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A Quality Improvement Project to Improve Pediatric Body Mass Index Screening

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A Quality Improvement Project to Improve Pediatric Body Mass Index Screening

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Abstract

Purpose: Childhood obesity in the United States has become a healthcare crisis. Evidence suggests that obesity is often not detected by healthcare providers (HCPs) due to inadequate screening at well-child visits. The purpose of this quality improvement project was to provide HCPs with improved pediatric obesity screening and counseling techniques using screening tools, diet, and physical activity education resources to enhance HCP compliance with current screening guidelines. **Method:** A pre/post-test design was utilized to measure HCP (n=6) knowledge acquisition after delivery of a customized educational in-service session. The in-service included education on (a) up-to-date BMI screening guidelines; (b) the Family Nutrition and Physical Activity (FNPA) screening tool; (c) the Healthy Eating Activity Together (HEAT) educational tool; (d) motivational interviewing techniques; and (e) BMI screening links accessible on electronic health record (EHR) systems. After the educational in-service, the EHR system used by the HCPs was updated to include a Centers for Disease Control and Prevention-approved BMI calculator and a link to the FNPA screening tool. Post-test results and follow-up interviews with HCPs were utilized to assess project effectiveness and areas of needed improvement at a one month follow-up. **Results:** The outcomes included knowledge gain in areas of BMI screening, National Guidelines Clearinghouse (NGC) screening guidelines, and Motivational Interviewing (MI) behavioral management techniques. Descriptive statistics were completed to determine effectiveness. Findings suggest positive changes among HCPs in relation to guideline use, BMI screening awareness, and MI techniques.

Keywords: childhood obesity, adolescents, clinical practice guidelines, primary care, evidenced-based practice, technology

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Introduction

Overweight children are defined as having excess body weight for a particular height with a body mass index (BMI) at or above the 85th percentile and lower than the 95th percentile when compared to other children of the same age and gender (Centers for Disease Control and Prevention [CDC], 2014). Childhood obesity diagnosis includes those children with a BMI at or above the 95th percentile for age and gender (CDC, 2014). Using this diagnostic criteria, the incidence of childhood obesity is close to four times higher in adolescents compared to 30 years ago (CDC, 2014). Further, one fourth of children in the United States (US) are now overweight and associated co-morbidities have increased (Hurt, Kulisek, Buchanan, & McClave, 2010).

The rise in childhood obesity has been linked to a pervasive environment of junk food (Thomson, 2011). Physical and social environments of children encourage consumption of calorie-rich foods and high sugar intake while reinforcing sedentary lifestyles related to excessive screen time (Goldfield et al., 2013). Empty-calorie foods are often less expensive and more readily obtainable than nutrient-dense options. Routine consumption of these foods has an adverse effect on health. Additionally, although there are well-documented benefits associated with regular participation in physical activity, many children are not reaching levels of activity that would prevent the co-morbidities associated with obesity (Goldfield et al., 2013).

Incidence and Consequences

In the 1980s, childhood obesity occurred in 7% of children in the US (Ogden, Carroll, Curtin, Lamb, & Felgal, 2014). Childhood obesity more than doubled by 2012, affecting 18% of children ages 9 to 12 and increased from 5% to 21% in adolescents ages 13 to 18 (CDC, 2014).

In 2012, 16% of the pediatric population in Massachusetts was considered overweight and 14.5% was considered obese (Levi, Segal, Raybur, & Martin, 2015). These statistics show the widespread and persistent nature of the obesity epidemic.

Pediatric obesity is associated with several co-morbidities, including diabetes mellitus, high blood pressure, high cholesterol, depression, kidney disease, asthma, liver disease, and heart disease (McCance & Huether, 2015). Obese children miss more days of school and have lower socioeconomic status compared to their non-obese peers (McCance & Huether, 2015). Additionally, obesity can lead to psychological issues, such as depression or anxiety (CDC, 2014). In 2009, yearly health expenses for childhood obesity totaled \$14.1 billion in additional prescription drug, emergency room, and outpatient visit costs (Trasande & Chatterjee, 2009). Pediatric obesity may also lead to physical and emotional ailments that persist into adulthood (Sanchez-Villegas et al., 2013).

Screening and Treatment for Obesity

Treatment for obesity has typically focused on management of co-morbidities; however, with the development of new screening tools, the focus has shifted from recognition to prevention (Savinon, Taylor, Canty-Mitchell, & Blood-Seigried, 2012). According to the American Academy of Pediatrics (AAP), BMI is the most widely accepted diagnostic method used to detect pediatric obesity. The National Guidelines Clearinghouse (NGC) recommends yearly BMI screenings for all children (NGC, 2015). Despite this aim, key prevalence indicators show that only 52% of patients have had BMI documented in EHRs (Klein et al., 2010). As part of Healthy People 2020 goals, the US Department of Health and Human Services (2014) has set a goal to increase this to 55% compliance through increased use of screening tools.

If a child is diagnosed as overweight or obese, NGC guidelines indicate that health care providers (HCPs) should discuss healthy eating and exercise habits (NGC, 2015). HCPs often do not follow these recommendations due to time constraints and other factors, including the “perceived futility of involvement” (Branscum & Sharma, 2011, p. 4), meaning many HCPs doubt their patients’ potential for lifestyle changes. Additional barriers to guideline adherence include lack of a standardized screening tool, incongruent delivery of information, financial costs of improved HCP training, lack of support service, poor multidisciplinary team coordination and policy implementation, and inadequate billing for diagnoses (Whitlock, O’Connor, Williams, Beil, & Lutz, 2010).

