Evaluation of a Childhood Obesity Screening Program in a Pediatric Dental Clinic

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Abstract

Background: Childhood obesity is a major public health concern in the United States. According to the CDC, nearly 24 million children and adolescents are overweight or obese. The prevalence of childhood obesity has increased considerably over the past two decades and continues to be a major health concern. Screening only by medical primary care providers is no longer a practical strategy. Healthy People 2020 asserted that disease prevention must be a shared priority and collaboration is necessary to curb this epidemic. Children between the ages of 6 to 12 are more likely to see their dentist than their primary care provider. Therefore, dentists are in an excellent and unique position to conduct BMI screening, and recommend follow-up with primary care providers of children identified as overweight or obese.

Purpose: The purpose of this project was to implement and evaluate the effectiveness of a childhood obesity screening program for a pediatric dental clinic.

Design: A process improvement project utilizing Rogers’ Diffusion of Innovation Theory as a framework to assess whether an educational intervention, identification and documentation of BMI-for-age screening in the electronic health record, and use of supportive tools such as an electronic scale and BMI-for-age growth chart improved engagement of dental students in screening for childhood obesity.

Sample: A convenience sample of 12 fourth-year dental students in a pediatric dental satellite clinic participated in the program.

Method: Utilizing paired-samples t-test, in a pre- and post-survey comparison design, the project determined if a childhood obesity screening program improved knowledge, attitudes, and beliefs of 12 fourth-year dental students. After completion of the educational intervention,
documentation of BMI measurements, and recommendation to follow-up with primary care provider were assessed.

**Results:** Six of the ten survey questions assessing knowledge, attitudes, and beliefs demonstrated statistically significant increase between pre- and post-survey scores. There was no difference in four of the ten survey questions. Of the 42 children who were seen during the study, 23 (55%) had BMI screening performed. Ten (43%) of the screened patients were identified as overweight or obese. Of the ten identified as overweight or obese, zero were recommended to follow-up with primary care provider.

**Implications:** The role of the Doctor of Nursing Practice (DNP) leader is to synthesize the evidence and implement evidence-based guidelines. This process improvement project demonstrated that implementation of a childhood obesity screening program in a dental clinic has the potential to improve health outcomes and decrease health care costs. A future BMI screening program could be replicated in not only teaching dental clinics, but also private or community dental clinics.
Background

Childhood obesity is a major public health concern in the United States. According to the Center for Disease Control and Prevention (CDC, 2012), nearly 24 million children and adolescents are overweight or obese. In 2009-2010, 31.8% of children ages 2-19 were overweight and of those 19.9% were obese (Ogden, Carroll, Kit & Flegal, 2012). The prevalence of childhood obesity has nearly tripled in children ages 2 to 5 and 12 to 19, and quadrupled in children ages 6 to 11 (Institute of Medicine [IOM], 2006). A major cause of childhood obesity is the consumption of too many calories and lack of physical activity (CDC, 2013). Children who are overweight are at greater risk for a myriad of health problems including Type 2 diabetes, hypertension, hypercholesterolemia, nonalcoholic steatohepatitis, and depression (CDC, 2012). Multiple factors contribute to childhood obesity including race, ethnicity, culture, literacy rates, residence, and socioeconomic status (Cheng, Cox, & Tavares, 2013); however, parental obesity has been found to be one of the strongest risk factors of a child being overweight or obese (Argras, Hammer, McNicholas, & Kraemer, 2004). While obesity impacts all children, minority and lower-income children are disproportionately affected (Hollar et al., 2010).

To address the obesity epidemic, the American Academy of Pediatrics (AAP) recommends body mass index (BMI) screening to identify children ages 2 to 18 who are overweight or obese (Krebs et al., 2007). Body Mass Index is a calculated number that approximates body fat and determines if an individual is at a healthy weight (CDC, 2012). In adults, BMI is used to classify an individual as overweight or obese. However, in children the BMI alone is not meaningful, and age and gender are also considered (CDC, 2012). Once a
child’s BMI is calculated, it is plotted on a gender-specific BMI-for-age growth chart. The BMI-for-age, reported as a percentile, indicates the weight status (CDC, 2012).

A child is considered underweight if BMI-for-age is less than the 5th percentile; normal weight if BMI-for-age percentile is between the 5th and 84th percentiles; overweight if the BMI-for-age percentile is between the 85th and 94th percentiles; and obese if BMI-for-age percentile is greater than or equal to the 95th percentile (CDC, 2012). Calculating and plotting BMI in children beginning at two years of age prompts earlier recognition of a weight problem by primary care providers (PCPs), as opposed to plotting height and weight alone (Ahlers-Schmidt, Kroeker, Chesser, Hart, & Brannon, 2010). The AAP (2003) recommends PCPs monitor BMI, identify weight status, and provide appropriate counseling annually. However, researchers have found that BMI screening continues to be underused by PCPs, despite these recommendations (Klein et al., 2010).

Healthy People 2020 (United States Department of Health and Human Services [HHS], Healthy People 2020, 2011) reported that obesity prevention must be a shared priority of all health care professionals, and collaboration is necessary to curb this epidemic. Tseng, Vann & Perrin (2010) reported 55% of children ages 6 to 12 were seen by their dentists on a regular basis, compared to the 34% of children ages 6 to 12 who were seen for well-child medical visits. There are no required immunizations for children between 6 and 12. Therefore, preventative visits scheduled to assure immunizations are administered are not needed for children in this age group (CDC, 2014). This places dentists in an excellent position to recognize children who are at risk of developing obesity and provide recommendations. According to Braithwaite, Vann, Switzer, Boyd & Lee (2008), dental professionals are more likely to have an impact on the
childhood obesity epidemic if diet and physical activity counseling are included during dental training.

The purpose of this scholarly project was to implement and evaluate the effectiveness and feasibility of a childhood obesity and BMI screening educational program for a pediatric dental clinic. This childhood obesity screening program has the potential to complement the efforts of PCPs in addressing the obesity epidemic and improving health outcomes. It was anticipated that dental providers who participated in the program would have improved knowledge, attitudes, and beliefs on screening for childhood obesity. A second anticipated outcome of this scholarly project was the adoption by the dental provider of routine BMI screening and recommended follow-up with PCP to families of children who were identified as overweight or obese.

**Theoretical Framework**

The Diffusion of Innovation Theory (DIT) by Rogers (2003) provides a framework for identifying strategies that facilitate adoption and communication of new practices, and determine potential barriers in the adoption of new practices. Diffusion of Innovation Theory has been shown to be effective for implementing health prevention practices. Rogers (2003) proposed four key elements influencing the adoption of a new practice: “innovation, communication channels, time, and a social system” (p. 11). This project focused specifically on the stages of the innovation-decision process: knowledge, persuasion, decision, implementation, and confirmation.

