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A Study of Provider Practices in the Screening, Diagnosis, and Treatment of Childhood Overweight and Obesity in a Rural Eastern Kentucky Clinic

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Final DNP Project Report

A Study of Provider Practices in the Screening, Diagnosis, and Treatment of Childhood

Overweight and Obesity in a Rural Eastern Kentucky Clinic

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Abstract

Objectives: The purpose of this study is to assess the current practices of providers for overweight and obese children at well visits, and how the demographics of age, sex, race, ethnicity, primary language spoken, insurance type, and provider type influence the care provided to overweight and obese children at the study site, which is a rural primary care clinic in eastern Kentucky.

Methods: This study is a retrospective design auditing well child charts ($n = 571$) from the study site over a two year period. Charts were audited for the data points of age, sex, race, ethnicity, primary spoken language, body mass index, documentation of a diagnosis of overweight or obesity, and if those diagnosed with as overweight or obese received education specific to their diagnoses or a dietician referral. Body-mass-index percentile and weight classification were calculated for each participant. Data points were statistically analyzed to identify possible causes and/or influences of demographics on the care provided to overweight and obese children.

Results: No statistically significant relationships were found between extracted data points and the screening, diagnosing, and treatment of overweight and obese children. However, the data revealed low rates of calculating BMI (screening) during well visits at 80.6%, extremely low rates of documenting a diagnosis of overweight and obesity (4.8%) and extremely low rates of providing appropriate education (45.5%) and dietician referral (0%) to those diagnosed as overweight or obese.

Conclusion: While no statistically significant relationships between extracted data points and provider practices for the screening, diagnosing, and treatment of overweight and obese children at well child visits were present, a need for improvement in provider practices in alignment with

expert recommendations and clinical practice guidelines for the overweight and obese child

exists.

A Study of Provider Practices in the Screening, Diagnosis, and Treatment of Childhood

Overweight and Obesity in a Rural Eastern Kentucky Clinic

Introduction

Childhood obesity is an epidemic faced by children, parents, and their primary care

providers. The Centers for Disease Control and Prevention (CDC) (2015) report that childhood

obesity rates have tripled over the last thirty years in the United States. Nationally 14% of high

school students are obese (CDC, 2015), and globally forty-two million children under the age of

five are obese (The World Health Organization, 2014). In the state of Kentucky 15.6% of

adolescents are overweight and 17.6% of adolescents are obese (CDC, 2012). While the

magnitude of this issue alone demonstrates the need for the use of evidence-based prevention and

management strategies by health care providers, it is the sequelae of this disease that raises the

highest concern and adds to the significance of the need to address this issue. Existing literature

suggests that providers do not always address the issue of obesity in primary care. The purpose

of this project is to gain a better understanding of current practices of primary care providers in a

rural clinic setting related to childhood obesity.

Background

Obese children can suffer from pre-diabetes, musculoskeletal strain and injury,

hypercholesterolemia, hypertension, and psychosocial issues (CDC, 2015). As obese children

age into obese adults, primary care providers will see them for many chronic and non-

communicable diseases that are more traditionally experienced by a much older population.

Examples of these disease processes are stroke, type 2 diabetes mellitus, hypertension, specific

cancers, osteoarthritis, and heart disease (CDC, 2015).

In addition to the individual health consequences of childhood obesity, the costs accumulated due to this illness will surely impact individuals, families, and economies financially. The Robert Wood Johnson Foundation (2015) estimates that annual costs related to obesity in the United States are approximately 117 billion dollars.

Countless hypothesized solutions to the obesity epidemic exist, and the most common settings suggested for these interventions and programs to be implemented are within school systems, in the home, and by health care providers. While it is indisputable that this is a multifaceted problem that will require collaboration by professionals and parents, primary care providers (PCPs) are in a unique position to initiate and drive the plan of care that can prevent and treat childhood overweight and obesity. This unique position comes from the often established and trusting relationship that PCPs have with parents and their children. In addition to the powerful position PCPs hold in the arena of childhood obesity prevention and treatment, they also have access to evidence-based clinical practice guidelines (CPGs) from the Endocrine Society (2008) to guide their practices.

The Endocrine Society's (2008) CPG for childhood obesity provides evidence-based recommendations for diagnosing, preventing and treating childhood obesity. The guideline also addresses societal barriers that can complicate implementation of guidelines, and supports community, public, and parental involvement throughout the guideline recommendations. The American Academy of Pediatrics (2016) recommends screening for overweight and obesity through BMI calculation at each well child visit beginning at age two.