Problem Statement

Management of obesity within primary care is complex. Low rates of annual BMI screenings, combined with the insufficient counseling on diet and exercise, may contribute to the risk of obesity and associated co-morbidities. There is an opportunity for improvement in screening and counseling practices to reduce pediatric obesity. The purpose of this quality improvement project was to improve pediatric obesity screening and related counseling by providing HCPs with user-friendly screening tools, and diet and physical education resources to enhance compliance in meeting evidenced-based NGC guidelines.

Review of the Literature

CINAHL, the Cochrane database, ERIC, Clearing House Guidelines, and PubMed were reviewed for literature on guidelines related to screening for and management of obesity in children from 2008 through January 2015. Search terms included childhood obesity, primary healthcare, guidelines, prevention, and interventions. Inclusion criteria for the studies were focus on pre-school children ages 2 to 5 years, children ages 6 to 12 years, or adolescents ages 13 to 21

years. Articles were excluded based on several factors including non-primary care emphasis, limited sample size, coexistence of other chronic illnesses, and inclusion of children under 2 and over 22 years of age. This search resulted in 150 studies. After considering all criteria, narrowing the range of articles to intervention-based programs, HCP-targeted actions, and pediatric-specific screening and lifestyle interventions, 12 studies met criteria for full literature review.

Obesity Management Guidelines

Six of the 12 articles included guidelines of management of obesity (Table 1). The NGC made 20 recommendations for childhood obesity management, the most pertinent of which included BMI screenings at all well-child visits, starting at age six (NGC, 2015). The NGC recommendation also asserted that a combination of improved diet, specific physical activity interventions, and reduced sedentary time is key to weight loss improvement. The Endocrine Society expanded upon the NGC's guidelines by stating that children should avoid sweetened beverages, restrict their intake of fast food, and abstain from over eating to lower their weight (August et al., 2008). According to the Daniels and Hassink (2015) and August et al. (2008), guidelines for physical activity includes at least 60 minutes of moderate to vigorous activity per day and limiting screen time to two hours or less per day.

The American Medical Association (AMA) also supports these guidelines (AMA, 2014). Additionally, the AMA (2014) recommends that children and adolescents eat five or more servings of fruits and vegetables daily, avoid artificially sweetened drinks, do not skip breakfast, and eat meals in the home and with family six out of seven times per week. The AMA also recommended that parents remove televisions and computers from bedrooms.

The U.S. Preventive Services Task Force (USPSTF; 2010) agreed that the AMA recommendations are necessary for full adoption of BMI prevention and screening. Further, in 2012, the USPSTF developed weight management programs that incorporated counseling and intensive behavioral interventions, which included a five-step approach to behavioral management and an all-inclusive support system for overweight and obese pediatric patients. Techniques included specific advice to change dietary practices, goal setting, regular follow-ups, and addressing motivational barriers using cognitive behavioral techniques. Intensive behavioral interventions were aimed at improving diet and physical activity. The AAP carried out a systematic review of intervention based pediatric obesity research, which identified Motivational Interviewing (MI) to have positive health outcomes alone and in conjunction with other weight loss interventions in children and adolescents (Christie, & Channon, 2014; Daniels & Hassink, 2015). MI counseling by HCPs indicated improvement in obesity-related to quality of life, impulsive eating tendencies, control over eating, and positive results in BMI and weight management of at-risk pediatric groups (Christie, & Channon, 2014). The AAP and AMA support HCP efforts to effectively influence positive self-reported behavioral changes through use of counseling and MI (AMA, 2014; Daniels & Hassink, 2015).

Screenings Tools

Six articles supported the screening of pediatric patients for obesity and focus on the use of screening tools (Table 2). Few healthcare professionals used systematic screening identification methods despite mounting evidence of their validity (Vine, Hargreaves, Briefel, & Orfield, 2013). In a meta-analysis, Vine et al. (2013) examined 96 studies and concluded that HCPs lack needed resources for consistent screening, diagnosis, counseling, and treatment of childhood obesity. This is a crucial finding given that other studies have shown that weight loss

improvement rates move from 38% without counseling to 77% with counseling (Rose, Gokun, Talbert, & Conigliaro, 2013). In other words, when HCPs have the resources to provide counseling to obese children, weight loss rates improve dramatically.

Hopkins, DeCristofaro, and Elliott (2011) created a toolkit that utilizes a step management approach for HCPs to implement and maintain clinical BMI practice guidelines. This intervention-based research focused on child and adolescent screenings and demonstrated the need for assessment of diet, physical activity, and annual screenings. Based on the toolkit resources provided in Hopkins, DeCristofaro, and Elliott (2011) the Family Nutrition Physical Activity (FNPA) was recommended as a screening tool. The FNPA screens for obesogenic risk factors in the home environment and was shown in intervention-based weight loss programs to support long-term screening in pediatric primary care (Tucker et al., 2014).