Rogers (2003) describes the innovation-decision process as “an information-seeking and information-processing activity, in which an individual is motivated to reduce uncertainty about advantages and disadvantages of an innovation” (p. 14). Diffusion of Innovation Theory was utilized as the framework to encourage and motivate dental providers and their patients about the
importance of BMI screening, and to make the appropriate recommendations in response to patient’s weight status, as well as appropriate recommendations to follow-up with the PCP. The first stage of the innovative-decision process is knowledge. The dental team was educated regarding the childhood obesity epidemic and their potential contribution to the prevention of childhood obesity by incorporating BMI screening and dietary and physical activity recommendations.

Persuasion is the second stage. The dental team was provided information to facilitate an understanding of their role in screening for childhood obesity. In the persuasion stage, Rogers (2003) suggests five characteristics that influence adoption. Information provided to the dental team was created based on these five characteristics: 1) relative advantage (BMI screening has the potential to improve health outcomes and reduce healthcare costs), 2) compatibility (healthy weight intervention is consistent with the dental team’s values and beliefs), 3) complexity/simplicity (dental team’s perception of BMI screening and counseling as difficult or simple to understand and use), 4) trialability (allowing a trial period before making a decision to adopt), and 5) observability (adoption increases if peers or faculty were observed to support the innovation).

Decision is the third stage. The dental team will choose to adopt or reject the innovation. Opinion leaders such as faculty, dental hygienists, and dental staff can influence the adoption of an innovation. Therefore, involving opinion leaders in the development and implementation stages may influence adoption by the dental team of BMI screening, dietary and physical activity recommendations, and appropriate referrals in their daily practice.

The fourth stage is implementation. The dental team will begin incorporating BMI screening, dietary and physical activity recommendations, and appropriate referral into their
daily practice. During the implementation of the program, providing support to the dental team will be essential.

In the last stage, the confirmation stage, the innovation is adopted as a routine part of dental visits for children. Rogers’ DIT provides valuable insight in understanding how knowledge translation can be achieved and provides a framework for identifying strategies that facilitate the adoption of a new program.

**Literature Review**

**Introduction**

A review of studies focused on strategies to evaluate and monitor a childhood obesity screening program in a dental setting. The reviewed studies assessed the reliability of visual assessment of childhood obesity, use of BMI screening for children by PCPs, role of pediatric dentists in the screening of childhood obesity and use of electronic medical records (EMR) to diagnose overweight and obesity.

**Body Mass Index (BMI)**

Although there has been some debate on the accuracy of BMI percentiles in children, BMI is believed to be one of the most reliable screening tools for assessment of overweight and obesity (CDC, 2012). Many health care providers rely primarily on visual assessment to determine whether a child is overweight or obese, which has been found to be inaccurate (Flower, Perrin, Viadro, & Ammerman, 2007). In a descriptive study, Ahlers-Schmidt et al. (2010) assessed the ability of medical students, pediatric residents and community physicians to accurately identify pre-school children’s weight status by visual assessment. Only 15 percent of the respondents were able to identify an obese boy accurately and 21 percent were able to identify an overweight girl, indicating the unreliability of visual assessments to determine weight
category. No significant difference was found between the students, residents or physicians when predicting BMI-for-age ($p = 0.478$). Respondents also identified barriers to using BMI to measure weight status, such as lack of time and difficulty explaining BMI to families. In a study by Oettinger et al., respondents identified usage of color-coded BMI charts to enhance a parent’s ability to understand the growth chart (2009) and use of EMR as facilitating more effective means of assessment. Strengths cited by the investigators include surveys being simple, low cost, and convenient, with data that are easy to collect. Limitations included lack of generalizability to a general population and limited sampling.

Based on the findings from several studies, investigators have suggested that BMI screening is underused by health care providers (Perrin, Flower, & Ammerman, 2004; Hillman, Corathers, & Wilson, 2009). A descriptive study conducted by Klein et al. (2010), surveyed pediatricians about their attitudes, screening practices, barriers, treatment and referral practices in overweight children. The majority of respondents reported obtaining height and weight, in conjunction with a visual assessment, to identify overweight patients at well-child visits. Fifty-two percent assessed BMI-for-age percentile beginning at two years of age. Attending continuing medical education programs compared to those who did not attend increased awareness of the AAP guidelines ($p < .001$), increased BMI-for-age charting ($p < .001$), and resulted in health care providers feeling more prepared to provide counseling. The investigators concluded that BMI screening is inconsistently used due to barriers such as lack of time and perception that counseling would not impact behavior change in family or child. However, health care providers responding in this study by Klein et al. (2010) believed the availability of nutrition and exercise handouts would be beneficial not only for themselves, but their patients as well.
Education

Several studies indicate dental professionals are interested in addressing the childhood obesity epidemic; however, very few dental professionals take actions to do so (Curran et al., 2010). In a descriptive study, Braithwaite et al. (2008) surveyed pediatric dentists to assess nutrition and healthy lifestyle counseling practices. The survey instrument focused on six categories which included: training, knowledge, confidence, personal opinions, practice patterns, and barriers. Braithwaite et al. (2008) found that 58% of respondents reported understanding how to calculate BMI; however, only 24% of these respondents were able to accurately identify BMI calculation components. While 38% of the respondents reported being qualified to provide nutrition counseling, only 32% were confident to do so. More importantly, only 7% of the respondents reported feeling comfortable addressing weight concerns with families. In the category of practice patterns, 94% do not routinely document both weight and height. Twenty-four percent provided nutrition counseling, and 81% had never referred a child for obesity counseling. Eighty percent believed dental curriculums should put more emphasis on general nutrition and obesity management. Nearly half the respondents reported lack of knowledge, training, and time as a barrier to nutritional counseling. Findings suggested that increased education may ultimately increase BMI screening and counseling. A major limitation of this study was a lack of generalizability since the survey was only sent to clinically active pediatric dentists in North Carolina.

