number of unique patients used in the study is unknown. Patients may have had more than one encounter with a healthcare provider within the study period. Additionally, the BMI QM is completed if the required documentation has been fulfilled within the 6 months prior to the intervention. Patients returning to the clinic within the study period in the two months following the intervention may have had an effect on the overall percentage of BMI QM completion. However, as there were no patient identifiers collected, this effect size is unknown.

There were multiple limitations to the analysis of the data collected from this project. While the population demographics may have been representative of the local population at the study site, evaluation of healthcare provider bias is limited due to the homogeneity of the sample. For example, bariatric referrals and medication orders were only provided to white patients. However, bariatric referrals were rare (0.4% for white patients) so there may have been no non-white patients in the 42 in this sample that were candidates for bariatric intervention. While none of the non-white patients received medication orders, they were only ordered for 2.4% of white patients. Again, the rarity of medication orders and small number of non-white patients could explain this discrepancy.

Another limitation of the analysis is the lack of post-hoc tests for the chi-square test. Significant chi-square tests show a difference between the highest and lowest values of the time points in the study. However, without post-hoc testing, it is not possible to know if additional differences were present between the groups.
Healthcare provider participants were given the opportunity, in an open-ended question format, to explain what they liked most about the educational intervention. One of the providers responses was, “the medication handout”, referring to the section within the AACE (2016) “Algorithm for the Medical Care of Patients with Obesity” which included a list of preferred medications for the treatment of obesity and how to select appropriate medications for patients with co-morbidities. As the study data contained only de-identified information, it is not possible to evaluate whether the participant who answered this question changed their prescribing behavior after the intervention.

The small participant sample size made it necessary to limit the characteristics of the participants from the data collection. It may have been helpful to know if the participants were male or female, BMI category, and other characteristics, in order to better assess for healthcare provider biases associated with the diagnosis and management of overweight and obese patients. Additionally, individual provider change could not be evaluated due to the sample size and the de-identification of the sample data. It is possible that if other demographic variables were utilized in the study it may have improved the predictive ability of the regression models. Ideally, both healthcare provider and patient characteristics would have been included in the study but to do so with such a limited number of healthcare provider participants would have made it impossible to maintain anonymity for the providers.

Without an evaluation related to the impact of the individual elements of the project, the reasons for the change in healthcare provider behavior are unknown. This study is limited by a lack of evaluation of healthcare provider participants allowing them to explain the factors that made it possible for them to change.
Implications for Practice, Education, Research, and Policy Dissemination

The educational intervention and optional-use order set significantly improved the BMI completion rate in patient records for three healthcare providers at a FQHC. Therefore, within the next year, the educational intervention completed at the study site will be presented to all other sites throughout the organization. The QI coach at the study site will continue to evaluate the BMI QM completion results monthly in order to maintain the current level of completion rate and assess for additional areas for possible improvement. If the intervention is reproducible at other practice sites in the FQHC it has the potential to have a significant impact on the care provided to patients.

While BMI QM completion increased significantly during the study period, further research is required to determine whether the behavior is sustainable over time. The impact of the quality improvement coach or the reminder emails on the rate of completion of the BMI QM is not known as this was not specifically addressed in the surveys of the participating healthcare providers. Further research is needed to evaluate the participating healthcare providers to find out what they felt was the reason for the increase in BMI QM completion in their patient charts.

As the study sample was not ethnically diverse, differences by race should be monitored to ensure that there is no underlying pattern of discrimination amongst healthcare providers. Evaluation of additional demographic data, such as socioeconomic status and healthcare provider characteristics, may also be necessary to further track healthcare provider behaviors and to look for additional relationships between patient or provider characteristics and BMI QM completion, and the use of specific weight loss interventions. Additionally, future studies should incorporate evaluation of socioeconomic status to assess for possible
barriers to interventions recommended in the literature (McTigue et al., 2003) for overweight and obese patients.

According to the AACE “Algorithm for the medical care of patients with obesity” (2016), bariatric surgery is recommended for patients with a BMI greater than 35. However, this study sample included bariatric referrals only when the patient had a BMI greater than 40. As the sample size was small, it is possible that there were no eligible candidates for bariatric referral during the short study duration. Further education of healthcare providers may be required regarding this recommendation. Another area for possible research would be to evaluate the barriers surrounding bariatric referrals for patients with a BMI greater than 35.

Across all study time periods patients who were obese or morbidly obese (i.e. BMI of 35 or higher) were more likely to be referred to a nutritionist. Additional education may be required for healthcare providers regarding the importance of nutrition education and referral for overweight patients and obese patients with BMI between 30 and 34.9.

In the patients aged 65 and older, handouts were less likely to be provided to those with BMI less than 25 than to those with BMI between 25 and 30. This may potentially be due to provider misunderstanding of the varying BMI ranges for patients age 65 years old or above. Patients age 65 and older were less likely to have the BMI QM completed two months after the intervention than any other age group. This could possibly be due to an increased number of co-morbidities in the elderly leaving less time for healthcare providers to specifically address overweight or obesity in these patients. Further study is needed to assess possible causes for this inconsistency.