In a quasi-experimental quality improvement study, Laiteerapong et al. (2011) initiated a program to streamline BMI documentation. These researchers proposed to increase education using a pamphlet designed with local and affordable community resources, nutrition options, a screening algorithm, and BMI documentation. They also created a process map tool for use by HCPs when teaching patients about obesity prevention measures using the Johns Hopkins Nursing Evidence-Based Protocol (Laiteerapong et al., 2011). After training was implemented, charting on BMI screening, education, and counseling increased by 34% in the participant group of 130 HCPs.

Electronic health records (EHRs) were examined by Savinon et al. (2102) for utility in BMI screenings. As part of their retrospective review study, the Healthy Eating and Activity Together (HEAT) tool was successfully integrated into the EHR screening tool, resulting in a 62% increase in BMIs recorded after the customization of the EHR and a 94% increase in growth

charts plotted (Savinon et al., 2012). This risk assessment tool was subsequently adopted by the Blue Cross Blue Shield of North Carolina Physician's Guide (Savinon et al., 2012).

Summary

Electronic charting is one of the primary tools used to improve BMI screening rates and accuracy. Key strategies identified as best practices included assessment of nutrition, physical activity in annual BMI screenings, and counseling based on a customized EHR screening tool that focused on obesogenic, or resource-poor, environments (NGC, 2015; Laiteerapong et al., 2011; Savinon, 2012). In primary care settings, where primary prevention and secondary prevention are crucial, evidence suggests pediatric obesity screening rates are low, possibly due to a lack of HCP resources and electronic tools. This suggests a need for quality improvement in BMI screening and HCP education.

Theoretical Framework

The Transtheoretical Model (TTM) is a public health model that has been broadly recommended across disciplines and is utilized as an agent for behavioral change (Lewis & Green, 2000; Prochaska & Diclemente, 1984). The TTM provides an appropriate framework to guide this capstone work because its five-stage model has demonstrated effectiveness as a tool when counseling individuals to adopt healthier behaviors.

The TTM includes five stages of change: pre-contemplation, contemplation, preparation, action, and maintenance. In pre-contemplation, the individual is challenged to recognize the problem or need for change but is reluctant because change is overwhelming. The idea of intent for behavioral change is introduced. In the contemplation stage, the individual is still undecided regarding the proposed change, but the problem has now been recognized and acknowledged. There is an opportunity to negotiate behavioral implementation. Education and motivation grow

and develop in this stage. The third phase, preparation, begins once the action for change has been set in motion. Making a plan and empowering behavioral change occur at this stage. In the fourth stage, action, the individual shows commitment to behavioral modifications and follows through with the plan of action. In the final stage, maintenance, the individual reinforces the plan and constructs, re-evaluates, and modifies the plan as needed (Burton et al., 2011).

The TTM can be applied in a clinical setting by HCPs working with a pediatric population to reduce obesity by assessing readiness for change in diet and exercise patterns. The HCP, through counseling, guides the patient with the necessary strategies to bring patients through the stages of behavioral change by encouraging them to adopt new behaviors while eliminating unhealthy ones.

MI is a style of counseling developed to recognize and employ HCPs to deliver brief, patient-tailored counseling based on a patient's intrinsic motivation to improve one's health (Korcha, Polcin, Evans, Bond, & Galloway, 2015). TTM and MI mutually employ the concept of readiness to change as a vehicle to guide an individual through a process of developing healthy behaviors. MI allows HCPs to translate the TTM concepts into practice and to move from a traditional advice-giving role to one which utilizes patients making their own choices and strategies to reduce weight (Korcha et al., 2015).

Methods

Project Design and Data Collection

This was a quality improvement project with a pre/post-test design, the goal of which was to improve pediatric obesity screening and related counseling given by HCPs. The Capstone project began in November, 2015. The project was implemented over a four-week time period at a health center affiliated with a private high school. The goal was to have 10 HCPs participate in

the project. Six HCPs, including one physician, one nurse practitioner, and four registered nurses, engaged in an initial in-service to improve BMI screening techniques. Two HCPs completed a follow-up interview four weeks later. Mental health counselors and a nutritionist were also available for referrals related to any psychological implications of obesity, and behavioral counseling; however, due to time constraints they were not able to participate in the in-service. All participants met the inclusion criteria as HCPs, and were able to understand, read, and write in English.

Educational In-service and Data Collection

HCPs were notified by verbal reminder of the time, date, and location of the in-service. All participants agreed to undergo training during a one hour educational in-service. During the first week in November, the DNP student met with participants to collect baseline data as a pre-implementation step. Baseline data was gathered from the six HCPs at the project site to assess (a) average weekly patient census; (b) perceived barriers in implementing BMI screening; (c) utilization of EHR for screening; and (d) availability of brochures, flyers, and pamphlets regarding healthy lifestyle (Appendix A). Directly following collection of baseline participant data, the pre-test was implemented. The 10-question pre-test measured HCP knowledge of BMI screening guidelines specific to the adolescent population's comfort and experience level when addressing BMI during health screenings and motivational interviewing techniques (MI) (Appendix B). Response options included multiple-choice, fill in the blank, and Likert scale. Baseline and pre/post-test answers were collected on paper.

