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Multidisciplinary Treatment of Pediatric Obesity: Nutrition Evaluation and Management

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Abstract

Assessment and treatment methods for pediatric obesity are rapidly evolving. Thought to be caused by an imbalance of caloric intake and expenditure, obesity requires a comprehensive evaluation of patient, familial, environmental, genetic, and cultural characteristics so clinicians can design successful interventions. Quantitative nutrition assessment of caloric intake is difficult and time consuming and should be used only in isolated settings, such as in the research setting, or if initial approaches to management have been unsuccessful. As an alternative, providers should identify dietary patterns or behaviors that have been linked to obesity and are promising targets for change. Clinicians should tailor interventions by considering patient and family motivation and readiness to change. Current guidelines recommend stepwise increases in treatment plans, and multidisciplinary treatment teams are recommended for patients who require intense intervention. Providers involved at the multidisciplinary level must incorporate their area of expertise into that of the team to develop a comprehensive management plan. This article reviews current recommendations for the evaluation and treatment of pediatric obesity with a focus on nutrition evaluation as part of a multidisciplinary team.

Keywords

obesity; pediatrics; nutrition therapy

The Surgeon General¹, the Institute of Medicine², and the World Health Organization³ have classified obesity as an epidemic in need of immediate and wide-reaching attention. Currently, the United States is experiencing the highest levels of overweight and obesity of any country in the world.⁴ Nationally representative data from 2003 to 2006 estimate that 16.3% of children and adolescents are obese and 32% are either overweight or obese.^{5,6} The major driving factor behind this increase is the imbalance of caloric intake and expenditure. The view of simply increasing activity or decreasing caloric intake to lose weight has been unsuccessful in practice. In reality, there is a complex interaction between patient, familial, environmental, genetic, and cultural factors, all of which contribute to this imbalance. The

most effective current strategies use behavioral treatment combined with weight management. Appropriate nutrition counseling and planning are essential at all levels of management. As the complexity of treatment increases, so do the intensity, expertise, and time spent in the various treatment domains. Thus, registered dietitians, exercise specialists, and behavioral counselors are cornerstones of a comprehensive obesity treatment strategy. The purpose of this article is to address current themes in the multidisciplinary approach to childhood obesity management with a specific focus on nutrition evaluation and management. This review provides an overview of management and of several key aspects of the multidisciplinary approach that are pivotal for successful implementation.

Assessment

The American Academy of Pediatrics published a supplement to the journal *Pediatrics* in 2007 addressing childhood obesity evaluation and management in a series of Expert Recommendations.^{7,8} First and foremost in pediatric practice, every child should be assessed at least annually for excess adiposity. Several expert advisory groups and panels have recommended using body mass index (BMI) as the preferred measure for evaluating obesity among children and adolescents 2–19 years of age.^{1,7,9} BMI is primarily recommended for its simplicity of measurement, strong correlation with body fat percentage, and ability to correctly identify the most obese individuals, with acceptable accuracy at the upper end of the distribution. Current guidelines state that children with a BMI ≥95th percentile for age and gender should be categorized as obese and those with BMI between 85th and 95th percentiles be categorized as overweight. However, the correlation between excess adiposity and BMI is not as clear in the 85th to 95th percentiles, so the assessment should also take into account other factors such as overall body composition with attention paid to muscle bulk and previous growth patterns.^{10,11} There is increasing research interest in more extreme levels of obesity, which may be associated with increased risk of comorbidities compared with less severe levels.^{12,13} A BMI ≥99th percentile has been proposed as a classification of severe obesity.¹⁴

Nutrition Assessment

Many complex dietary factors are associated with obesity. Accurate assessment of energy intake is important in the evaluation of obesity and can be challenging even under the most rigorous of research environments. Traditional methods of dietary assessment include 24-hour food recalls, food records, and food-frequency questionnaires. All of these methods have specific advantages and disadvantages, but all are impractical for use in most clinical settings. Many of the available assessment tools are too cumbersome and expensive to administer in the office, are not available in languages other than English, or take a considerable amount of time to administer. A few rapid assessment methods are available for evaluation of eating behaviors or physical activity, such as the WAVE (Weight, Activity, Variety, Excess) and REAP (Rapid Eating and Activity Assessment for Patients) evaluations,¹⁵ as well as for delivery of effective nutrition counseling,⁷ but administration of these measures requires additional time and training. This specialized skill set generally is not readily available in the primary care or community setting.