Despite the opportunity that PCPs have to positively impact the epidemic of childhood obesity, a small body of literature exists that demonstrates the failure of PCPs to address this problem in practice. Data reveal failure of providers to deliver resources to parents and families

to engage in healthier lifestyles (Holt, Schetzine, Dalton, Tudiver, Fulton-Robinson, & Wu, 2010), failure to consistently calculate body mass index (BMI) for age to screen for overweight and obese children (Larsen, Mandleco, Williams, & Tiedeman, 2005), inadequate use of psychosocial assessments in obese children and their families (Small, Anderson, Sidora-Arcoleo, & Grace-Clevelan, 2009), lack of adequate knowledge on childhood obesity prevention and treatment strategies (Spivack, Swietlik, Alessandrini, & Faith, 2010), and strong negative feelings by providers on the topic of childhood obesity (Walker, Strong, Atchinson, Saunders, & Abbott, 2007).

Childhood overweight and obesity in the rural setting further complicates the implementation of screening, diagnosis, and treatment recommendations specific to the issue for primary care providers. The heightened difficulty of treating this issue in rural populations comes, in part, due to the increased prevalence of childhood overweight and obesity. In rural regions 16.5% of children are obese compared to 14.4% of urban children (Findholt, Davis, & Michael, 2013; Trust for America's Health, 2016). Other dimensions unique to rural regions that negatively influence provider practices for childhood overweight and obesity are socioeconomic status (Davis, Bennett, Befort, & Nollen, 2011), prevalence of physical limitations (Bavis, Bennett, Befort, & Nollen, 2011), community barriers (lack of specialists and multidisciplinary services for overweight and obese children, and minimal community resources) (Findholt, Davis, & Michael, 2013), and sociocultural influences (Findholt, Davis, & Michael, 2013).

Objectives

Existing data, as described above, exhibit a significant deficit by PCPs in addressing childhood obesity and significant barriers to the implementation of expert recommendations in rural settings, thus, several questions have been raised. What are the current practices that PCPs

engage in related to childhood obesity in the rural setting? What provider, visit, and patient characteristics influence whether patients are being screened, diagnosed, and treated for overweight or obesity?

Given this gap in knowledge and practice, the purpose of this practice inquiry project is to gain a stronger and clearer understanding of the current practices related to childhood overweight and obesity by PCPs in a rural clinic setting. This project aims to:

1. Identify the *current practices* of primary care providers in a rural setting for the screening, diagnosing, and treating childhood overweight and obesity.

2. Analyze *patient demographics* for trends in data offering explanation for why providers in a rural setting do or do not screen, diagnose, and treat childhood overweight and obesity.

3. Analyze *provider type* (nurse practitioner or physician) for trends explaining why specific types of providers in a rural setting do or do not screen, diagnose, and treat childhood overweight and obesity.

Study Design

The study design for this project was a retrospective design. Data collection occurred via a retrospective chart review and was conducted for visits that occurred between September 1, 2013 and September 1, 2015. The participating clinic site agreed to provide records for all well child visits, for all providers, employed in the 24-month chart review period.

Study Population

This study has two study populations. The primary study population is compromised of primary care providers, (made up of advanced practice registered nurses and physicians) who are employed by the study site. Five providers, three advanced practice nurses and two physicians

employed by the clinic were included in the study. Well-child visits conducted in the data collection period by a provider who is no longer employed at the clinic were also included.

The secondary study population is pediatric patients, ages 2 to 18-years-old who visited the above-identified clinic for a well-child visit. Visit data from well-child visits was essential for this study as encounter/visit and patient demographics were being used to further understand how demographics may influence primary care provider's practices for the overweight and obese child. Gaining a stronger understanding of current practices in rural primary care for overweight and obese children will offer insight into pathways to improve the screening, diagnosis, and treatment of this special population of overweight and obese children in rural eastern Kentucky.

Methods

Study Permission and Recruitment

In addition to approval from the clinic site for this study, a formal application for research permission was submitted to the study site's Institutional Review Board (IRB). The study site's IRB determined that there was minimal risk involved for this study and the project was approved through the expedited review process. Following approval from the IRB documentation was sent to the University of Kentucky's Office of Research Integrity (ORI) for review. At that time the University of Kentucky's ORI agreed to grant oversight of the study to the study site. The informed consent and assent processes for subjects, both primary and secondary as identified above, were waived by the study site's IRB since all data were retrospective, de-identified and no more than minimal risk to patients

For privacy purposes, no provider or patient identifying information was included in the data provided to the primary investigator, such as names, birthdates, social security numbers, addresses, email addresses, phone numbers, licensure numbers, and certification numbers. All

data were kept in a single password protected computer in the possession of the primary investigator at all times. The primary investigator only received a list of patient and visit demographics and data points that were de-identified from the Informatics Department at the study site.

Inclusion and Exclusion Criteria

Inclusion criteria for included visits were that each visit must be at the study site and were a well visit with a CPT code of a comprehensive visit (Table 1). All patient records were for children ages 2 to 18-years-old, all visits were between September 1, 2013 and September 1, 2015, and providers for each visit were an advanced practice nurse or physician. Well child visits staffed by a physician assistant were not included. This is because physician assistants are not regularly utilized by this clinic, thus the limited number of visits with physician assistants would not provide the volume of well-child visits needed to delineate trends, and ultimately fail to create statistically significant results.