One week later, the HCP educational in-service was implemented. The in-service highlighted screening guidelines, dietary and exercise aims, and rationale for implementing improved screening and education to patients. Specifically, the in-service included NGC

guidelines, the Family Nutrition Physical Activity (FNPA) screening tool, the Healthy Eating Activity Together (HEAT) educational tool, and MI techniques. During the in-service, each participant was given handouts describing the FNPA and HEAT education tools. Participants were then shown how to use the FNPA and HEAT tools. The FNPA was presented as an assessment tool for the at-risk pediatric population with which the HCPs could focus on meal choices, family practices, screen time, and sleep routine (Hopkins, DeCristofaro, & Elliott, 2011). The HEAT tool was promoted as a healthy eating handout. It emphasized eating fruits and vegetables and monitoring daily energy balance intake and output by using concrete examples, such as replacing screen time with family walks and eliminating TV during meal times (Savinon et al., 2012). The in-service also included a brief review of increasing prevalence of childhood obesity in the US, its comorbidities, related pathophysiology, and the importance of improved BMI screening guidelines.

Participants were then reminded of the screening guidelines and patient education points, including (a) avoiding sweetened beverages, (b) restricting intake of fast food, (c) limiting screen time to less than two hours per day, (d) getting at least five servings of fruits and vegetables daily, and (e) engaging in 60 minutes of moderate-intense physical activity most days of the week. HCPs were shown where to access the CDC-approved BMI calculator and FNPA links within the EHR, which was based upon Savinon et al.'s (2013) recommendations for EHR customization.

Food and lifestyle behavioral management strategies were highlighted based on the importance of MI. A case study was discussed with participants demonstrating the use of the five "A"s of MI, as applied to obesity, which included (a) assessing readiness, (b) advising, (c) agreeing or disagreeing on plan of action, (d) assisting patients by assessing food attitude,

relationship to food, and integration of exercise within daily life, and (e) limitations and influences of attitude on obesity behaviors. An MI case scenario was presented to increase participant understanding of MI as a client-centered therapeutic conversation in which advice giving is limited by HCPs. A question-answer session followed the educational in-service to confirm that the goals and guidelines of the presentation were clear. Upon completion of the in-service, the same 10-question pre-test was administered as a post-test to ascertain if the in-service improved HCP baseline knowledge. The post-test consisted of the same questions as the pre-test and were collected on paper (Appendix B).

Adaptation of the Electronic Health Record System

Within one week of the in-service, the EHR was updated to include a link to the FNPA, as well as a web link for the CDC-approved BMI calculator. Following the educational in-service, body mass growth chart visuals were posted in exam rooms for HCPs along with HEAT tool healthy living handouts. Nurses were shown where to access to 1) an accurate quick BMI calculator in the EHR, 2) the HEAT handout for patients, and 3) the FNPA tool to screen and perform a risk assessment on patients. The NP and physician received the BMI screening information from nurses and used the FNPA and HEAT to assess patients' risk factors. All HCPs had access to EHR links following the in-service and the available FNPA and HEAT tools in order to help facilitate the development of an individualized plan for each patient.

Follow-up Evaluation

Follow-up qualitative evaluations took place at one month post in-service to gather data on HCP adherence, screening tools and/or calculator functionality, utility of these tools in clinical practice, barriers to using the tools, and areas for improvement (Appendix C).

Qualitative data was filled out and collected on paper. Due to unforeseen time constraints related

to EHR updates and staffing changes, only two HCPs were available to participate in the one month follow-up individual interview.

Data Analysis

Data analyses were performed using IBM SPSS version 22. Each participant self-reported qualitative and quantitative answers based on a 10-item paper survey, which were then recorded in an Excel spreadsheet. Descriptive statistics were used to summarize data using counts and percent for pre- and post-test data. Qualitative data from the one month follow-up were analyzed to determine HCP perceptions of screening for obesity using the new tools.

Project Goals, Objectives, and Expected Outcomes

Goal 1: Provide a BMI screening educational in-service to Center HCPs.

Objective	Expected Outcome
1. The educational in-service will be attended by pediatric Center HCPs.	At least 8 out of 10 HCPs will attend the in-service.
2. HCPs will demonstrate increased knowledge related to BMI screening and MI.	On post-test, at least 5 out of 10 HCPs will answer knowledge questions correctly. At least 5 out of 10 HCPs will rate their comfort level as “comfortable or higher”.

Goal 2: After participating in the education in-service, HCPs will routinely provide BMI screening and wellness education at the project site.

Objective	Outcome
3. HCPs will incorporate routine screening and education into their practice using information introduced the in-service.	At one month follow-up, at least 5 of the 10 HCPs will qualitatively report routine use of FNPA and HEAT tools.

Goal 3: EHR updates will provide improved usefulness in BMI screening and wellness education at this practice site.

Objective	Outcome
4. Educational in-service provided to patients by the HCPs will be enhanced through the use of EHR updates.	At one month follow-up, at least 8 out of 10 HCPs will report EHR updates are helpful and user-friendly, as evidenced by verbal report.

Goal 4: Teens using services provided at the Center will have a better understanding of their own health in terms of diet and exercise practices.

Objective	Expected Outcome
5. Teens will be provided individualized, nutrition and physical activity education by HCPs.	At least 5 out of 10 HCPs will report improvement in teen awareness of diet and exercises post-intervention, as evidenced by verbal reports from patient to HCPs.