While pediatric dentists are interested in playing a role in the prevention of childhood obesity, lack of formal training is identified as a barrier. A descriptive study by Hisaw, Kerins, McWhorter and Seale (2009) surveyed pediatric dental residents to assess formal curriculum-based training on obesity. Nearly 50% of the respondents reported formal curriculum training.
Topics that were most often covered during training were diabetes, dietary recommendations, and medical complications. Topics less frequently covered include: BMI (28%), prevention of obesity (25%), screening and treatment (13%), parental notification (11%), and guidelines for physician referral (9%). Residents whose curriculum included managing overweight or obese pediatric patients were more likely to feel prepared to treat overweight or obese patients compared to residents who did not have formal training ($p < .001$). Hisaw et al. (2009) concluded that the management of overweight and obese patients in the dental clinic is inadequately addressed, and recommended that all dental programs include obesity prevention competency-based guidelines. Limitations include a threat to internal validity from self-reported surveys and generalizability limited to only pediatric residents.

**Electronic Medical Records**

Investigators have found that implementation of EMR has improved preventive healthcare and chronic disease management (Savinon, Taylor, Canty-Mitchell, & Blood-Siegfried, 2012). Coleman et al. (2012) evaluated the use of a computer-assisted decision tool in the diagnosis and management of childhood obesity. The researchers found that initially a diagnosis of overweight and obese children was made 12% of the time with an increase to 61% of the time with the use of a computer-assisted decision tool. Documentation of diet and physical activity counseling increased from 1% to 50% in all children. In children ages 2 to 5, there was a noticeable improvement in diagnosis (13% to 75%) and counseling (2% to 75%). The computer-assisted decision tool significantly improved identification, diagnosis, and counseling of overweight and obese children ($p < .001$). Limitations identified in the study were the lack of a control group and the inability to verify if counseling was performed. Additionally,
generalizability was limited as the sample was composed only of patients at Kaiser in Southern California.

**Synthesis**

The literature suggests that measurement of BMI-for-age and gender is an inexpensive and reliable screening tool that may increase early identification of unhealthy and excess weight gain. A common theme among the studies was the effectiveness of using BMI-for-age percentiles to monitor patients’ weight status accurately. Although Ahlers-Schmidt et al. (2010) found inaccuracy using visual assessment to assess BMI-for-age weight category, Klein et al. (2010) reported a high percentage of PCPs utilize weight and height measurements and visual assessment to screen for overweight and obesity.

Ahlers-Schmidt et al. (2010) reported lack of time and difficulty explaining BMI to families as a barrier to charting BMI, but indicated that color-coded growth charts and use of EMRs could increase use of BMI for screening obesity. Klein et al. (2010) similarly reported lack of time as a barrier, and found that continuing medical education and simple diet and physical activity handouts may support effective obesity interventions by PCPs. Klein et al. (2010), Ahlers-Schmidt et al. (2010) and Coleman et al. (2012) reported that EMRs may increase BMI screening and diagnosis of overweight and obesity in children. Braithwaite et al. (2008) and Hisaw et al. (2009) reported that dental professionals are not adequately trained to screen for childhood obesity, and concluded that academic preparations during dental school are necessary in order to impact the childhood obesity epidemic. Hisaw et al. (2009) recommended that competency-based guidelines be developed and included in all dental curriculums.

Although BMI percentiles are an effective screening tool, a low percentage of PCPs use BMI percentiles to diagnose childhood obesity, provide appropriate counseling, and make
referrals. Common barriers identified by both PCPs and dental providers were a lack of knowledge and resources. Recommendations from this literature review to overcome these barriers include increasing continuing medical education to improve awareness of AAP guidelines, using clinical practice guidelines to guide evidence-based interventions, and including more emphasis on universal diet and physical activity recommendations and BMI monitoring in the dental curriculum. Education will improve dental health care provider engagement with patients and their families, lead to more effective monitoring of data, and increase awareness of the importance of interprofessional collaboration in the fight against childhood obesity.

[See attached Appendix A for a more detailed review and summary of findings]

**Methods**

Researchers have found that BMI screening is underused by PCPs (Klein et al., 2010; Perrin, Flower, & Ammerman, 2004) and in order to curb the childhood obesity epidemic, a more collaborative effort is necessary. BMI is an inexpensive valid screening tool that can assess a child’s weight status (CDC, 2012). Dental professionals report an interest in curbing the childhood obesity epidemic but identify lack of formal training as a barrier (Braithwaite et al., 2008). Implementing BMI screening in a dental clinic has the potential to impact the childhood obesity epidemic. Design, sample, setting, procedures, data collection, and data analysis will be reviewed.

**Project Design**

This process improvement project, utilizing Rogers’ Diffusion of Innovation Theory, assessed whether this intervention improved engagement of dental practitioners in screening for childhood obesity. A pre- and post-survey comparison design was used to determine if a childhood obesity screening program improved knowledge, attitudes, and beliefs of fourth-year
dental students. Feasibility of the clinical practice changes was evaluated. After completion of the educational intervention, documentation of new and recall patients were reviewed for weight, height, BMI measurements, and weight category. The dental IT department provided data on anthropometric measurements, BMI, weight category, and recommendation to follow-up with a PCP.

**Setting and Sample**

The participants for this project were providers in a pediatric dental satellite clinic connected to a large academic center. The inclusion criteria limited participants to dental providers at this satellite clinic caring for pediatric patients ages 6-15. A convenience sample of dental providers in this satellite clinic is described as 12 fourth-year dental students. One dental student did not complete the pre and post-survey. Pediatric patients were scheduled on Wednesdays from 9:00 am to 4:30 pm. The aforementioned providers see an average of 25 patients on a typical day. The satellite clinic is paperless, and all documentation are recorded in the electronic health record system (EHRS).

Dental providers in this clinic are responsible for measuring and entering weight and height in the EHRS for all pediatric patients. The BMI number is calculated by the EHRS and listed with the vital signs. The BMI automatically plots on the CDC 2000 growth chart in the EHRS. Prior to implementation of the educational program, there were no standards or guidelines for BMI screening in this pediatric dental clinic. BMI-for-age growth charts were not available in the EHRS; therefore, weight category could not be identified. According to dental faculty members, and summary data from EHRS, weight and height were not routinely measured in the pediatric dental clinic with the exception of patients being prepared for sedation. Although there is a referral form within the EHRS, they are only generated to dental specialists within the
academic center’s dental clinic. Therefore, dental providers in this clinic do not refer overweight or obese patients to PCPs for further evaluation.

**Human Subjects**

University of Maryland Baltimore Institutional Review Board (IRB) reviewed the submission and determined the project was not human research and did not require Full IRB review. Security and confidentiality were maintained by de-identifying all data and keeping all documentation in a password protected computer.