Study Procedures

Given this was a retrospective chart review, procedures only pertained to the extraction and protection of data from the existing electronic medical record established at the participating clinic site. A list of data points and demographics were extracted by staff in the facilities' Informatics Department and provided directly to the primary investigator in a de-identified list. All data were stored on the PI's personally owned password protected laptop. There was no physical copy of the data set. Data were free of personal identifying information such as names, birthdates, social security numbers, addresses, email addresses, phone numbers, licensure numbers, and certification numbers.

The source of all research material was the existing electronic medical record at the study site. Data to be collected was preexisting data from the dates of September 1, 2013 to September 1, 2015. Specific data collected is listed in Table 2.

Data Analysis

Data analysis was completed using IBM SPSS Statistics (Version 23.0). Descriptive statistics were used to analyze the obtained dataset. The chi-square test was used to evaluate for significant associations between pairs of categorical variables of each patient demographic (sex, ethnicity, etc.) and if BMI was or was not calculated. The chi-square test was also used to assess for a significant association between provider types and if BMI was or was not calculated. The Breslow-Day test was used to assess for the effect that patient demographics had on whether providers calculated BMI, gave the patient a diagnosis code consistent with being overweight or obese at the visits, and if they did receive a diagnosis code consistent with overweight or obesity, then did the provider give education for the overweight or obese child.

In order to assess whether or not age impacted if BMI was calculated, if a diagnosis was given or not, and if education was provided or not, a t-test was conducted with those variables. Additionally, a linear regression was used to assess between provider type, insurance status, and whether or not BMI was calculated, diagnosis was given for those who were overweight or obese, and if education was provided. Variables could not be tested against whether or not dietician referral was provided within the study sample as no patient who received a diagnosis of overweight or obese received a referral for this service.

Results

Sample Characteristics

There were a total of 1,012 pediatric visits at the study site during the study time frame. A total of 602 of all pediatric visits at the study site were well child visits. Six well-child visits were excluded as a physician's assistant staffed them, 24 were excluded because they did not have a care provider type reported, and one visit was excluded for not having an insurance type reported. The total encounters included in the study were 571 well-child visits.

The average age of the study sample was 9.95 years. Table 3 arranges age in ranges consistent with CPT coding for well visits (see Table 1 for CPT codes, descriptions, and age ranges). The male (53.8%) and female (46.2) distribution was nearly equal. The sample yielded little diversity in patient characteristics with only 27 patients being a race other than white. English was the primary language for all patients. The primary source of insurances for the sample was Medicaid, totaling 423 (74.1%). Complete sample demographics can be seen in Table 3.

While calculated BMIs were extractable from the system, BMI-for-age percentile was not. Using the documented age and body mass index from the medical record, the primary investigator calculated body mass index-for-age percentile classification (see Table 4 for definitions of BMI-for-age percentile classifications). Body mass index was not documented for 111 (19.4%) encounters, and thus body mass index-for-age percentile classification could not be calculated for these visits. For the visits where a BMI and BMI-for-age percentile classification were calculated it was found that 15 (2.6%) were underweight, 215 (37.7%) patients were of healthy weight, 98 (17.2%) were overweight, and 132 (23.1%) were obese. Of those patients identified as over weight or obese (n=230), only 4.8% of them received a diagnosis consistent

with overweight or obesity (see Table 5 for list of diagnosis codes and descriptions for childhood overweight and obesity). Advanced practice registered nurses staffed 413 (72.3%) of the well visits, and physicians staffed 158 (27.7%).

Screening

Screening for childhood overweight and obesity requires calculation of body-mass-index and plotting it on the clinical growth chart (CDC, 2009), BMI-for-age percentile. At the study site when BMI is calculated it is automatically plotted on the growth chart in the electronic health record (EHR). While calculated BMIs were extractable from the EHR, BMI-for-age percentile and weight classification were not, thus the primary investigator calculated these data.

Of the 571 well visits included in the study sample 460 (80.6%) had a BMI calculated. Ninety-eight (21.3%) of them were identified as overweight, and 132 (28.7%) were identified as obese (total of 230 overweight or obese patients in study sample). Advanced practice registered nurses calculated BMI for 80.6% (n=333) of well child visits that they staffed, and similarly, physicians calculated BMI for 80.4% (n=127) of well child visits they staffed.

Analysis of how the demographics of age, sex, race, ethnicity, insurance type, and provider type influenced whether or not BMI was calculated revealed that calculation of BMI was independent of those demographics (see Table 6). Primary language spoken was excluded form this analysis as 100 percent of the study sample were English speaking. Additional analysis was conducted to assess the influence the demographics of age, sex, race, ethnicity, and insurance type had on APRNs and physicians practices related to screening and for overweight and obesity (see Table 7). While there were no differences in association between demographic and screening practices of APRNs and Physicians to screen patients, there was a statistically significant (χ^2=4.01, p = .045) difference in how APRNs screened male versus female patients.