Results

Baseline Data

Prior to the QI project the HCPs completed a baseline data survey. Participating HCPs were asked how many adolescent patients are seen weekly. Results showed an average of 29 (8-37) adolescent patients are seen weekly. Baseline question two asked about barriers to screening BMI. Responses included 1) 2 out of 6 HCPs listed time constraints, 2) 2 out of 6 stated lack of access is a barrier, and 3) 1 HCP stated BMI screening is not a focus unless it’s an acute issue. Baseline question three asked HCPs to state their familiarity with BMI guidelines. One out of 6 stated they are very comfortable with BMI screenings, 3 out of 6 HCPs answered they are not familiar and 1 HCP stated they feel a specialist should address BMI screening guidelines. When HCPs were provided a list of potential barriers, three out of 6 HCPs for a second time listed time constraints and 2 HCPs listed patient refusal to discuss topic as barriers to screening. Though all

participants report using an EHR to chart results, 4 of the 6 HCPs answered “no” to having access to EHR health maintenance reminders.

Results of Objectives

Objective 1. BMI screening educational in-service was provided to Center HCPs. The educational in-service goal was to have 8 out of 10 HCPs attend. Six out of the original 10 HCPs engaged in the in-service education.

Objective 2. Questions 2-4 addressed BMI knowledge. The post-test objective was that at least 5 out of 10 HCPs would demonstrate increased knowledge related to BMI screening and MI by answering questions correctly. HCPs were asked (question two) to rate their frequency of assessing adolescent nutritional and exercise status based on BMI. Three out of 6 incorrectly answered on pre-test compared to 6 out of 6 answering correctly on post-test. Half of HCPs (3 out of 6) incorrectly answered how frequently to assess patients with a BMI of 25 on pre-test compared to all HCPs answering correctly on post-test. When HCPs were asked about the screening frequency of a patient with a BMI of 30, only 1 out of 6 answered correctly on pre-test compared to 5 out of 6 correctly answering screening frequency on post-test.

Additionally, it was expected that at least 5 out of 10 HCPs would rate their comfort level as “comfortable or higher” when addressing an adolescent’s BMI (question 5). HCP comfort level improved from 3 out of 6 on pre-test to 6 out of 6 feeling comfortable or higher on post-test, moving 2-points on the 5-point Likert scale from pre-test to post-test. See Figure 1 to compare BMI screening knowledge gains on the pre/post-test questionnaires.

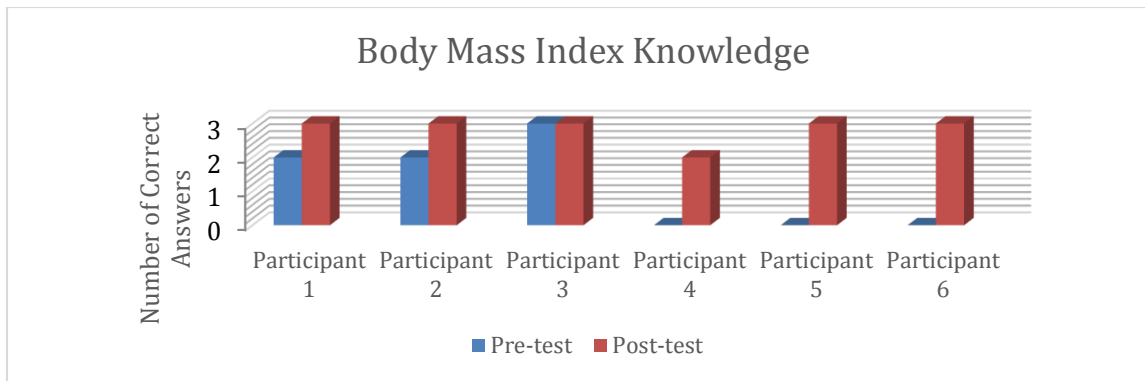


Figure 1. Comparison of participants’ BMI screening knowledge on the pre- and post-test questionnaire answers.

HCP knowledge of MI was assessed primarily using closed-ended multiple choice questions (questions 6-10) with a perfect score being 9 out of 9. Incorrect answers on these questions may indicate levels of pre-knowledge or test-taking skills. HCPs recognized that in MI one should avoid giving information (question 7) and instead focus on a client-centered approach (question 6), with 1 out of 6 HCPs answering correctly on pre-test compared to 5 out of 6 answering correctly on both post-test questions. For questions 8 through 10, pre-test revealed the majority of HCPs (5 out of 6) were not able to correctly describe the acronym (question 8) OARS (open question, affirmation, reflective listening, and summarization), did not have knowledge of the five “A”s (0 out of 6), nor could HCPs explain the principles of MI (1 out of 6) correctly. Post-test scores improved in OARS, the five “A”s, and MI knowledge, with HCPs answering correctly 100% of the time in all three categories. The average MI pre-knowledge score was 9.3% compared to a post-knowledge score of 96% correctly answered. Figure 2 compares MI pre- and post-test knowledge.