**Procedures**

Integrating the BMI-for-age growth chart in the EHRS of the dental clinic was an essential component of the project. Axium is the EHRS in use by this pediatric dental clinic. A meeting with the dental information technology (IT) department was scheduled prior to the implementation of the project to coordinate modifying the EHRS. The dental IT department modified the EHRS to include the CDC 2000 BMI-for-age gender-specific growth chart. A check box for documentation of discussion of BMI with family, diet and physical activity recommendations, and recommendation to follow-up with PCP for further evaluation was embedded in the EHRS. The DNP student met with the administrator of the dental clinic to coordinate purchasing the equipment necessary for accurate weight and height measurement. The administrator of the satellite dental clinic purchased the SECA 760 scale and stadiometer for the dental clinic. The new scale and stadiometer required yearly calibration to ensure accuracy. Calibration occurred prior to the implementation of the project.

The administrator of the satellite dental clinic arranged a convenient time for dental students to attend a one-hour educational session taught by the DNP student who is experienced in the management of childhood obesity. Dental students were assigned to this satellite clinic for
three consecutive weeks. Each week, three new dental students rotated in and three students rotated out. In order to provide training to the dental students assigned to this satellite clinic during the implementation of the project, the DNP student conducted a total of two educational sessions. The pediatric dental faculty members and residents were educated one week prior to the implementation of the project. At the start of the educational session, fourth-year dental students signed in using their provider identification number. The administrator kept the sign-in sheet; upon completion of the educational sessions the administrator provided the list of provider numbers to the dental IT staff. The dental IT team provided the DNP student aggregated de-identified data results which were not linked to any of the participants.

**Educational Session**

At the beginning of the each session, a ten-question anonymous pre-survey questionnaire to assess knowledge, attitudes and beliefs about screening for childhood obesity was administered to the participants using pencil and paper method. Responses ranged from strongly disagree to strongly agree on a 5-point Likert scale. The survey was created by the DNP student (See Appendix B). Each student was provided a number that matched the number on the pre- and post-survey. The surveys were placed in a secured box.

A standard power point presentation was used at each session. First, students were educated regarding the childhood obesity epidemic and the role of the pediatric dentist in impacting this chronic disease. Second, discussion of the difference of BMI in adults versus children was reviewed (e.g. BMI-for-age percentiles and weight categories). Third, accurate techniques for measuring weight and height (e.g. removal of outer-wear and shoes) were discussed. Finally, the presentation addressed the importance of privacy and sensitivity when obtaining and conveying anthropometric measurements. Strategies for engagement with patients
and their families were discussed. A color-coded BMI-for-age growth chart (Appendix C) was created and made available at each dental station, which could be used to communicate BMI percentiles to patient/families. The importance of universal dietary and physical activity recommendations for all patients regardless of weight status, and availability of patient handouts were also discussed. Dental students were provided a script on how to start a conversation with families about BMI (Appendix D). The dental providers were also educated on the process for making a recommendation to follow-up with PCPs for further evaluation of children identified as overweight or obese. At the end of the education session, students had an opportunity to ask questions and discuss fears and concerns (See Appendix E for a detailed lesson plan). At the end of the educational session the same post-survey questionnaire, identical to the pre-survey questionnaire including one additional question, was administered to the participants and completed surveys were placed in a secured box and given to the DNP student at the end of the program.

**Data Collection**

After completion of the session and implementation of BMI screening and childhood obesity screening program, queries were conducted by IT to collect data from the EHRS for patients seen at the satellite clinic by the dental providers who attended the educational program during the time of the study. The first query by IT collected data on age, gender, weight, height and BMI measurements of pediatric patients ages 6 to 15. A second query determined the number of patients with a BMI-for-age and gender equal to or greater than the 85th percentile, and of those patients with a BMI $\geq 85^{th}$ percentile, how many were recommended to follow-up with the PCP. The dental IT team provided the data to the DNP student in a Microsoft Excel spreadsheet. The
data was entered using an Excel spreadsheet and analyzed by excel at the completion of the project. Data findings were summarized using descriptive statistics.

Data from the dental students’ pre- and post-survey questionnaire were analyzed by the DNP student using Statistical Package for Social Sciences (SPSS version 23). All data entered into SPSS were checked for errors. A paired samples t-test was conducted to compare knowledge, attitudes, and beliefs before and after implementation of the program.

Data Analysis

The purpose of this process improvement project was to implement and evaluate a childhood obesity BMI screening program at a pediatric dental clinic. A comparison of a pre- and post-survey questionnaire, using paired-samples t-test, was used to determine if the educational program had an impact on knowledge, attitudes and beliefs of dental students in the screening of childhood obesity. Twelve fourth-year dental students attended the educational intervention and completed the pre- and post-survey questionnaire. A second measurable outcome for this project was BMI screening, and recommendation to follow-up with the PCP for further evaluation of children who were identified as overweight or obese.

The pre-survey questionnaire consisted of ten items. The answers for the first eight survey questions used a Likert-item scale response with five categories ranging from Strongly Disagree = 1 to Strongly Agree = 5. A negative response was defined as “Strongly Disagree” or “Disagree.” A positive response was defined as “Strongly agree” or “Agree.” A response of “Neither Agree nor Disagree” was defined as uncertain. Survey question 9 was a Likert response of seven categories. Survey question 10 was a “yes” or “no” answer. The post-survey had identical questions to the pre-survey with one additional question at the end of the survey (Appendix B).
Results

A paired-samples t-test compared pre- and post-survey data after implementation of a childhood obesity and BMI screening program, were examined for each participant. BMI screening and recommendation to follow-up with the PCP for further evaluation of children who were identified as overweight or obese were also assessed.