Advanced practice nurses calculated BMI at a statistically significant (χ^2=4.01, p = .045) higher proportion for males than females. However, the Breslow-Day test demonstrates no significant difference in how APRNs and physicians screen males and females (χ^2=2.28, p =.13).

Diagnosis

Statistical analysis of the diagnosis of childhood overweight and obesity for this study occurred through two analyses. The first was to assess for an association between the demographics of sex, race, ethnicity, provider type, insurance type, and primary spoken language and whether those in the sample who were overweight or obese received a diagnosis code reflecting their weight status (see Table 8). No statistically significant associations were assessed through the t-test performed for age and diagnosis status or Chi-square tests with all other variables.

The second analysis looked specifically at the practice of APRNs alone, physicians alone, and then compared their diagnosing practices using the Breslow-Day test (see Table 9). Advanced practice registered nurses saw 72.6% (n=167) of all overweight or obese children in the study sample, and of those they diagnosed 7 patients as overweight or obese. Conversely, they failed to diagnose 160 of those patients (95.8%). Physicians saw 27.4% (n=63) of all overweight and obese children in the study sample, and of those they diagnosed 4 patients as overweight or obese, and failed to diagnose 59 of those patients (93.7%). No statistically significant associations were seen for variables (age, sex, race, ethnicity, insurance type) and APRN or physician practices. Additionally, there was no statistically significant difference in the practices of APRNs and physicians diagnosing practices within the study sample.

Treatment

Treatments assessed for in this study were education and dietician referrals. These treatments were assessed for among those patients who were diagnosed as overweight or obese (n=11), both for association to demographics (age, sex, race, ethnicity, primary language spoken, insurance type, and provider type) (see Table 10), and for association between demographics and provider types (see Table 11). No dependent relationships were assessed through statistical analysis for education provided. Advanced practice registered nurses provided education to two of the seven patients they diagnosed as overweight or obese (28.6%), and physicians provided education to three of the four patients they diagnosed as overweight or obese (75%).

Statistical analysis for dietician referral was unable to be conducted as no patients who were diagnosed as overweight or obese in the study sample received a dietician referral.

Discussion

This study aimed to better understand the current practices for childhood overweight and obesity to assess if types of providers vary in their practices, and if patient demographics are associated with these practices for the screening, diagnosis, and treatment of overweight and obese children in the rural setting. Overall, no significant statistical associations were demonstrated in the performed analysis discussed above for screening, diagnosis, and treatment across the assessed demographics and provider types in this study.

The only statistically significant test for this study was for Chi-square test for APRNs and whether or not BMI was calculated for male verses female. The resulting p value was .045 ($\chi^2=4.01$), demonstrating that APRNs may calculate BMI for males at a higher proportion that females. However, this result should be interpreted cautiously as the value is just within the significance level (p = <.05), and also because the Breslow-Day test was used to compare APRN

and physician practices in calculating BMI for males verses females and results were non-significant, which suggest that there is no difference in the two provider type practices.

While the studied demographics were not associated with the type of care provided to overweight and obese children at well visits, the current practices at the study site, overall, are not aligned with expert recommendations and clinical practice guidelines for the care of overweight and obese children. Of the total well child charts reviewed ($n = 571$), 460 of them had a BMI calculated (80.6%). For those patients with a BMI calculated, 230 of them were classified as being overweight or obese (50%). Eleven patients of those who were overweight or obese received diagnoses reflecting their weight status during the visit, which is 4.8%. Then of those 11 patients only five of them received education specific to their weight (45.5%), and none of them received a dietician referral.

The American Association of Pediatrics (AAP) (2016) recommends that BMI be calculated for every well child visit beginning at 24 months, thus the study site is compliant with recommendations only 50% of the time. Low rates of screening for overweight and obese children was similarly assessed in a study from Findholt et al. (2013) where it was found that 73% ($n = 850$) of reviewed well child charts had a BMI calculated. This study's findings are also congruent with the study from Larsen et al. (2005) who found that 73.7% ($n=99$) of participating advanced practice registered nurses self-reported calculating BMI annually for pediatric patients as 'never,' 'rarely,' and 'sometimes.'

The Endocrine Society (2008) recommends that *every* child with a BMI-for-age percentile of 85th to 94th be diagnosed as overweight, and a BMI-for-age in the 95th percentile or greater to be diagnosed as obese. This is consistent with the CDCs clinical growth charts (CDC, 2009). Overall, providers in this study did this at a rate of 4.8%. For overweight and obese

children in the study, 132 were obese, and 98 of them were overweight. Providers diagnosed 10 of those children who were obese as such (7.6%), and diagnosed one of those children who were overweight as such (1%).