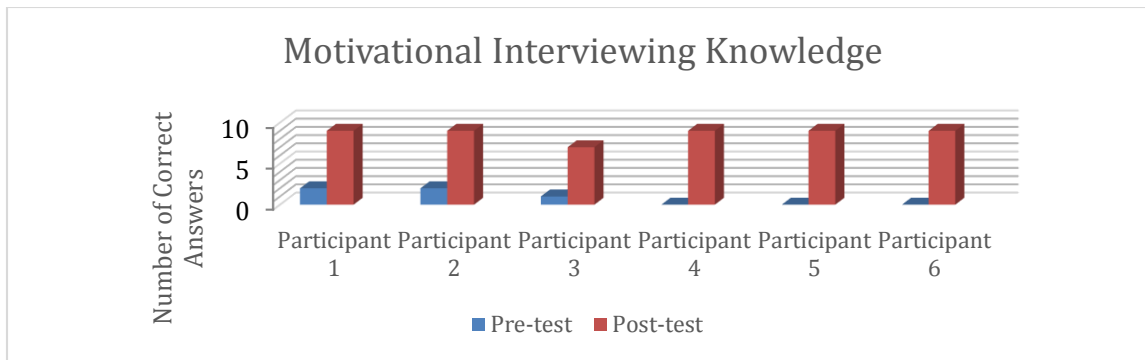


Figure 2. Comparison of participants’ MI knowledge on the pre- and post-test questionnaire answers.

Objective 3. After participating in the education in-service, HCPs were expected to routinely provide BMI screening and wellness education at the project site. It was noted on pre-test (question 1) that 4 out of 6 HCPs indicated a hesitance to using national guidelines. However, on post-test, 4 out of 6 HCPs agreed that national BMI guidelines are a valuable tool and only 2 out of 6 were ambivalent regarding guideline usefulness.

At one month follow-up, at least 5 of the 10 HCPs were expected to qualitatively report routine use of FNPA and HEAT tools. Of the 2 HCPs that participated in the one-month follow-up, one HCP reported use of the HEAT tool and BMI calculator during office visits. The HCP reported receiving positive feedback from patients regarding the tools.

Objective 4. The utility of the EHR updates were measured at this practice site. At the one month follow-up, 2 HCPs reported EHR updates as helpful and user-friendly. One HCP stated that the “EHR updates included a wonderful set of tools to help increase communication from providers to patients” but that lack of routine physical exams and the need for other EHR updates during this project implementation were barriers.

Objective 5. Teens were expected to gain a better understanding of their own health as evidenced by at least 5 out of 10 HCPs verbal report of improvement in teen awareness of diet

and exercises post-intervention. At the one month follow-up, 1 out of the 2 HCPs who participated in the follow-up interview stated the tools were helpful, especially when explaining diet and exercise choices to teenage patients. The other HCP stated the tools helped to increase her communication with patients; however, she was only able to use the tools on a few occasions due to the limited annual physical exams scheduled.

Facilitators and Barriers

Facilitators of this project included support from stakeholders, well-educated HCPs, an online EHR system that could be readily adapted to include new tools, and an existing infrastructure for healthcare. Several barriers to implementation arose when attempting to perform the educational in-service. HCP commitment to using resources gained during the in-service and ability to gain follow-up with HCPs within a timely manner were limitations. The project site underwent staffing changes and EHR upgrades in the middle of the QI project implementation. Additionally, breaks in the academic calendar when students were not onsite and a limited number of annual exams occurred during Capstone implementation leaving little opportunity to employ the screening tools. To overcome this barrier, the project was implemented in early November to avoid the winter break. To encourage follow-up, stakeholders were emailed and verbally reminded following the educational in-service to set up a one month follow-up interview.

Discussion

This project was designed to help HCPs take steps to improve BMI screening techniques and in turn to create healthier habits among pediatric patients. Effectiveness of the HCP in-service education was assessed after the post-test and at a 1-month follow-up. The findings suggest positive changes among HCPs in relation to guideline use, BMI screening awareness,

and MI techniques. There were improvements in the participants' knowledge of BMI guidelines after the educational in-service. There were also improvements in the participants' knowledge of motivational interviewing after the in-service education measured by knowledge gained.

Two themes arose as barriers cited by HCPs around screenings. Based on pre/post-test results, the first theme was HCP self-professed constraints on their time and the second was lack of familiarity with BMI screenings. Pre/post-test comparisons of these issues revealed that quick links and improved therapeutic MI and BMI knowledge had a qualitative and quantitative impact when addressing participant-specific barriers. Prior to the in-service education, the majority of HCPs were unaware of or did not have access to the health maintenance reminders and education built into their EHR system. This suggests that there is a gap in education and awareness amongst the majority of EHR users as to what materials are available. Notably, 3 of the 6 HCPs stated that they were either unfamiliar with the BMI, nutrition, and exercise guidelines, or they felt that a specialist should address these issues prior the in-service. Results of the pre/post-test comparison and one month follow-up interviews revealed that there was increased comfort and awareness of BMI during office visits after introduction of the FNPA and HEAT tools through the education in-service. Knowledge gained after the educational in-service regarding comfort level when addressing overweight and obesity in office visits improved among HCPs.

Overriding themes noted in this QI project reflect the conclusions identified in the literature review. The literature suggests that healthy diet tools, increased physical activity education, and use of a customized EHR system can have a significant impact on improvement of BMI screenings (Hopkins et al., 2011; Savinon, 2012). This capstone QI education was based on NGC guideline standards and recommendations and was supported by the US Department of Health and Human Services' (2014) Healthy People 2020 goal to increase BMI screening to 55%

compliance through increased use of screening tools. Achieving this level of compliance was also a major aim of this project; even though this aim was not successfully achieved, quantitative and qualitative improvement were reported overall. There was a significant improvement in BMI screening knowledge after the educational in-service. In other words, there may be a relationship between BMI screening guideline knowledge and comfort level when addressing overweight and obesity in pediatrics.