Pre/Post-Survey Results

<table>
<thead>
<tr>
<th>Item</th>
<th>Pretest Mean</th>
<th>SD</th>
<th>Posttest Mean</th>
<th>SD</th>
<th>95% CI Difference</th>
<th>t(df) (^a)</th>
<th>Sig (2-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Epidemiology</td>
<td>2.83</td>
<td>.84</td>
<td>3.83</td>
<td>.58</td>
<td>-1.00</td>
<td>-4.69(11)</td>
<td>.001***</td>
</tr>
<tr>
<td>Role of Dentist</td>
<td>3.92</td>
<td>.67</td>
<td>3.83</td>
<td>.58</td>
<td>.08</td>
<td>.43(11)</td>
<td>.674</td>
</tr>
<tr>
<td>Wt/HT Measurement</td>
<td>3.42</td>
<td>1.17</td>
<td>4.25</td>
<td>.62</td>
<td>-.83</td>
<td>-2.16(11)</td>
<td>.054</td>
</tr>
<tr>
<td>BMI Calculation</td>
<td>2.50</td>
<td>.80</td>
<td>4.33</td>
<td>.65</td>
<td>-1.83</td>
<td>-6.78(11)</td>
<td>.001***</td>
</tr>
<tr>
<td>BMI Interpretation</td>
<td>2.50</td>
<td>.91</td>
<td>4.25</td>
<td>.75</td>
<td>-1.75</td>
<td>-6.28(11)</td>
<td>.001***</td>
</tr>
<tr>
<td>Diet and Nutrition</td>
<td>3.08</td>
<td>1.17</td>
<td>3.17</td>
<td>.94</td>
<td>-.08</td>
<td>- .36(11)</td>
<td>.723</td>
</tr>
<tr>
<td>Obesity counsel</td>
<td>3.08</td>
<td>1.08</td>
<td>3.17</td>
<td>.72</td>
<td>-.08</td>
<td>- .32(11)</td>
<td>.754</td>
</tr>
<tr>
<td>Initiate conversation</td>
<td>2.50</td>
<td>1.00</td>
<td>3.33</td>
<td>.78</td>
<td>- .83</td>
<td>-2.59(11)</td>
<td>.025*</td>
</tr>
<tr>
<td>Identify overweight</td>
<td>1.33</td>
<td>.49</td>
<td>1.50</td>
<td>.52</td>
<td>-.16</td>
<td>-1.48(11)</td>
<td>.166</td>
</tr>
<tr>
<td>Confident in Converse</td>
<td>1.25</td>
<td>.45</td>
<td>1.83</td>
<td>.39</td>
<td>-.58</td>
<td>-3.92(11)</td>
<td>.002**</td>
</tr>
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</table>

\(^a\) Paired samples t-tests were used to compare mean scores between pre- and posttests; SD = standard deviation; CI=confidence interval

* p<.05; **p<.01; ***p<.001

There was a statistically significant increase between pre- and post-survey in the knowledge of epidemiology and etiology of childhood obesity \((p < .001)\), BMI calculation and interpretation \((p < .001)\), how to initiate a conversation about obesity \((p < .025)\), and confidence to initiate a conversation about weight concerns \((p < .002)\). There was no difference between the pre- and post-survey in the role of dental provider in screening for childhood obesity \((p = .674)\), training in obtaining height and weight measurements \((p = .054)\), training in nutrition and dietary recommendations \((p = .723)\), belief that families would be open to obesity prevention recommendations by dental provider \((p = .754)\), and best method to screen for overweight in
children ($p = .166$). Overall, there was a statistically significant increase in pre- and post-survey responses ($p < .001$).

Of the 42 children aged 6 to 15 years who were seen during the study for a new patient visit (NPV) or recall visit, 23 (55%) had BMI screening performed. Ten (43%) of the screened patients were identified as overweight or obese. Of the ten identified as overweight or obese, none were recommended to follow-up with the PCP.

**Discussion**

Childhood obesity prevention must be a shared priority of all health care professionals, and collaboration is necessary to curb this epidemic. This process improvement project demonstrated that implementation of a childhood obesity and BMI screening program improved dental students’ knowledge, attitudes, beliefs, and behaviors. Previous studies indicate the most commonly reported barrier to screening for childhood obesity, by dental providers, was a lack of training and knowledge, and fear of offending patients and families. The purpose of this project was to empower dental students to conduct BMI screening, promote healthy lifestyles to all children despite their weight status, and recommend follow-up with PCP for further evaluation of children identified as overweight or obese. Findings of this project suggested that participation in a childhood obesity and BMI screening educational program can improve dental students’ knowledge, attitudes and beliefs, as well as change behavior. Survey results revealed dental students reported having a better understanding of the epidemiology and etiology of obesity in children, anthropometric measurements, calculation and interpretation of BMI, how to begin a conversation with patient/family about overweight and obesity, and confidence initiating a conversation with patient/family about weight concerns. Additionally, after attending the educational program, ten (83%) of the dental students reported they would be more likely to
conduct BMI screening, provide universal dietary and physical activity recommendations, and provide appropriate recommendation to follow-up with PCP. Overall, the pre- and post-survey results indicated statistically significant improvement.

There were four survey questions that did not reveal improvement after the educational intervention. The pre-survey question “should dentists have a role in identification and prevention of childhood obesity” showed that three (25%) of the dental providers had a neutral response, and nine (75%) had a positive response. Therefore, dental students already believed dental providers should have a role in the prevention of childhood obesity. A second question that did not reveal improvement was “students received sufficient training in providing dietary and nutrition recommendation in the prevention of childhood obesity.” During the educational program, simple dietary recommendations, such as limiting sugary beverages to 1 cup per day and increasing fruit and vegetable consumption, were provided. Based on these results, more emphasis on dietary education may be needed in the dental curriculum. Another question that did not reveal improvement measured whether the dental providers believed “patient/families would be open to obesity prevention recommendations from dental providers.” Although the literature supports families being open to obesity prevention counseling, findings indicate that dental providers have a fear of offending patients. This response may not change until dental students have an opportunity to conduct BMI screening and provide healthy recommendations and have an opportunity to experience patient/family reactions. Lastly, the modest increase in believing that BMI-for-age measurement is the “best method to identify and screen for overweight in children” (p=0.166), indicates that, perhaps, more emphasis should have been placed on BMI-for-age during the program. Three slides were used to emphasize this point.
Prior to the implementation of this project, approximately 13% of children seen in the central and satellite clinics had weight and height measurements documented. BMI-for-age percentile could not be documented since growth charts were not available in the EHRS. Therefore, weight category could not be identified. Results post-educational intervention indicated that 23 (53%) of the patients who were seen in this satellite clinic by the dental students who attended the program had weight, height and BMI measurements documented in the EHRS. Ten (43%) of the screened patients had a BMI $\geq 85^{th}$ percentile and should have been recommended to follow-up with PCP. In order to document that a child was recommended to follow-up with PCP for further evaluation, the dental student had to go back into the medical record section of the EHRS and click on the recommend follow-up with PCP box. This extra step could be one potential reason there was no documentation of follow-up with PCP. There is also a possibility the dental student may have verbally recommended the family follow-up with the PCP, but did not document this in the EHRS. While dental students did not refer overweight or obese children back to the PCP, findings demonstrated that dental students were able to incorporate BMI screening into their daily practice which is a major first step.