The Endocrine Society (2008) recommends extensive diet modification for overweight and obese children. The guideline from the AAP (Spear et al., 2007) recommends a multidimensional approach to the care of the overweight and obese child, and specific to diet modifications. The AAP suggests a combination of care within the clinic (educational) and with a dietician. In this study, the percentage of those who received education after being diagnosed as overweight or obese was 45.5% (*n* =11), and the percentage that received a dietician referral was 0% (*n* =11). This demonstrates a failure to provide recommended treatment, which is consistent with Holt et al. (2010), who found that providers failed to deliver resources to parents and families to engage in healthier lifestyles.

The practices discussed above of the providers in this study sample demonstrate a deficit in the care they are providing to overweight and obese children. While an analysis of patient demographics revealed no influence over these practices, the studies from Spivack et al., (2010) and Walker et al. (2007) may offer insight into why this quality of care is being provided. Spivack et al. (2010) found that providers lacked sufficient knowledge on childhood obesity prevention and treatment strategies, and Walker et al. (2007) found that providers had strong negative feelings toward the topic of childhood obesity. Further studies are needed to gain insight into provider knowledge at the study site and the attitudes they may have toward childhood overweight and obesity.

Limitations

Limitations should be considered when interpreting the results of this study. First, this is a retrospective study, thus variables were limited to what was documented in the existing charts from those encounters in the study timeframe. The second limitation is that the study population lacked diversity, and this low variability made statistical analysis difficult and significantly limits the generalizability of study results. Third is that the electronic health record in place at the study site flags any open chart as an encounter, thus there is a possibility that some of the well visits with no BMI calculated were falsely labeled. Additionally, education and dietician referral were not extractable data points in the electronic health record, thus data analysts in the informatics department of the study site manually assessed only those 11 charts of diagnosed children for these data, thus there is a chance that overweight and obese children who were not diagnosed did receive some type of intervention from the provider. Another limitation is that the primary investigator of the study did not have access to the electronic health record, only a single, de-identified data set, thus the data set received could not be checked for accuracy. The final limitation to consider is that other medical staff (excluding APRNs and physicians) are likely the ones inputting the values needed to calculate weight status (height, weight, and age) and these processes were not accounted for in this study. While the above limitations do exist for this study, results can be utilized for a quality improvement initiative within the study site, and may be used to better understand the multidimensional issue of providing health care to overweight and obese children.

Recommendations

Future research recommendations would be to conduct a longitudinal study where frequent interval chart audits can be performed, not only to insure the accuracy of details of the

provider, patient, and visit, but also to be able to extract more patient and provider demographics that could potentially be influencing practice for overweight and obese children. Some other demographics to consider are who presents to the appointment with the pediatric patient, living situation or household members (nuclear family, single parent family, etc.), and if the patient presented with an acute issue at their well visit. It is recommended that this study would be conducted once again in a rural clinic as limited research of provider practices of overweight and obese children in this population exist, and also because the higher incidence of this issue in rural regions.

Additional future research recommendations, specific to the study site, are that they use this study to go forward with a quality improvement initiative in the care provided to overweight and obese children. In addition, the same analysis should be performed at all of the primary care clinics associated with the organization, as they are all rural clinics. This would allow a stronger statistical analysis through a larger and likely more diverse sample, as well as assess for the presence of the issues seen in this study at other clinic sites. Specific measures to improve practices at the study site are to use the electronic health record to create reminders and alerts to ensure calculation of BMI occurs, and for when a child is identified as overweight or obese. Provider's knowledge base on the topic of childhood overweight and obesity and the available guidelines should be assessed, and identified deficits should receive remediation. Additionally, the root cause of this issue should also be evaluated through the use of focus groups to explore provider attitudes on the topic of childhood overweight and obesity and the discussion of workflow and processes in place at the study site and either facilitate or impede their adherence to clinical practice guidelines and expert recommendations.

While recommendations for practice specific to the demographics assessed in this study cannot be made due to the absence of statistical significance, it can be recommended that efforts be given to improve the rate of screening, diagnosing, and treating childhood overweight and obesity in accordance with expert recommendations and clinical practice guidelines such as those from the Endocrine Society (2008). Additionally, it is recommended that regular and ongoing evaluation of provider's practice for overweight and obesity be assessed to monitor for improvements or deterioration.

Conclusion

This retrospective study examined associations between patient demographics, types of providers, and the health care provided to overweight and obese children (screening, diagnosis, and management). Findings of this study revealed no significant relationship between age, sex, race, ethnicity, primary language spoken, insurance type, or provider type and the care provided to overweight and obese children at the study site. However, this study did reveal low rates of screening, diagnosing, and treating overweight and obese children, which is consistent with existent previously conducted studies on this issue. Given these findings clinics and providers should work toward improving practices, not just to improve the health of these patients as children, but to ensure they can mature into healthy adults. Continued research examining the cause for the repeated findings of low rates of screening, diagnosis, and treatment of overweight and obese children should continue, specifically in rural regions, as the population there poses unique barriers to care that may not be present in urban populations. These research efforts should be large-scale in nature to generate more generalizable findings.

