Nutrition Coaching by Registered Dietitians as an Effective Strategy to Reduce Adolescent Obesity

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Introduction

In the past thirty years, the incidence of childhood and adolescent obesity has more than tripled.[1] Childhood obesity affects one in six children and adolescents in the United States, and has long lasting consequences on health.[1] This increasing trend in overweight and obesity is a public health concern because obesity can lead to significant medical consequences including diabetes, heart disease, stroke and hypertension.

Research suggests that several factors appear to be contributors to obesity. Meal skipping, meal frequency, inactivity and sugar sweetened beverage consumption have all been linked to weight gain.[2–4] In addition, children with high intake of low fiber snacks, sugars and candy were found to have a higher incidence of obesity and increased risk of higher adipose fat.[5,6] Conversely, a diet high in fruits, vegetables and whole grains is associated with a lower body mass index (BMI).[5]

While literature exists on the causes of obesity, more work needs to be done to stop this alarming trend. Fourteen school-based health centers (SBHC) located in high schools across Delaware initiated a quality improvement project to evaluate the effectiveness of identifying and counseling overweight and obese students.

Methods

An interdisciplinary team from the SBHC looked at current procedures to identify and treat overweight and obese adolescents in the SBHC. The SBHCs are physically located within each high school and staffed by a multidisciplinary team including a nurse practitioner (NP), licensed clinical social worker (LCSW), registered dietitian nutritionist (RDN), and a medical director (MD).

Study Population

The project included students from 14 different high schools who were referred to the RDNs in the SBHCs during the 2012-2013 and 2013-2014 school years. Parents must enroll their students in the SBHC in order for them to receive services. Once a student becomes a member of the SBHC, he/she may self-refer for a variety of services including medical, mental health or nutrition. A student may also be referred to the SBHC by a parent, coach or school staff.

Measures

The American Academy of Pediatrics Expert Committee guidelines recommend that health care providers assess body mass index (BMI) by percentile annually as a key step in improving the incidence of overweight and obesity.[7] In the SBHC, the BMI and blood pressure of all students receiving medical care were routinely assessed. The BMI was plotted on the CDC growth charts specific for adolescents based on age and gender. A student was diagnosed as overweight if BMI

fell at or above the 85th percentile but less than the 95th percentile, and obese when BMI was greater than or equal to the 95th percentile.

Motivational Interviewing

All students identified as overweight or obese were offered an internal referral to the RDN for nutritional assessment and follow-up counseling using motivational interviewing (MI) techniques. Healthcare providers have identified the lack of patient motivation as a major barrier in the treatment of overweight children and adolescents.[7,8] Use of MI in a health care setting has been identified as appropriate for the adolescent population because adolescents often perceive health care professionals as "health experts" and may listen to them more than their parents or other adults. This patient-centered style of counseling may also be developmentally appropriate for adolescents who are in a stage of their life when they need to feel a sense of control and they want to be treated as adults.[9] The RDNs at the SBHC were the providers who were most experienced in counseling adolescents about diets and lifestyle changes and well-suited to implement MI techniques. The RDNs used a basic MI approach with students including open-ended questions, affirmation, reflective listening and summary reflection (OARS). RDNs also report having more time to discuss these changes with patients compared to the other medical providers.[10]

Assessment Tool

The initial visit with the RDN included an evaluation of BMI and a detailed dietary history and food frequency assessment as reported by the student. The RDN then recorded the student's weight and BMI and evaluated diet and exercise history on the nutritional progress assessment sheet (NPAS) (Figure 1). This one page assessment sheet includes eight healthy behaviors that were selected by the RDNs based on identified risk factors for overweight and obesity in adolescents.[2–5,7]

Figure 1: Nutritional Progress Assessment Sheet

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SCHOOL-BASED HEALTH CENTER NAME: _____