There are certain strategies to consider when making a practice change. Rogers’ Diffusion of Innovation Theory (DIT) has been shown to be effective for implementing prevention practices in healthcare. In this project, DIT provided a framework that facilitated implementation and adoption of a clinical practice change and determined potential barriers in the adoption of new practices. This project focused specifically on the Rogers’ stages of the innovation-decision process: knowledge, persuasion, decision, implementation, and confirmation. Other strategies suggested by Rogers for successful implementation that were considered prior to the implementation of this project include: leadership and organizational
support, buy-in from key stakeholders, identifying champions, and considering time and resources.

Prior to the implementation of the program, an essential component was meeting with the pediatric dentistry leadership group and with the dental IT team to gain support. Once leadership support was attained, it was necessary to meet with key stakeholders including administration, dental students, dental residents, and dental hygienist. These key stakeholders were able to identify potential facilitators and barriers to implementation of the project. Key stakeholders expressed the importance of making this new practice change as simple as possible.

Modifications were made to ensure the practice change was practical for the dental students. First, purchasing an electronic scale with a stadiometer which automatically calculated BMI allowed students to know BMI prior to entering data into the EHRS. Second, placing a color-coded BMI growth chart at each dental station facilitated dental student’s discussion of BMI with patient and families. Modifying the EHRS to integrate gender-specific BMI-for-age growth charts into the EHRS enhanced clinical efficiency for the dental students. Furthermore, modifying the EHRS to use a check box, versus written documentation, facilitated documentation of weight category, type of diet or physical activity recommendations, and recommendation to follow-up with the PCP. To facilitate conversation with families about dietary and physical activity recommendations, all families, despite weight status, were given a simple handout on dietary and physical activity recommendations by the front desk staff (Appendix F). In addition, patient handouts with more specific recommendations were available for children who were identified as overweight or obese.

At the end of the educational program, students had an opportunity to discuss fears and concerns. During the first education session, there were two concerns conveyed by the students.
First, although students understood how to calculate BMI, many were not sure what the differences in BMI measurement for children meant and how to communicate the BMI results to the family. To address this concern, time was spent at the end of the program explaining in more detail the meaning of BMI-for-age and how to explain the BMI percentile to the family. The second concern expressed by the dental students was how to initiate a conversation about BMI with families. A script was created and given to the students the following day on how to initiate a conversation with families using motivational interviewing techniques. Subsequently, more emphasis on BMI-for-age and communication of BMI measurements to families was incorporated into the educational intervention and script for the second session. Interestingly, with these minor changes, no other significant concerns were raised by the dental students in the second session.

**Limitations**

A major limitation of this project was a small convenience sample of fourth-year dental students from a large academic center. Since this is a process improvement project with only 12 participants from one academic center, the results cannot be generalized. Second, the accuracy of anthropometric measurements and correct data entry cannot be confirmed. Third, changes seen in pre- and post-survey could easily be the result of social desirability or reporting bias. Lastly, the project was conducted over a six-week period following the intervention; therefore, retention of knowledge and behavior could not be assessed.

**Recommendation**

Upgrading the SECA scale to include wireless transmission of anthropometric measurements into the EHRS could decrease the risk of manual data entry error and improve efficiency. Creating a point-of-care red alert flag in the EHRS, if a BMI was $\geq 85^{th}$ percentile,
could eliminate two unnecessary steps (the need to click on the growth chart and the need to click on the BMI tab.) Accessing the BMI-for-age growth charts in the EHRS took approximately 1 minute to load, which in the clinic environment is unacceptably long. Therefore, improving the performance of loading the growth chart could improve the efficiency of the patient visit.

**Translation Plan**

In today’s complex health care environment, DNP leaders have an opportunity to play a critical role in transforming the health care system. The DNP has an opportunity to not only improve clinical health outcomes, but to translate scientific knowledge in health care delivery, particularly in vulnerable populations. Although implementation of evidence-based practice is vital, and evaluating, refining, and adapting evidence-based intervention is also essential, it cannot be accomplished independently. Understanding the importance of collaboration with other disciplines is necessary.

It is essential for the DNP leader to present outcomes of process improvement projects to key stakeholders, as well as disseminate findings through publications, poster presentations, and professional conferences. Sharing and disseminating the results from this childhood obesity screening program has the potential to encourage not only dental professionals, but other health care professionals, such as physical therapists, occupational therapists, or sub-specialists, in implementing this type of program in their setting.

**Implications for Future Practice**

A childhood obesity and BMI screening program has the potential to impact the childhood obesity epidemic. Dental professionals are responsible for oral and general health prevention for their patients. BMI screenings by dental professionals would be a valuable
addition to comprehensive preventive care, while also providing an opportunity for interprofessional collaboration in the prevention of childhood obesity. Dental professionals have an unusual opportunity to expand their role by including routine BMI screening and recommending follow-up for further evaluation of children identified as overweight or obese. Adoption of this type of program enables dental professionals to meaningfully participate in interprofessional collaborative efforts to prevent childhood obesity. This childhood obesity program can be replicated in not only teaching dental clinics, but also in private or community dental clinics. The recommendation to the dental school faculty would be to implement this type of program annually to all students who are starting clinic and continually evaluate the efficacy of the program.

Conclusion

This process improvement project demonstrated that implementation of a childhood obesity and BMI screening program in a pediatric dental clinic has the potential to improve health outcomes and decrease healthcare costs associated with obesity. The lessons learned from this process improvement project can be used to serve as a foundation for a childhood obesity and BMI screening program for all dental providers.
References