Table 1

CPT Codes and Code Descriptions	
CPT Code	CPT Code Description
99382	Initial Comprehensive Visit, New Patient, 1-4 years
99383	Initial Comprehensive Visit, New Patient, 5-11 years
99384	Initial Comprehensive Visit, New Patient, 12-17 years
99385	Initial Comprehensive Visit, New Patient, 18-39 years
99392	Periodic Comprehensive Visit, Established Patient, 1-4 years
99393	Periodic Comprehensive Visit, Established Patient, 5-11 years
99394	Periodic Comprehensive Visit, Established Patient, 12-17 years
99395	Periodic Comprehensive Visit, Established Patient, 18-39 years

While CPT codes include the age range of 1-39 years, only those patients who are age 2-18 years are included in the study.

Table 2

Data Points	
General	Encounter Specific
Total Number of Pediatric Visits	Age
Total Number of Well Visits	Sex
All Visits with CPT Code for well child visit (Table 1)	Race
	Ethnicity
	Primary Spoken Language
	Insurance Type
	Provider Type
	Body Mass Index (BMI)
	Body Mass Index-for-age Percentile Classification
	Overweight and Obese Diagnosis Codes Given
	Education Specific to Overweight and Obesity Provided
	Dietician Referral Provided

Table 2. Data points collected only from within study time frame of September 1, 2013 to September 1, 2015.

Table 3

Sample Demographics		
Demographic	Count n=571	Percentage
Age Range per CPT Codes		
2-4 (99382, 99392)	83	14.4
5-11 (99383, 99393)	244	42.4
12-17 (99384, 99394)	248	43.1
18 (99385, 99395)	1	.1
Sex		
Male	307	53.8
Female	264	46.2
Race		
Black or African American	6	1.1
More than one race	18	3.1
White	544	95.3
Undefined	3	.5
Ethnicity		
Hispanic or Latino	6	1.1
Not Hispanic or Latino	564	98.8
Undefined	1	.2
Primary Spoken Language		
English	571	100
Insurance Type		
Medicaid	423	74.1
Other	126	22.1
Uninsured	21	3.7
Provider Type		
Advanced Practice Registered Nurse	413	72.3
Physician	158	27.7

Table 3.

Table 4

Body Mass Index-for-Age Percentile Classification and Description	
Classification	Description
Underweight	Less than the 5th percentile
Healthy Weight	5th percentile to less than the 85th percentile
Overweight	85th to less than the 95th percentile
Obese	Equal to or great than the 95th percentile

Centers for Disease Control and Prevention (2015). About child and teen BMI. Retrieved from
http://www.cdc.gov/healthyweight/assessing/bmi/childrens_bmi/about_childrens_bmi.html

Table 5

Childhood Overweight and Obese Diagnosis Codes and Description	
Diagnosis Code	Diagnosis Code Description
278.02	Overweight
V85.53	Body Mass Index Pediatric 85th Percentile to Less than 95th Percentile for age
278.00	Obesity Unspecified
V85.54	Body Mass Index Pediatric Greater than or Equal to 95th Percentile for Age

Table 6

Statistical Analysis of Influence of Patient and Provider Demographics on Screening				
Demographic	BMI Calculated n (%) n=460	BMI not Calculated n (%) n=111	Test Statistic	p
Age, *Mean,* (SD)	9.97 (4.39)	9.91(4.29)	t = .12	.90
Sex				
Male	254 (55.2)	53 (47.7)	X^2	
Female	206 (44.8)	58 (52.3)	2.01	.16
Race				
White	436 (95.4)	108 (97.3)	X^2	
Other	21 (4.6)	3 (2.7)	.79	.60*
Ethnicity				
Hispanic or Latino	0 (0)	6 (1.3)	X^2	
Not Hispanic or Latino	110 (100.0)	454 (98.7)	1.45	.60*
Insurance Type				
Medicaid	337 (73.4)	86 (77.5)	X^2	
Other	105 (22.9)	21 (18.9)	.83	.66
Uninsured	17 (3.7)	4 (3.6)		
Provider Type				
Advanced Practice Registered Nurse	333 (58.3)	80 (14)	X^2	.95
Physician	127 (22.2)	31 (5.4)	.005	

Table 6. Statistical analysis of primary language spoken was not conducted because there is no variation in this variable, 100% of sample were English speaking.
* Denotes use of Fisher's Exact Test due to small cell count.