Younger patients were significantly more likely to receive medication orders. Middle-aged patients (between 40 and 64) are more likely to receive nutritionist referrals than younger or
older patients. There may be multiple co-morbidities in the elderly population causing medications to be removed from the list of options for the treatment of overweight and obesity. Furthermore, younger patients may be less inclined to accept referrals to a nutritionist due to lack of time if they work or have children. However, the discrepancies in multiple areas related to age suggest that differences by age should also be monitored to ensure there is no underlying pattern of discrimination amongst healthcare providers. Additionally, further research may identify barriers to appropriate referrals and orders for the management of overweight and obesity for all age groups.

Finally, females were more than three times more likely than their male counterparts to receive medications and handouts during the study. While this is consistent with previous literature, more research is needed to evaluate the possible causes of these discrepancies.

**Recommendations for Nursing Practice and Further Study**

The results of this study indicate that an educational intervention for healthcare providers increases compliance with documentation of BMI QM indicators in patient medical records. Additionally, following the intervention there was an increase in the provision of educational handouts, referrals, and medication orders for overweight and obese patients. It is important that healthcare providers possess the tools necessary to perform their required interventions. In this case, giving healthcare providers the educational information, clinical practice guidelines, ideas for a workflow process and an optional-use order set to help simplify the process was instrumental in creating a major behavioral change. It is recommended that this study be replicated in additional settings with a greater number of providers and a more diverse patient population to evaluate whether or not the effect would be the same. The next step in this research will be to evaluate whether or not the interventions begin to make a difference in
measureable improvements in patient outcomes in areas such as weight, BMI, blood pressure, A1C, anxiety, and depression.
Appendix A: Teaching Strategy and Learning Objectives

Educational Intervention Teaching Strategy

Presentation will occur during a regularly scheduled mandatory staff meeting. It will last no longer than 30 minutes. It will be presented by the principal investigator. Participants will include three healthcare providers: one M.D., one D.O., and one Family Nurse Practitioner. The quality improvement coach will also be in attendance at the meeting. A PowerPoint presentation will be used to guide the presentation and provide a visual aid. Handouts provided to participants will include:

1. Centers for Medicare and Medicaid Services Core Quality Measures: “ACO and PCMH / Primary Care Measures”
3. The American Association of Clinical Endocrinologists “Algorithm for the Medical Care of Patients with Obesity”

Educational Intervention Learning Objectives

Upon completion of a 30-minute educational intervention, participants will be able to:

1. Understand the background and significance of the problem of overweight and obesity
2. Identify patients with out of range Body Mass Index
3. Provide appropriate, individualized patient intervention for overweight and obesity using clinical practice guidelines.
4. Understand the meaning and significance of the Centers for Medicare and Medicaid Services core quality measures for Primary Care, particularly the BMI quality measures.
5. Outline the required elements for completion of the BMI quality measures.
6. Use the newly created order sets for overweight and obesity to quickly document patient weight loss goals, interventions provided, and follow up plan.
7. Describe the workflow for completion of BMI quality measure from monitoring the quality management tab in the electronic medical record through documentation.
Appendix B: Order Set Templates

**Obesity Order Set**

(Found within the electronic medical record at the Federally Qualified Health Center/study site)

*Note: the Obesity Order Set does have a space at the top for the patient’s current weight, it is cut off due to limited space for viewing, see scroll bar to the right of the notes section.

**Overweight Order Set**
Appendix C: Educational Activity Evaluation

Amy Larson, ARNP, FNP, NP-C

Effect of an Intervention for Healthcare Providers on BMI Quality Measures

March 2017

EDUCATIONAL ACTIVITY EVALUATION

Directions: Please complete the following questions. Your comments are greatly appreciated.

1. What was your overall opinion of the BMI Quality Measures activity? (please circle one)
   - Excellent
   - Good
   - Satisfactory
   - Poor

2. Upon completion of this BMI Quality Measures activity, the following objectives were met:
   a. I understand the background and significance of the problem of overweight and obesity
      - Agree
      - Somewhat Agree
      - Somewhat Disagree
      - Disagree
   b. I am able to identify patients with out of range Body Mass Index
      - Agree
      - Somewhat Agree
      - Somewhat Disagree
      - Disagree
   c. I am able to provide appropriate, individualized patient intervention for overweight and obesity using clinical practice guidelines.
      - Agree
      - Somewhat Agree
      - Somewhat Disagree
      - Disagree
   d. I understand the meaning and significance of the Centers for Medicare and Medicaid Services core quality measures for Primary Care, particularly the BMI quality measures.
      - Agree
      - Somewhat Agree
      - Somewhat Disagree
      - Disagree
   e. I am able to outline the required elements for completion of the BMI quality measures.
      - Agree
      - Somewhat Agree
      - Somewhat Disagree
      - Disagree
   f. I will be able to use the newly created order sets for overweight and obesity to quickly document patient weight loss goals, interventions provided, and follow up plan.
      - Agree
      - Somewhat Agree
      - Somewhat Disagree
      - Disagree
   g. I can describe the workflow for completion of BMI quality measure from monitoring the quality management tab in the electronic medical record through documentation.
      - Agree
      - Somewhat Agree
      - Somewhat Disagree
      - Disagree

4. What did you like most about this BMI Quality Measures activity?
5. What did you like least about this BMI Quality Measures activity?