STUDENT ID: _____ AGE: _____ GENDER: _____

Reason for Referral: _____

Other Nutritional Concerns: HBP   DM   Other

Pertinent Family Health Risks: Overweight/Obese   HBP   DM   Heart Disease

NUTRITIONAL PROGRESS

Eating Breakfast (per week)	0(Never)	1(Less than 3 days)	2(3-4 days)	3(5+ days)
Eating fruits (per day)	0(Less than 1 svg)	1(1 svg)	2(2 svg)	3(3+ svg)
Eating vegetables (per day)	0(Less than 1 svg)	1(1 svg)	2(2 svg)	3(3+ svg)
Consuming Dairy (per day)	0(Less than 1 svg)	1(1 svg)	2(2svg)	3(3+ svg)
(Dairy Type)	a(whole)	b(2%)	c(1%)	d(skim)
Eating fast food (per week)	0(4+ meals)	1(3 meals)	2(1-2 meals)	3(never)
Drinking SSB (per day)	0(3+)	1(2)	2(1)	3(never)
(SSB=Sugar Sweetened Beverage)				
Physical activity (per week)	0(0-30 min)	1(31-90 min)	2(91-180 min)	3(181+ min)
Healthier food choices:	0	1	2	3
(subjective scale/see comments)				

DATE						
BMI						
WEIGHT						
HEALTHY HABITS						
Eating breakfast						
Eating fruits						
Eating vegetables						
Eating or drinking dairy						
Eating fast food meals						
Drinking SSBs						
Participating in physical activity						
Choosing healthier meals/snacks						

Date: _____ Comments: _____

Date: _____ Comments: _____

Date: _____ Comments: _____

Date: _____ Comments: _____

Date: _____ Comments: _____

Date: _____ Comments: _____

Date: _____ Comments: _____

Date: _____ Comments: _____

This tool is unique because it rates eight targeted behaviors using the objective Likert scale. The Likert scale was utilized to quantitatively evaluate eating and exercise habits on a scale of one to three. After assessing the student's weight, diet, and exercise history, the RDN attempted to help the student see the bigger picture, and encouraged him or her to target changes suggested by the healthy lifestyle goals listed on the NPAS. During follow-up visits, the RDN utilized the NPAS as a tool to track a student's change in targeted behaviors and BMI, and to evaluate each healthy lifestyle goal on a scale from zero to three as defined on the tool. Goals were reassessed at each visit when the RDN clarified the details of the student's self-reported dietary adherence and physical activity and updated the evaluation. This assessment tool became a permanent part of

the student's medical record so that other members of the SBHC team could readily review the student's progress.

Students were scheduled for follow up nutritional counseling every two to three weeks to reinforce behavioral changes and reevaluate goals. During follow-up visits, the RDN utilized the NPAS as a tool to track a student's change in targeted behaviors and BMI. The RDN clarified the details of the student's self-reported dietary adherence and physical activity and updated the evaluation. Motivational interviewing techniques were utilized to help the student overcome obstacles, improve compliance and achieve targeted goals (Figure 2).

Figure 2: Registered Dietitian Nutritionist Counseling Procedures

Figure 2 RDN Counseling Procedures

Initial Visit:	
Discuss/determine dietary habits/history	Previous eating patterns, weight history, food preferences/intolerances
Determine starting Body Mass Index (BMI)	Measure height/weight, calculate BMI, determine if student is overweight or obese by CDC standards
Utilize Nutritional Progress Assessment Sheet (NPAS) to establish a baseline of health status	Document results of testing and history, create initial goals with student
All subsequent visits:	
Measure/Calculate BMI each visit	Measure height/weight, calculate BMI, discuss change from previous if any
Utilize Nutritional Progress Assessment Sheet (NPAS) to track habits/progress/etc.	Document healthy habits re: eating breakfast, fruits, vegetables, fast food, snacks, eating/drinking dairy, drinking sugar sweetened beverages, physical activity
Use 'motivational interviewing' techniques* to counsel student	Review progress or obstacles, reinforce positive efforts, reevaluate and revised goals as necessary
Review overall progress	Tie changes in dietary habits to change in health status

*Motivational Interview techniques include: (OARS) **O**pen-ended questions, **A**ffirmation, **R**eflective listening, **S**ummarizing towards establishing and achieving goals.