Table 7

Statistical Analysis of Influence of Patient Demographics on Providers Calculating Body Mass Index

	Advanced Practice Registered Nurse				Physician				Breslow-Day Test
Demographic	BMI Calculated n (%) n=333	BMI not Calculated n (%) n=80	Test Statistic	p	BMI Calculated n (%) n=127	BMI not Calculated n (%) n=31	Test Statistic	p	
Age, *Mean,* (SD)	10.21(5.03)	10.21(4.02)	t-.13	.90	9.49(4.98)	9.13(4.88)	t=.36	.72	$p=,68$
Sex									
Male	183 (84.3)	34 (15.7)	X^2 4.01	**.045**	71 (78.9)	19 (21.1)	X^2 .30	.59	$X^2 = 2.28$
Female	150 (76.5)	46 (23.5)			56 (82.4)	12 (17.6)			$p = .13$
Race									
White	320 (80.6)	79 (19.8)	X^2 1.18	.48*	116 (80.0)	29 (20.0)	X^2 .02	>.99*	$X^2 = .56$
Other	12 (92.3)	1 (7.7)			9 (81.8)	2 (18.2)			$p = .45$
Ethnicity									
Hispanic or Latino	4 (100)	0 (0)	X^2 .97	>.99*	2 (100)	0 (0)	X^2 .48	>.99*	-
Not Hispanic or Latino	329 (80.4)	80 (19.6)			125 (80.6)	30 (19.4)			
Insurance Type									
Medicaid	245 (80.1)	61 (19.9)	X^2 .15	.93	95 (77.9)	27 (22.1)	X^2 2.61	.27	-
Other	75 (81.5)	17 (18.48)			30 (88.2)	4 (11.8)			
Uninsured	14 (77.8)	4 (22.2)			3 (2.34)	0 (0)			

*Table 7.   * Denotes use of Fisher's Exact Test due to small cell count.*

   a.   *Percentages for each variable represent the percentage of that cell count within the entire variable population. For example, 15.7% of male patients seen by APRNs (34 patients) did not have a BMI calculated.*

   b.   *The p-value for age comparison between providers was calculated using a linear regression.*

   c.   *Analysis of Primary Language Spoken variable not conducted because there was no variation (100% of sample was English speaking).*

   d.   *No p-value is reported for Ethnicity Breslow-Day Test because the variable has no distribution.*

   e.   *No p-value reported for Insurance Type Breslow-Day Test because there was complete separation and test could not be conducted.*

   f.   *Unable to perform Breslow-Day test for insurance type has more than 2 variable types.*

Table 8

Statistical Analysis of Influence of Patient and Provider Demographics on Diagnosing Childhood Overweight and Obesity

Demographic	Diagnosis Documented *n* (%) n=11	Diagnosis not Documented *n* (%) n=219	Test and Test Value	p
Age, *Mean,* (SD)	10.82 (3.7)	9.78 (4.7)	t = .79	.43
Sex				
Male	4 (36.4)	126 (57.5)	X^2	.22*
Female	7 (63.6)	93 (42.5)	1.91	
Race				
White	9 (81.8)	209 (96.3)	X^2	.08*
Other	2 (18.2)	8 (3.7)	5.25	
Ethnicity				
Hispanic or Latino	0 (0)	3 (1.4)	X^2	>.99*
Not Hispanic or Latino	11 (100)	216 (98.6)	.15	
Primary Spoken Language				
English	11 (100)	219 (100)	-	-
Insurance Type				
Medicaid	8 (72.7)	169 (77.5)	X^2	.67
Other	2 (18.2)	41 (18.8)	.82	
Uninsured	1 (9.1)	8 (3.7)		
Provider Type				
Advanced Practice Registered Nurse	7 (6f3.6)	160 (73.1)	X^2	.50*
Physician	4 (36.4)	59 (26.9)	.47	

*Table 8. * Denotes use of Fisher's Exact Test due to small cell count.*
   a. *Only patients who had a BMI calculated and were classified as overweight or obese were included in this analysis (n=230).*
   b. *No p value was calculated for English speaking patients because there was no variation in primary language spoken (100% of sample spoke English as their primary language).*

Table 9

Statistical Analysis of Influence of Patient Demographics on Providers Diagnosing Overweight or Obesity

Demographic	Advanced Practice Registered Nurse				Physician				Breslow-Day Test
	Diagnosis Documented *n* (%) n=7	No Diagnosis Documented *n* (%) n=160	Test and Test Value	p	Diagnosis Documented *n* (%) n=4	No Diagnosis Documented *n* (%) n=59	Test and Test Value	p	
Age, *Mean,* (SD)	9.0 (2.89)	10.2 (4.13)	t-68	.45	14 (2.83)	9.3 (4.94)	,92	.06	*p* =.07
Sex Male Female	2 (2.2) 5 (6.7)	90 (97.8) 70 (93.3)	X² 2.08	.25*	2 (5.3) 2 (8.0)	36 (94.7) 23 (92)	X² .19	>.99*	X² = .29 *p* =.59
Race White Other	6 (3.7) 1 (33.3)	157 (96.3) 2 (66.7)	X² 6.41	.12*	3 (5.5) 1 (14.3)	52 (94.5) 6 (85.7)	X² .80	.39*	X² = .80 *p* =.37
Ethnicity Hispanic or Latino Not Hispanic or Latino	0 (0) 7 (1.7)	2 (100) 158 (95.8%)	X² .09	>.99*	0 (0) 4 (6.5)	1 (100) 58 (93.5)	X² .07	>.99*	-
Insurance Type Medicaid Other Uninsured	6 (4.7) 0 (0) 1 (14.3)	121 (95.3) 32 (100) 6 (85.7)	X² 3.25	.20	2 (4.0) 2 (18.2) 0 (0)	48 (96) 9 (81.8) 2 (100)	X² 3.19	.20	-