## Appendix A

### Johns Hopkins Evidence-Based Individual Evidence Summary

<table>
<thead>
<tr>
<th>#</th>
<th>Author</th>
<th>Date</th>
<th>Evidence Type</th>
<th>Sample &amp; Sample Size</th>
<th>Results/Recommendations</th>
<th>Limitations</th>
<th>RATING</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Ahlers-Schmidt, Kroeker, Chesser, Hart, &amp; Brannon</td>
<td>2010</td>
<td>Descriptive survey study</td>
<td>Fourth year medical students, family medicine and pediatric residents, family medicine and pediatric community physicians 134 respondents</td>
<td>This study found that 15 and 21 percent of respondents respectively were able to accurately identify 3-year-old boy, whose BMI was &gt;95th percentile for his age, as obese identified A 4-year-old girl who was overweight at the 90-95th percentile BMI-for-age. There was no significant difference in accuracy between medical students, resident physicians, or community physicians when predicting the BMI-for-age categories. Study concluded, physicians and trainees have difficulty visually assessing a child’s BMI-for-age weight status. This reinforces the importance of calculating and plotting BMI-for-age at well-child visits.</td>
<td>Small county in Kansas limits generalizability. Homogenous sampling A threat to internal validity - no random selection - racial and cultural bias since pictures were only of non-Hispanic white children</td>
<td>3/B</td>
</tr>
<tr>
<td>2</td>
<td>Klein, Sesselberg, Johnson, O'Connor, Cook, Coon, ... Washington</td>
<td>2010</td>
<td>Descriptive study</td>
<td>Active AAP members Final sample of 677 completed surveys</td>
<td>99% and 97% of respondents respectively measured weight and height and visually assessed children for overweight and obesity at well-child visits. 52% of respondents assessed BMI percentile for children &gt; 2 years. Concluded that BMI percentile screening is underused. Training provides on national guidelines may increase BMI use and prevent childhood obesity</td>
<td>Limitations include generalizability since surveys were only sent to AAP members. Response may be biased toward inaccurate reporting of BMI use. Selection bias, since respondents may have an interest in childhood obesity prevention</td>
<td>3/B</td>
</tr>
<tr>
<td>#</td>
<td>Author</td>
<td>Date</td>
<td>Evidence Type</td>
<td>Sample &amp; Sample Size</td>
<td>Results/Recommendations</td>
<td>Limitations</td>
<td>RATING</td>
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<tr>
<td>3</td>
<td>Braithwaite, Vann, Switzer, Boyd, &amp; Lee</td>
<td>2008</td>
<td>Descriptive Study</td>
<td>Active pediatric dentist in NC. A response rate to 70/102 (69%)</td>
<td>Dentists with &gt;10 years’ experience and females were more likely to provide dietary and lifestyle counseling. Survey focused on academic training, knowledge, confidence, personal opinions, and barriers. Fifty-eight percent reported understanding BMI calculations; however 24% of respondents were able to accurately identify BMI calculation components; 24% percent provided nutrition counseling; and 81% had never referred a child for obesity counseling. Eighty percent believed dental curriculum should place more emphasis on general nutrition. Fifty-five percent reported lack of time as a barrier, while 47% reported lack of nutritional knowledge. Study concluded that respondents who were more knowledgeable and confident about nutrition counseling were more likely to counsel patients about obesity. Findings suggest that dental school curriculum should include BMI training and counseling which may have a positive impact on prevention of childhood obesity.</td>
<td>Limitations include limited generalizability since surveys were only sent to NC pediatric dentist. Self-reported survey can result in threat to internal validity as well as sample size.</td>
<td>3/B</td>
</tr>
<tr>
<td>4</td>
<td>Hisaw, Kerins, McWhorter, &amp; Seale</td>
<td>2009</td>
<td>Cross-sectional descriptive study</td>
<td>Surveys sent to university-based, hospital-based, or combination university and hospital based dental. Random selection of 3 different programs 135/191 survey were returned</td>
<td>A 17 question survey assessed formal curriculum-based training on obesity. Forty-seven percent of residents reported formal curriculum training on managing overweight or obese patients. Subjects less frequently covered in the formal curriculum included: 28% BMI calculation; 25% obesity prevention; 13% how to screen and treat obesity; 11% how to communicate overweight or obese to parents; and 9% how guidelines for physician referrals. Residents whose</td>
<td>Limitations include threat to internal validity from self-reported surveys. Generalizability limited to only pediatric residents.</td>
<td>3/B</td>
</tr>
<tr>
<td>#</td>
<td>Author</td>
<td>Date</td>
<td>Evidence Type</td>
<td>Sample &amp; Sample Size</td>
<td>Results/Recommendations</td>
<td>Limitations</td>
<td>RATING</td>
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<tr>
<td>5</td>
<td>Coleman, Hsii, Koebnick, Alpren, Bley, Yousef, Shih, ... Woods.</td>
<td>2012</td>
<td>Retrospective study</td>
<td>1,976,872 outpatient charts were analyzed of children ages 2-12 living in Southern California.</td>
<td>Prior to implementation of clinical practice guidelines (CPG) in EMR, 66% of children had a height and weight measurements. After implementation, rate increased to 94% Diagnosis of overweight and obesity increased from 12% to 61%, with the most significant increase in 2 to 5 year olds (13% to 75%) Documentation of diet and physical activity counseling increased from 1% to 50, with highest rate in 2 to 5 year olds (2% to 75%)</td>
<td>Limitations include no control group; therefore, difficult to determine if increase was from CPG embedded in EMR or if increase knowledge Generalizability was also limited since was only on Kaiser Permanente patients in Southern California</td>
<td>3/B</td>
</tr>
</tbody>
</table>
Appendix B

1. Do you believe you have sufficient knowledge in the epidemiology and etiology of overweight and obesity in children?

2. Should dentists have a role in identification and prevention of childhood obesity?

3. Do you believe you have received sufficient training in accurately obtaining height and weight measurements in children?

4. Do you believe you have received sufficient training in BMI calculation for children?

5. Do you believe you have received sufficient training to interpret BMI in children?

6. Do you believe you have received sufficient training in providing dietary recommendations in the prevention of childhood obesity?

7. Do you believe families would be open to receive childhood obesity prevention recommendation from dental providers?

8. Do you believe you have received sufficient training on how to initiate a conversation with a family about overweight or obesity?

9. Best method to screen for obesity in children?

10. Are you confident to initiate a conversation with a patient/family about weight concerns?

Additional post-survey

11. After participating in this program how likely are you to conduct BMI screening, provide universal nutrition and physical activity recommendation and provide appropriate referrals?
Appendix C

2 to 20 years: Boys
Body mass index-for-age percentile

<table>
<thead>
<tr>
<th>Date</th>
<th>Age</th>
<th>Weight</th>
<th>Stature</th>
<th>BMI*</th>
<th>Comments</th>
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<tbody>
<tr>
<td></td>
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</tbody>
</table>

*To Calculate BMI: Weight (kg) + Stature (cm) + Stature (cm) x 19,000
or Weight (lb) + Stature (in) + Stature (in) x 703

Appendix D
After reviewing the surveys, we realized how it may be challenging to start a conversation about BMI. We thought it would be helpful to provide you with an example script that may be used for starting the conversation. We would like to clarify that the only time the nutrition recommendations need to be offered as an option to the parents is if the BMI is at or greater than the 85th percentile. We would recommend that you continue with your normal oral health counseling which likely includes decreasing sugary beverages and snacks—goals that also might help in the prevention of childhood obesity.

Just a reminder, this is a new protocol that is being implemented and must be completed by all dental providers.