Given the variety of settings in which an assessment may take place (primary care office, subspecialty clinic, community setting, multidisciplinary clinic), a focused approach to key problem areas in pediatric obesity is warranted (Table 1). Current recommendations include obtaining a qualitative assessment of the patient's diet with a particular focus on dietary patterns that are thought to be linked to excess energy intake and adiposity. Intervening with these patterns could significantly reduce energy intake and potentially improve nutrition status. Although limited data are available that definitively link some of these patterns to childhood obesity, such as fast food and sweetened beverage intake, recommendations still

include addressing these types of behaviors. It is also of paramount importance to assess the entire family's nutrition patterns and food shopping habits, particularly for younger children, including the meal environment, meal location, and eating behaviors.

Interventions

Behavioral Treatment of Obesity

The tenets of pediatric obesity treatment come from the pioneering work of Epstein and colleagues. Distinct from low-calorie dietary interventions, Epstein's work uses a behavior change model, including reinforcement, monitoring, and, most important, inclusion of primary caregivers.^{16–20} This last component is the basis for a family-based approach, in which adult caregivers as well as other family members are vital to the success of the program. The family-centered approach can be modified based on the age of the patient. For example, parental involvement may lose some importance when working with older teens,²¹ and there is some evidence that a parent-only approach may be as effective for younger children as including the child in the treatment plan.^{22,23} Also clear from classic studies is the need for frequent contact with the treatment team to establish behavior change, usually with weekly visits for a period of time and long-term followup.^{21,24} A key goal of the assessment is to identify modifiable behaviors that are likely contributing to the child's obesity.

The concepts of self-efficacy and readiness to change are useful models in assessment and intervention. Self-efficacy is the personal belief that one can attain or successfully establish what one sets out to do.²⁵ Self-perceptions, like self-efficacy, influence our decision making, our resolve, and our actions.²⁶ These concepts are important in weight management, particularly with goal setting, where children and families must have confidence they can change a behavior and achieve their goal. If they do not, failure is more likely and can lead to negative feelings about behavior change. Readiness to change is a behavioral approach that assesses an individual's interest in and motivation for thinking about, starting, or maintaining a change in behavior. Initially proposed as the stages of change by Prochaska and DiClemente,²⁷ this model proposes that for any behavior problem and at any given encounter, a patient will be in 1 of 5 stages: precontemplation, contemplation, preparation, action, and maintenance. The intervention should be tailored to the stage of change with the goal being progression toward the next stage until the behavior has been mastered. This technique has been successfully applied to diverse behaviors such as smoking cessation and sun exposure.²⁸ These concepts allow the provider to tailor interventions for the patient and family if both are ready to change and feel capable of doing so. More research in applying these concepts directly to pediatric obesity is needed.

Family-Centered Communication

Rollnick²⁹ has more formally incorporated both of these ideas into a treatment approach called "motivational interviewing." Motivational interviewing is defined as "a client (patient)-centered counseling style for eliciting behavior change by helping clients explore and resolve ambivalence."³⁰ By asking questions about motivation for change and confidence in making changes, the provider is able not only to evaluate where to start making changes but also to choose interventions and tailor them to the patient's motivation or confidence. The provider can then help the patient resolve ambivalence and create new areas for change. Recent work has shown the feasibility of this approach for pediatric obesity treatment in a primary care setting, which included an intervention arm with dietitian support.³¹

Behavioral Modification: Tailored Interventions

Behavior modification is often misunderstood among physicians and other healthcare providers. Education alone is insufficient to change a behavior. Because physical activity and nutrition are profoundly influenced by behavior, modifying habits contributing to weight gain is central to the treatment of obesity. The components of behavior change, as it pertains to the treatment of pediatric obesity, are self-monitoring, stimulus control, and goal setting.^{21,32}

Self-monitoring is used to help patients gain awareness of habits, usually through keeping records, diaries, and logs. Using these techniques, patients may identify behaviors of which they were previously unaware that are contributing to their obesity. This is best accomplished through feedback from a clinician, for example, a dietitian who reviews food records and provides specific feedback. Simple food logs and records are often expanded to encompass other behavioral components of eating, such as level of hunger, boredom, and mealtime environment. This can provide valuable information for stimulus control, described next.