In further alignment with current evidence-based practices, this Capstone was modeled after both the national guidelines and the 2010 USPSTF's five "A"s of Behavioral Counseling Framework. Additionally, the Capstone was modified to include motivational interviewing techniques. The use of the TTM provided a framework to guide this work. The TTM model was used to help change health behaviors and it demonstrated effectiveness in teaching behavioral changes regarding diet and exercise. The concepts used in this study were aligned with the MI approach, allowing for adaptation of an education in-service that is therapeutically sensitive and appropriate in opening the lines of communication with the pediatric population. There was an improvement in MI knowledge gained after the educational in-service and qualitative reports of MI utility when addressing BMI in adolescents.

Implications for Nursing Practice

This QI project demonstrated improvements in HCP understanding of MI techniques and BMI screening approaches. Incorporation of an accurate and quick BMI calculator in the EHR, MI techniques, the HEAT handout, and the FNPA tool were strengths of this educational intervention. HCPs were able to use the education they received to answer correctly with an average of 94% on BMI post-test knowledge gained compared to pre-test average score of 39%. Post-test MI knowledge gains resulted in an average score of 96%, compared to pre-test average

score of 8%. The outcomes demonstrated that the impact of education in these areas has the potential to enable HCPs to use the education they received to improve BMI screening practices and improve awareness of current evidence based BMI guidelines.

Receiving accurate BMI screening information to assess patients is a necessary tool for HCPs to discuss obesity and its long-term effects. This project showed that a successful step management approach in screening for childhood obesity resides in the availability of evidenced-based resources and accurate BMI screening education. The BMI screening success rate among HCPs can be greatly improved through actively supporting HCPs by improving quick link access in EHRs, evidence-based education, and providing up-to-date screening tools. More evidence-based education is required for HCPs to become both knowledgeable and confident in their skills to promote and manage child pediatric overweight and obese patients. Improved screening and guideline awareness has the potential to reduce the incidence of obesity and its related co-morbidities and lead to a paradigm shift in how primary care providers perceive and care for their pediatric patients. Training HCPs to utilize evidence-based guidelines in the care of at risk overweight or obese patients' influences practice throughout the healthcare field, leading to increased rates of screening.

Opportunities for additional application depend on a wider dissemination of the in-service education to HCP training programs.

In this project, the screening tools and MI knowledge gained provided HCPs with a way to facilitate open and productive conversations. Development of a team approach with school counselors has the potential to evolve this project in the future. HCPs are set up on site to be able to refer at risk patients with improved customized plans of care. These positive outcomes have the potential to further the development of similar QI improvements, particularly in a

setting with a larger sample size. The next step of the Capstone work is forming strategic alliances and joint ventures with school counselors and nutritionists, which has the potential to provide an opportunity to maximize partnerships between HCPs, nutritionists, and counselors and streamline obesity-related screenings.

Conclusion

Childhood obesity is a health priority that carries substantial health and economic risks. Addressing obesity through early detection and screening is key to managing this epidemic. Although obesity management is complex, evidence suggests that HCPs play a crucial role. HCPs must lay the groundwork for managing and screening for childhood obesity. This Capstone showed that training and educational in-service in the secondary prevention and screening of BMI in adolescents in the United States can foster improvements in the knowledge of BMI screenings in pediatrics, and thus has the potential to improve health outcomes. Further project expansion needs to embrace multiple reminder in-services to provide optimal HCP compliance. Findings from this QI project will be shared at UMass Scholarly Presentation Day. The abstract work will be submitted to the National DNP Annual Conference.

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Table 1

National Guideline Recommendations

First Author	Year	Major Recommendations
American Medication Association	2014	<ul style="list-style-type: none"> • BMI should be calculated and plotted annually, and compared with growth pattern, familial obesity, and medical risks to assess the child’s obesity risk. • Children and adolescents should eat five or more servings of fruits and vegetables daily, avoid artificially sweetened drinks, avoid excessive screen time, eat meals in the home and with family six out of seven times per week, and engage in 60 minutes of moderately vigorous activity each day. • Patient-centered counseling techniques such as motivational interviewing to help families identify their own motivation for making change.
August	2008	<ul style="list-style-type: none"> • Clinicians should prescribe and support intensive lifestyle, dietary, physical activity, and behavioral modification to the entire family and to the patient and as the prerequisite for all overweight and obesity treatments for children and adolescents. • Teach patients to avoid low-nutrient calorie dense, high-fat and high-sugar foods and beverages.
Christie	2015	<ul style="list-style-type: none"> • Motivational interviewing has the potential to improve outcomes in the management of childhood obesity and has been used in behavioral counseling interventions to help HCPs guide weight loss interventions. Using patient sited barriers, MI has proven successful in engaging the patient to make choices and develop strategies for lifestyle changes to reduce weight.
Daniels	2015	<ul style="list-style-type: none"> • Reduce high-risk dietary and activity behaviors and increase in exercise to at least 60 minutes of moderate to vigorous activity per day and limiting screen time to two hours or less per day. • Use of motivational interviewing by HCPs to improve self-reported behavior changes for obesity prevention and treatment.
National Guideline Clearinghouse	2015	<p>Health care providers should counsel all families to:</p> <ul style="list-style-type: none"> • Limit child consumption of sugar-sweetened beverages, eat a diet with the recommended quantities of fruits and vegetables, and eat breakfast daily. • Eat meals together as much as possible and limit eating out, especially eating at fast food restaurants • Avoid television for children under the age of two and "screen time" to less than two hours per day • Screen all children yearly for BMI.