SCRIPT

- Front desk will provide the universal handout on nutrition and physical activity to the family when they check in
- When you pick-up the child/parent from the lobby area, you can let them know that UMB dental clinic has a new protocol in place where we are routinely taking weights, heights and looking at BMI. Explain you will provide more information about the BMI during the visit
  - NOTE: If asked why you are checking BMIs, you can explain that as dental providers you are not only concerned with the patient’s oral health but with their overall health as well.
- When ready to discuss BMI with family, explain that BMI is a screening tool that looks at the amount of weight on your body in comparison to how tall you are.
- If BMI is less than the 85th percentile, show the family the color-coded growth chart and let them know BMI is in the healthy range
- If BMI is greater than the 85th percentile, show the family the growth chart and explain that BMI is in the unhealthy range and the goal is to get them into the healthy range.
  - Ask parents if they are interested in recommendations on how to get their BMI in the healthy range.

  - If they agree:
    - You have the option of providing nutrition recommendations such as
      - Limiting sugary beverages to 1 cup a day
      - Switching to 1% skim milk
      - Limiting snacks to two per day
      - Choosing healthy snack options such as low fat yogurt, fruits, vegetables, granola bar
    - If time is limited, you can also simply provide the family with the “Making Healthier Food Choices” handout which is located at the front desk
    - Make sure you recommend and document that they follow up with their pediatrician.

  - If they don’t agree:
    - Simply ask them to follow up with their pediatrician for further evaluation

Appendix F
**Hábitos Saludables**

**FRUTAS Y VERDURAS**
Coma 5 frutas y verduras o vegetales todos los días.

**COMIDAS CADA DÍA**
Desayune, almuerce y coma o cene todos los días. Siéntese a comer con su familia.

**HORAS DE PANTALLA**
No vea televisión o use la computadora y juegos de videos por más de 2 horas al día.

**HORA DE ACTIVIDAD**
Haga ejercicio o muévase por lo menos una hora todos los días.

**BEBIDAS AZUCARADAS**
Tome leche sin grasa o con 1% de grasa y tome mucha agua.

---

MiPlato
Choose MyPlate.gov

**Metas:**

[Blank lines for metas]

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Handout created by Jena Douglas, MS, RD, LDN
# Instructional Lesson Plan

## Course:
Topic: Prevention of Childhood Obesity and BMI Screening

## Date:

## Instructor:
Elsie M. Stines, MS, CRNP

## Goal:
Dental providers will use BMI-for-age percentile to identify children’s weight category and appropriately refer back to PCP. Dental providers will be empowered to promote healthy and active lifestyles to all children.

## Context (learner characteristics, style, developmental level, learning theory):
Fourth year dental students, fourth year dental hygiene students, and pediatric dental faculty. Interactive learning approach will be utilized.

<table>
<thead>
<tr>
<th>Objectives</th>
<th>Content</th>
<th>Method of Instruction</th>
<th>Time</th>
<th>Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>To understand epidemiology and etiology of CO</td>
<td>US and MD childhood obesity rates.</td>
<td>Lecture/Interactive</td>
<td>5 minutes</td>
<td>Students will verbalize understanding.</td>
</tr>
<tr>
<td>To understand the role of all healthcare professionals in the assessment and management of CO</td>
<td>Must be a collaborative effort in curbing CO epidemic</td>
<td>Lecture/interactive</td>
<td>2 minutes</td>
<td>Questions will be asked to determine full understanding</td>
</tr>
<tr>
<td>To understand the role of dental professionals in prevention of CO</td>
<td>- Dental provider vs medical provider frequency of visits. - Dental providers provide some dietary</td>
<td>Lecture/interactive</td>
<td>5 minutes</td>
<td></td>
</tr>
<tr>
<td>To understand the recommendations of AAP 2007 Expert committee guidelines for CO</td>
<td>counseling.</td>
<td>Lecture/interactive</td>
<td>3 minutes</td>
<td></td>
</tr>
<tr>
<td>To know how to accurately measure weight and height.</td>
<td>-Minimum yearly assessment of BMI. -Universal diet and physical activity counseling</td>
<td>Lecture/interactive</td>
<td>3 minutes</td>
<td></td>
</tr>
<tr>
<td>To understand BMI-for-age percentile and weight category</td>
<td>-Accuracy in weight and height measurements. -Taking off shoes and outerwear prior to obtaining weight and height. -Ensure privacy -Review new scale and stadiometer in clinic and location.</td>
<td>Lecture/interactive</td>
<td>5 minutes</td>
<td></td>
</tr>
<tr>
<td>To understand simple dietary and physical activity recommendations</td>
<td>-Review BMI-for-age percentile. Underweight, normal weight, overweight and obese. -Plotting of BMI-for-age percentile</td>
<td>Lecture/interactive</td>
<td>2 minutes</td>
<td></td>
</tr>
<tr>
<td>To learn how to sensitively communicate BMI percentile and weight category to patient and families.</td>
<td>-Communication of weight status in a sensitive manner -Using color-coded growth chart for simpler understanding of weight status</td>
<td>Lecture/interactive</td>
<td>7 minutes</td>
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<tr>
<td>To understand and be sensitive to the social economic and environmental barriers in certain high risk populations to healthy and active living</td>
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</tbody>
</table>
| -Cost of fruits and vegetables  
-Access to healthy foods  
-Food deserts  
-Unsafe neighborhoods  
-Culture context |
| Lecture/interactive |
| 2 minutes |

<table>
<thead>
<tr>
<th>To understand when to refer children back to PCP for further evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Children with BMI ≥ 85th percentile.</td>
</tr>
<tr>
<td>Lecture/interactive</td>
</tr>
<tr>
<td>1 minute</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>To understand the new location of BMI-for-age growth chart, and simple nutrition and physical activity handouts in the EHRS</th>
</tr>
</thead>
</table>
| -Changes in Axium to accommodate BMI screening.  
-Check box for handouts and referrals |
| Lecture/interactive |
| 5 minutes |

<table>
<thead>
<tr>
<th>To participate in role playing in learning how to address challenging families</th>
</tr>
</thead>
<tbody>
<tr>
<td>Opportunity to role play and students to verbalize fear and concerns of new role of dental providers</td>
</tr>
<tr>
<td>Interactive</td>
</tr>
<tr>
<td>15 minutes</td>
</tr>
</tbody>
</table>
Appendix G

Timeline:

- Submit proposal to committee members by 11/24/14
- Present proposal to committee members on 12/1/14
- Submit UMB IRB for review by 12/10/14
- Implement project 01/29/15 thru 3/04/15
- Analyze and evaluate data 3/18/15
- Submit final scholarly project 4//15
- Present final scholarly project report to committee 4/20/15