Stimulus control, a component of many treatment regimens, involves changing environmental cues that lead to increased caloric intake and sedentary activity. This can be applied in 2 forms: establishing new routines and changing access. These may be applied to both physical activity (changing work schedules to facilitate going to a gym) and nutrition intake (removing high-calorie foods from the home).

Goal setting is one of the most widely used approaches in behavior change. Caution must be exercised because goals can be detrimental, such as unrealistic weight loss goals. Successful goal setting can be implemented using the acronym SMART, which refers to goals that are Specific, Measurable, Attainable, Realistic, and Timely. In obesity treatment, the goal should pertain to a specific behavior, such as walking or snacking, rather than health or weight in general. SMART especially pertains to short-term goals, even though setting long-term goals can also be useful. For children, goal-related contracting can help maintain focus and provides structure to a reward. Rewarding success in reaching a goal is important for all children and should be negotiated between parent and child. It is helpful to make the reward an activity or privilege instead of food, money, or purchased items. Rewards should be small so they can be used frequently. Family-based activities are often the most successful rewards.

In using motivational interviewing, the clinician may “guide” the family in identifying behaviors to change. Although many behaviors may contribute to the child’s obesity, the clinician should empower the family to choose the behaviors they would like to modify. Once a behavior has been chosen, the clinician’s role is to support this choice by directing the family in setting SMART goals.

Specific Dietary Interventions

Few clinical trials have addressed specific dietary interventions in obese children, and even fewer have adequately controlled for the complexity of behaviors, environments, and families involved. However, a number of approaches have demonstrated some effectiveness in the treatment of obese children. Some of the most promising studies have involved grouping foods based upon nutrient quality and caloric density and then encouraging selection of foods with high nutrient quality and low energy density,^{16,33,34,17,35} often taught in a “traffic light” format (red, rarely; yellow, less often; green, more often). Diets focusing on the glycemic index of a food, based on the insulin response to specific carbohydrates, have shown some promise in studies involving adolescents,³⁶ but overall the

results have been mixed. Low-carbohydrate diets have recently become very popular in the general population.^{37–39} This approach is difficult to adhere to over the long term, and its safety in children is unproven. With the lack of definitive dietary approach recommendations, clinicians are encouraged to focus on the quality and quantity of dietary carbohydrates and fats. A focus on food behaviors is likely to carry the greatest efficacy.¹⁶

Recommendations for Treatment: Staged Approach

The American Association of Pediatrics, in recommendations published in 2007,⁸ advises a staged approach for pediatric weight management. The stage of treatment initiation is based upon the child's age, BMI percentile, and history of success in previous stages of treatment. Table 2 provides an overview of location of care, providers, and nutrition goals for each stage. It is recommended that patients be counseled on obesity prevention at all well-child visits, regardless of BMI. Stages 1 and 2 are typically carried out in the primary care office by primary care physicians or allied healthcare providers who have had additional training in weight management and behavioral counseling. Stages 3 and 4 typically exceed what can be accomplished in the primary care office.

The stages of treatment represent a progressive increase in the degree of supervision, counseling, and intervention. Clinicians perceive significant perceived barriers to obesity treatment, including a lack of support services, clinician time, clinician knowledge, and treatment skills available.⁴⁰ Reimbursement for services related to obesity management is typically poor. A study of a tertiary weight management program found a reimbursement rate of only 11%, requiring the program to attain significant external support for long-term financial viability.⁴¹ However, wide variation in reimbursement among programs was noted (0%–100%). Since 2005, several successful multicomponent multidisciplinary programs have been developed,^{42–47} prompting the United States Preventive Services Task Force (USPSTF) to release updated recommendations regarding screening and treatment for obesity in children and adolescents.⁴⁸ The USPSTF has found adequate evidence that multicomponent behavioral interventions of moderate (26–75 hours of treatment contact) to high (>75 hours) intensity for obese children and adolescents aged 6 years and older can yield short-term (up to 12 months) improvements in weight status. Lower intensity interventions (>25 hours) that are possibly feasible within the primary care setting have not demonstrated a significant, consistent benefit with regard to BMI. These data support the recommendations for a staged treatment approach as well as a higher level of treatment in the management of childhood obesity. Additional therapies, such as very-low-calorie diets, meal replacements, medications, or bariatric surgery, should only be used by a protocol-driven, tertiary weight management team with expertise in childhood obesity and should include continued diet and activity counseling.¹⁴