6. Do you have specific suggestions as to how this BMI Quality Measures activity might be improved?

7. Did you feel the BMI Quality Measures activity content was: (please circle one)
   
   Just right  Too advanced  Too basic

   Thank you for taking the time to share your thoughts about this educational activity.

   (Form adapted from the AAFP CME Evaluation Form Template)
Appendix D: BMI Order Set Evaluation

Amy Larson, ARNP, FNP, NP-C

Effect of an Intervention for Healthcare Providers on BMI Quality Measures

March 2017

BMI ORDER SET EVALUATION

1. What percentage of the time during the study period did you use the BMI order set?

2. How satisfied were you with the documentation/notes section of the order set?
   - Very satisfied
   - Somewhat satisfied
   - Somewhat dissatisfied
   - Very dissatisfied

3. How relevant did you find the information in the documentation/notes section of the order set?
   - Very relevant
   - Somewhat relevant
   - Slightly relevant
   - Not at all relevant

4. How satisfied were you with the orders (referrals and education) section of the order set?
   - Very satisfied
   - Somewhat satisfied
   - Somewhat dissatisfied
   - Very dissatisfied

5. How relevant did you find the information in the orders (referrals and education) section of the order set?
   - Very relevant
   - Somewhat relevant
   - Slightly relevant
   - Not at all relevant

6. What did you like about the order set?

7. What suggestions do you have for improving the order set?

Thank you for taking the time to share your thoughts about the BMI Order Set!
## Appendix E: Data Dictionary

<table>
<thead>
<tr>
<th>Variable Name</th>
<th>Variable Description</th>
<th>Data Source</th>
<th>Data Format</th>
<th>Measurement Type</th>
<th>Possible Values</th>
<th>Coding Instructions</th>
<th>Missing Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>bmi</td>
<td>BMI</td>
<td>EMR</td>
<td>Numeric 2.0</td>
<td>Continuous</td>
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<td>None</td>
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</tr>
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<td>Status of Quality Measure</td>
<td>EMR</td>
<td>Numeric 1.0</td>
<td>Dichotomous</td>
<td>Not Complete, Complete</td>
<td>0 = Not Complete, 1 = Complete</td>
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</tr>
<tr>
<td>age</td>
<td>Age at Time of Visit</td>
<td>EMR</td>
<td>Numeric 3.0</td>
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<td>18-115</td>
<td>None</td>
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</tr>
<tr>
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<td>Gender</td>
<td>EMR</td>
<td>Numeric 1.0</td>
<td>Dichotomous</td>
<td>Male, Female</td>
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<td>Race</td>
<td>EMR</td>
<td>Numeric 1.0</td>
<td>Nominal</td>
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<td></td>
</tr>
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<td>Numeric 1.0</td>
<td>Nominal</td>
<td>Hispanic, Not Hispanic</td>
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<td></td>
</tr>
<tr>
<td>handout</td>
<td>Was educational handout related to overweight or obesity provided?</td>
<td>EMR</td>
<td>Numeric 1.0</td>
<td>Nominal</td>
<td>Yes/No</td>
<td>0 = No, 1 = Yes</td>
<td>Leave Blank</td>
</tr>
<tr>
<td>dietitian</td>
<td>Was a nutritionist/dietitian referral ordered?</td>
<td>EMR</td>
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<td>Nominal</td>
<td>Yes/No</td>
<td>0 = No, 1 = Yes</td>
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<td>Was a bariatric referral ordered?</td>
<td>EMR</td>
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<td>Nominal</td>
<td>Yes/No</td>
<td>0 = No, 1 = Yes</td>
<td>Leave Blank</td>
</tr>
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<td>medication</td>
<td>Was a medication ordered?</td>
<td>EMR</td>
<td>Numeric 1.0</td>
<td>Nominal</td>
<td>Yes/No</td>
<td>0 = No, 1 = Yes</td>
<td>Leave Blank</td>
</tr>
</tbody>
</table>
Appendix F: Reminder E-mail

Reminder E-mail: BMI Quality Measures

This is a friendly reminder to check for BMI Quality Measure completion at every patient encounter. For more information about specific requirements to satisfy the measure click on the measure to open it and then click “VIEW INFO”. Remember, you can use the pre-made order sets for Overweight and Obesity as these include attached educational materials and referrals as well as each of the required elements for completion of the measure. If you have any questions, please contact xxx xxx*, Quality Improvement Coach, xxx@xxx.org*

Thank you for all you do for our patients!

Amy Larson, ARNP, FNP, NP-C

*Identifying names have been removed from this document.
Bibliography


Driehuis, F., Barte, J., ter Bogt, N., Beltman, F., Smit, A., van der Meer, K., &