U.S. Preventive Services Task Force	2012	<ul style="list-style-type: none">• Concluded that medium- to high-intensity counseling by HCPs has a small net benefit on health behaviors and outcomes.
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Note. HCP = health care provider; BMI = body mass index

Table 2

Body Mass Index Screening Findings

First Author	Year	Major Findings
Hopkins	2011	Both evidence-based interventions and clinical practice guidelines in the form of provider resources/toolkit provided the basis for a successful step management approach for primary care providers treating childhood obesity.
Laiterapong	2011	Education to streamline BMI documentation was implemented using a pamphlet designed with local, affordable community resources, nutrition options, a screening algorithm, and EHR systems updates to calculate BMI and improve documentation. After training 130 HCPs, there was a 34% increase in charting on BMI screening and patient education and counseling documented.
Rose	2013	This study looked at screening and management of obesity and perception of weight status. Of the 1,510 participants, 77% reported weight loss attempts were positively linked to physician weight counseling discussions. Perceived weight loss improvement rates results were only 38% without counseling.
Savinon	2012	Customizing the EHR using screening guidelines and the risk assessment HEAT tool resulted in a 62% increase in BMI charting and obesity diagnoses
Tucker	2014	The FNPA survey, which screens for obesogenic risk factors in the home environment, was used in an intervention study measuring weight loss outcomes. The authors identified the FNPA as a useful tool to support long-term screening in pediatrics.
Vine	2013	Of the nine identified, successful treatment among providers for children with a BMI above a specified percentile focused on treatment interventions that incorporated individual patient-centered counseling as a means for achieving a child's healthy weight.

Note. HCP = health care provider; FNPA = Family Nutrition Physical Activity; EHR = electronic health record; BMI = body mass index; HEAT = Healthy Eating Activity Tool

Appendix A

Baseline Data

<p>1. How many adolescent patients do you assess and treat on a weekly basis? (please list an average)</p>
<p>2. Please describe any barriers that exist in your practice to evaluating your patients' BMI, nutritional and exercise status.</p>
<p>3. Describe your familiarity with BMI screening, nutrition and exercise guidelines:</p>
<p>4. Do you utilize an electronic health record (EHR) system as your main form of documentation while assessing and treating patients at this facility? (circle one)</p> <p>Yes No</p>
<p>5. If you answered yes to question 4, are there health maintenance reminders and education built into your EHR system? (circle one)</p> <p>Yes No I don't use the EHR system</p>
<p>6. Have you experienced any of the following barriers when attempting to perform a BMI screening, diet or exercise counseling? (circle one)</p> <p>Patient refused to discuss topic Time constraints Healthcare provider personal beliefs The topic should be discussed with a specialist I have no barriers to this</p>

Appendix B

Pre/Post-Test

Question	Responses				
1. I believe national guidelines are a valuable tool.	Strongly Disagree	Somewhat Disagree	Neither agree nor disagree	Somewhat Agree	Strongly Agree
2. In an adolescent patient (ages 10-19 years), how frequently should you assess pediatric nutritional and exercise status?	Yearly	Monthly	Quarterly	Semi-Annually	Other
3. How frequently should you assess adolescent nutritional and exercise status in patients with a BMI greater than 25.0?	Yearly	Monthly	Quarterly	Semi-Annually	Other
4. How frequently should you assess adolescent nutritional and exercise status in patients with a BMI greater than 30.0 or above?	Yearly	Monthly	Quarterly	Semi-Annually	Other
5. Please rate your comfort level when addressing an adolescent's BMI.	Very uncomfortable	Somewhat uncomfortable	comfortable	Somewhat comfortable	Very comfortable

<p>6. Motivational Interviewing is a _____, practitioner-directed method for enhancing _____ motivation to change by exploring and resolving ambivalence</p> <ul style="list-style-type: none"> a. consequence-driven; low b. superior; non-existent c. famous; outward d. client-centered; intrinsic
<p>7. Which one of these is NOT a value of motivational interviewing?</p> <ul style="list-style-type: none"> a. Free choice b. Collaborating together c. Bringing forth strength for change d. Giving information
<p>8. What does the acronym OARS stand for?</p> <ul style="list-style-type: none"> a. Old ideas, Add new ones, Return to values, Stop arguing b. Open questions, Affirmation, Reflective listening, Summarizing c. Open questions, Add information, Reflective listening, Summarizing d. Open questions, Affirmation, Reflective listening, Share information
<p>9. Which of these is NOT one of the principles of motivational interviewing?</p> <ul style="list-style-type: none"> a. Roll with resistance b. Repeat key messages c. Develop difference (discrepancy) d. Support self-efficacy
<p>10. What are the 5 As of MI?</p>

Appendix C**Qualitative One Month Follow-up**

1. Have you experienced any barriers in implementing aspects of the screening toolkit (FNPA and HEAT tool utility, ease of BMI calculator accessibility)? Please explain.

2. How often have you used with FNPA and HEAT tools? (please list an average)

3. Have you experienced any successes in implementing aspects of the screening toolkit? Please explain.

4. What are possible areas to improve or modify the toolkit?