Students were scheduled during study halls, elective classes or after school. If a student failed to show up for an appointment, the administrative assistant or the RDN attempted to locate the student or rescheduled the student at a more convenient time.

Statistical Analysis

Data collected from this project was used to assess the impact of nutrition coaching on body weight, BMI and eight different targeted behaviors over the counseling period.

Frequencies of visits to the RDN were tabulated.

Mean initial and mean final BMI were calculated for all participants who had more than one visit to the RDN and analyzed for the group as a whole and by gender. A t-test was used to compare the two groups and SD, SEM, p-values and 95% confidence intervals were calculated.

A Pearson product moment correlation coefficient was computed to assess the relationship between the variables in the data collected by the RDN on the nutritional progress form in participating SBHCs and improvement in BMI.

Results

In total, 1824 unique students were seen by an RDN for nutritional assessment and counseling during a total of 3934 encounters during the 2012-2013 and 2013-2014 school years. The average number of encounters per student was 2.16 with 66% of students visiting an RDN for two or more visits. The student population was 32% male and 68% female with an average age of 15.8 years. Several students reported family risk factors related to overweight including 43.2% with overweight parents; 15.6% with a family history of high blood pressure; and 9.3% with a family history of diabetes mellitus.

Of the 1824 students seen by the dietitian, 61.6%, or 1123 students were considered overweight or obese. The average baseline BMI for overweight or obese students with more than one visit (N=743) was 35.24 (overweight) and 34.82 (obese) and the average final BMI was 33.43 (overweight) and 33.62 (obese) (p=0.0002, overweight and p=0.0005, obese). The change in BMI was greater for females compared to males. The males average baseline BMI was 35.44 and final BMI was 34.33 (p=0.0575). For females, average baseline BMI was 34.19 and final BMI was 32.91 (p=0.0027)

The average number of RDN visits for the overweight or obese students was 2.49 with 50.3% (n=374) of students having more than 2 visits. Females visited the RDN more frequently with 56% having more than 2 visits. In contrast, only 38% of males returned to see the RD for more than 2 visits. The total number of visits is positively correlated with an improvement in BMI. The number of visits also corresponds well with the representative need as defined by BMI

The most important predictors of improvement in BMI among overweight and obese students in regression modeling were reduction in fast food consumption and increase in physical activity. Although reduction in the consumption of sugar sweetened beverages alone does not significantly predict BMI change, it is significantly correlated with improvement in self-reported health habits across most of the lifestyle/behavioral measurements assessed in this study for both males and females.

Discussion

The fourteen SBHCs included in this study were successful in targeting students at high risk for obesity and referring them to the RDNs. Nutritional coaching using MI by the RDNs in

association with an assessment tool to track behavior change was successful in reducing BMI. This reduction in BMI correlated with the frequency of encounters with the RDN.

Visits with the RDN

Students were targeted to be seen by the RDN every two to four weeks, as their schedules allowed. Frequency of visits was important in order for the RDN to more accurately evaluate dietary recall and behavioral changes and promote compliance with identified goals. Since successful reduction in BMI and improvement in healthy lifestyle behaviors correlated with frequency of RDN visits, it is important to note that employment of the RDN utilized minimal resources. Health care practitioners have cited lack of reimbursement as a barrier to obesity treatment.[8,9] The SBHCs employed four RDNs to work in the 14 different high schools. Due to financial constraints, the hours for RDNs were limited to 4 to 7 hours per week at each school which represents a very small percentage of the SBHC budget. This study demonstrates that the RDN can have an impact with minimal costs. In some states or locations of care, such visits may be billable.