*Table 9. * Denotes use of Fisher's Exact Test due to small cell count.*

a. Percentages for each variable represent the percentage of that cell count within the entire variable population seen by the specified provider type. For example, 100% of the Hispanic patients seen by APRNs (2 patients) that were overweight or obese did not receive a diagnosis code consistent with their weight status.
b. Analysis of the age demographic performed using a t-test, and the p-value was calculated using a linear regression.
c. Analysis of Primary Language Spoken variable not conducted because there was no variation (100% of sample was English speaking).
d. No p-value is reported for Ethnicity because the variable has no distribution or complete separation.
e. Unable to perform Breslow-Day test for insurance type has more than 2 variable types.

Table 10

Statistical Analysis of Influence of Patient and Provider Demographics on Providing Education to those Patients who received a Diagnosis Code Consistent with Overweight or Obesity Status

Demographic	Education Provided n (%) n=5	Education not Provided n (%) n=6	Test and Test Value	p
Age, *Mean,* (SD)	12 (5.1)	9.83 (2.04)	t= -.96	.36
Sex			X^2	>.99*
Male	2 (40)	2 (33.3)	.05	
Female	3 (60)	4 (66.7)		
Race			X^2	>.99*
White	4 (80)	5 (83.3)	.02	
Other	1 (20)	1 (16.7)		
Ethnicity			-	-
Hispanic or Latino	-	-		
Not Hispanic or Latino	5 (100)	6 (100)		
Primary Spoken Language			-	-
English	5 (100)	6 (100)		
Insurance Type			X^2	.63
Medicaid	4 (80)	4 (66.7)	.92	
Other	1 (20)	1 (16.7)		
Uninsured	0 (0)	1 (16.7)		
Provider Type			X^2	.24*
Advanced Practice Registered Nurse	2 (40)	5 (83.3)	2.21	
Physician	3 (60)	1 (16.7)		

Table 10. * Denotes use of Fisher's Exact Test due to small cell count.
a. No p value was calculated for Primary Spoken Language or Ethnicity because there was no variation in primary language spoken (100% of sample spoke English as their primary language) and no variation in Ethnicity (all patients listed as Not Hispanic or Latino).

Table 11

Statistical Analysis of Influence of Patient Demographics on Providers Providing Education Specific to Overweight and Obesity in those Patients who received a Diagnosis Code for Consistent with Overweight or Obese Status

	Advanced Practice Registered Nurse				Physician				Breslow-Day Test
Demographic	Education Provided n (%) n=2	Education not provided n (%) n=5	Test and Test Value	p	Education Provided n (%) n=3	Education not Provided n (%) n=1	Test and Test Value	p	
Age, *Mean,* (SD)	-	-	-	-	-	-	-	-	-
Sex									
Male	1 (50)	1 (50)	X^2 .63	>.99*	1 (50)	1(50)	X^2 1.33	>.99*	X^2 = 1.97
Female	1 (20)	4 (80)			2 (100)	0 (0)			p =.16
Race									
White	2 (33.3)	4 (66.7)	X^2 .47	>.99*	2 (66.7)	1 (33.3)	X^2 .44	>.99*	X^2 = 91
Other	0 (0)	1 (100)			1 (100)	0 (0)			p = .34
Ethnicity									
Hispanic or Latino	-	-			-	-			
Not Hispanic or Latino	-	-	-	-	-	-	-	-	-
Insurance Type									
Medicaid	2 (33.3)	4 (66.7)	X^2 .47	>.99	2 (100)	0(0)	X^2 1.33	>.99	-
Other	0(0)	0(0)			1 (50)	1 (50)			
Uninsured	0 (0)	1 (100)			0(0)	0(0)			

Table 11. *Denotes use of Fisher's Exact Test due to small cell count.*

a. *Percentages for each variable represent the percentage of that cell count within the entire variable population. For example, of male patients who received a diagnosis code consistent with overweight or obesity by APRNs, 50% (1 patient) of them received education.*

b. *Unable to perform t-test analysis with age as cell counts small and complete separation was present.*

c. *Unable to perform statistical analysis for ethnicity since variable is constant (there were no Hispanic or Latino patients who received a diagnosis code for overweight or obesity).*

d. *Analysis of Primary Language Spoken variable not conducted because there was no variation (100% of sample was English speaking).*

e. *Unable to perform Breslow-Day test for insurance type has more than 2 variable types.*

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