Weight loss goals vary with the age of the patient and the stage of treatment. The goals for stages 1 and 2 of treatment are typically for maintenance of weight with increasing growth, resulting in a decline in BMI and BMI percentile. As the level of intervention increases, expected weight loss should not occur at levels faster than those prescribed for each level of intervention. From 2 to 18 years of age, maintenance of weight velocity or absolute weight maintenance may be an appropriate goal at the initial levels of intervention. For children 2–5 years of age, weight loss up to 1 lb per month may be acceptable if BMI is >21–22 kg/m². For those 6 years of age or greater, weight loss of up to 2 lb per week may be acceptable.⁸

Components of a Multidisciplinary Team

The basic components of any weight loss program involve both assessment and intervention. The initial assessment should include identification of weight-related comorbidities, diet history, physical activity, and any significant behavioral components. After the assessment

is complete, intervention and monitoring can begin. The depth in which these areas are covered varies with the levels of treatment. Accordingly, as the level of intervention increases, the degree of specialization required for that level of intervention increases. Stage 1 and 2 treatments can typically be handled in the primary care setting. Along the spectrum from stages 2 to 3, varying degrees of increased intervention and specialization are required and may be tailored to the patient, given the availability of resources within the community. With increasing intensity of treatment, specialized practitioners are needed, such as dietitians, counselors, and exercise specialists. For that reason, treatment in these stages usually occurs in specialized centers or within larger multidisciplinary or specialty practices. Regardless of the specific location, once stage 3 treatment is initiated, there should be a specialized evaluation by a registered dietitian and an exercise specialist. In a tertiary care setting, or stage 4 intervention, evaluations are largely protocol driven. The assessment of each domain is performed by professionals specifically trained in each area: registered dietitian for diet, exercise specialist for physical activity, and behavioral counselor for behavior modification. However, this separation of duties should not occur at the cost of a holistic approach to treatment, and the individual treatment plans should converge into one coherent plan. It is encouraged that everyone on the team use behavioral tools such as motivational interviewing and behavioral modification. In an ideal setting, families would meet with various specialties jointly (ie, dietitian, exercise specialist, counselor, physician) rather than sequentially.

Role of the Dietitian Within a Multidisciplinary Team

For intense obesity treatment, such as stages 3 or 4, a multidisciplinary approach is essential. The multidisciplinary team is often made up of a medical provider (physician, nurse practitioner, physician's assistant, nurse), nutritionist (dietitian), counselor (psychologist, licensed clinical social worker), and exercise specialist (physical therapist, exercise physiologist). Table 3 describes the different components of a multidisciplinary team and their typical roles. Children and their families may be seen by each provider individually (on different days or sequentially on the same day) or as a team; this may be done in a group setting with other families, individually, or as a combination of visits (ie, individual assessment with group treatment). Communication and collaboration within a multidisciplinary team are necessities; the dietitian not only must provide a focused assessment of the child's and family's nutrition status but must interpret it in light of other providers' assessments. Often, nutrition problems are identified during the initial assessment. It may not be appropriate to address several at once, however, as there may be more urgent medical or psychosocial issues to address. An example from our program (a tertiary care multidisciplinary team with a physician, dietitian, family counselor, and physical therapist/exercise specialist) is a 9-year-old child who eats fast food most nights of the week. Although this is likely contributing to his weight gain, the team believed that addressing potentially serious medical (sleep apnea) and psychosocial (depression) issues was of greater importance initially. Arriving at joint treatment plans in this scenario required clear communication on the part of the team.