Use of Nutritional Progress Assessment Sheet

Use of the nutritional progress assessment sheet as a tracking tool was helpful in engaging students in goal setting with the RDN. During each visit with the student, the RDN would review goals, reinforce success, address obstacles and coach students to make changes as needed. Assessment of behaviors using the Likert scale served as a mechanism to track student progress in terms of healthy behavioral changes instead of looking at changes in weight or BMI alone. Changes in eating and exercise habits were based on self-reported behaviors that were further assessed in an interview with the RDNs but could still be misrepresented by the adolescents. Future studies could utilize pedometers or digital apps to track diet and exercise behaviors in order to give a more accurate report.

A periodic review of the nutrition assessment tool was also helpful in tracking frequency of visits and identifying students who were lost to follow-up. The RDN sent special invitations to those students who did not keep their appointments. As 21% of referrals never returned for a second visit, efforts were made to reach out to these students.

Statistical predictors of improvement in BMI

The most important predictors of improvement in BMI among overweight students in this quality improvement project were an increase in physical activity and reduction in fast food intake. Students who participated in gym classes or school sports reported an increase in physical activity and energy expenditure. Students who ate less calorically dense fast foods reported a decrease in energy consumption.[11]

Although consumption of sugar sweetened beverages alone was not predictive of BMI change in regression analysis, sugar sweetened beverage intake did correlate with improvement of other self-reported behaviors. It appears that decreased consumption of sweetened beverages may be a marker of other healthy choices that promote weight loss. A motivated student who recognizes the negative impact of sweet drinks on body weight may find it easier to control beverage choices than to increase the consumption of fruits, vegetables, breakfast or low fat milk.

Gender differences

Although overall change in BMI was significant, the BMI change in males did not reach statistical significance. This may be due to less frequent visits with the RDN for males compared with females. Fifty-six percent of females had more than 2 visits with the RDN while only 38 percent of males followed up with the RDN for more than 2 visits. This gender difference could also be explained by differences in body composition, growth and sexual maturation. Generally, adolescent females have a greater percent body fat compared to males who have more lean body mass. Females may be more motivated to decrease their body fat and thus decrease BMI. The adolescent males may be less motivated to lose weight because of their interest in gaining lean body mass. In future studies, this variance between males and females could be further assessed by estimation of body fat using bioelectrical impedance and/or waist circumference.

Conclusions

Identification of overweight and obese adolescents by routine assessment of BMI is important in addressing the obesity problem. Results of this study indicate that referring overweight students for counseling by a qualified RDN trained and experienced in nutrition coaching and MI techniques can reduce BMI and promote healthy lifestyle behaviors. Students who are encouraged to keep more frequent follow-up visits will increase their chances for success.

Utilizing a tool such as the NPAS to evaluate behavioral changes and not just changes in weight or BMI may be a better way to fully assess the impact of a nutrition and physical activity intervention. A student who fails to lose weight but initiates healthy food and activity behaviors may reduce his/her risk of future problems related to weight gain and obesity.

Studies should continue to evaluate different counseling approaches for helping adolescents increase their motivation to change.[12] Perhaps males would benefit from a different technique or combination of counseling styles than females. Looking at gender specific behaviors or differences in ethnicity or socioeconomic status may also help target future counseling strategies for behavioral change. Future studies could also focus on the long term effects of nutrition interventions that begin in the school setting and how they impact a student's future health and improve the home environment to benefit other family members.

The convenient location of SBHCs in the schools is ideal for identifying and counseling overweight and obese students. This SBHC with medical, mental health and nutrition providers was successful in achieving a statistically significant reduction in BMI. This success was attributed to increased referral of students for one on one counseling with an RDN experienced in MI and using an assessment tool to target specific behavioral changes. Successful changes in eating and exercise behaviors should decrease risk for future health problems.

Acknowledgements

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