For teams that use family-centered communication and counseling methods, such as motivational interviewing, collaborative assessment and treatment are important. Motivational interviewing can often result in providers guiding families in their treatment as opposed to the more traditional method of prescribing a series of diets and exercises. This may be difficult for the dietitian on a multidisciplinary team, because children and their families may choose to focus on an area that the dietitian considers less problematic. A common example in our program is sweetened beverage intake. Many families have been told repeatedly to remove these high-calorie drinks from their diets yet have chosen not to do so. When under the care of a multidisciplinary team using motivational interviewing, the

child and family may chose to focus on increasing physical activity, decreasing sedentary activity, or including breakfast in their daily diets. This can be frustrating for a dietitian, because sugar-sweetened beverages add a significant number of empty calories to a child's diet, and removing these beverages may dramatically decrease energy intake; however, the chosen behavior change is focused elsewhere. Initiating behavior change according to the readiness and confidence of the family is imperative for success. Again, trust and collaboration with team members, as well as with the family, are important to maintain a strong team approach and a respectful and positive relationship with families.

Working within a multidisciplinary team can provide dietitians with greater insight into the child and the family, including psychosocial stressors and medical issues, both of which may affect the direction and effectiveness of treatment. This is found most often in our program during return visits when families have made little progress in treatment and providers are helping the families determine the causes. Counselors may provide greater insight into tension among family members or assess the impact of other psychosocial stressors on the family. In more severe cases, counselors may identify problematic mental health issues affecting treatment and provide referral for care. The nutrition assessment may therefore be focused more on family or behavioral issues, as detailed in Table 1, to best integrate nutrition within a multidisciplinary assessment. An example is fast food intake: this may be affected by childcare situations, financial stressors, and daily schedules. This combined assessment provides an opportunity for holistic assessment of family function and therefore a more targeted intervention. Normally, addressing fast food intake may entail educating clients about the nutrition content of these meals, devising alternative meal plans, and setting goals for change. A multidisciplinary assessment may expand interventions to include addressing financial concerns, assisting in time management, or providing referrals to other resources to assist the family. Additional areas of focus for the dietitian that affect energy intake and nutrition status may include eating pace, meal location, family meals, food security, and disordered eating behaviors. The complexity of these areas involving the dynamics of the family can be more easily identified and addressed within the multidisciplinary team.

Case Study

We present the case of a 16-year-old male with a seizure disorder who presented with his mother to the Brenner FIT (Families In Training) Program, a multidisciplinary weight management clinic at Brenner Children's Hospital (Winston-Salem, NC). Because of his medications, he has slow speech, giving him the appearance of a developmental delay. He weighed 367 lb with a BMI of 58.8 kg/m² and suffered from sleep apnea. He had failed individual nutrition counseling in the past, accomplishing only minimal weight loss. In Brenner FIT, he attempted to track sedentary activity time and intake of sweetened beverages and add short "fit breaks" during TV commercials to increase his physical activity. For several months, he made very little progress, particularly with tracking and physical activity. At this point, the team decided to engage him primarily through motivational interviewing, allowing him to chose what behaviors he wanted to work on, and guided him in setting realistic goals. His mother was advised to transition from tracking his progress to encouraging the behaviors he chose to change. He chose to give up his normal cereal bowl (which was quite large) and switch to a smaller one but insisted on eating meals in front of the television. Although this seemed to be an insignificant change, he was successful in the switch. For the first 4 months, this was one of the few goals he achieved, but it resulted in a 9-lb weight loss. His mother rewarded him for this achievement, and the Brenner FIT team recognized his success by giving him a water bottle. He then set additional goals of increasing intensity, including switching to sugar-free beverages and tracking his starch intake. The patient gained confidence in his ability to change the health

behaviors he was motivated to address and was rewarded by his physical changes and weight loss. He lost 40 lb over a year of treatment and went on to lose a total of 70 lb, with significant improvement in his health parameters.

Conclusion

Success in treatment of childhood obesity requires a multifaceted approach to nutrition patterns and physical activity, with particular attention paid to the family and other environmental factors that may significantly affect outcomes. Nutrition assessments should focus on key areas linked to obesity, taken in the context of the family. Recent expert recommendations for the assessment and treatment of pediatric obesity provide a framework that features multidisciplinary teams. Working in teams modifies the assessment and treatment provided by dietitians and may provide new and unique opportunities for intervention. As research continues to unravel the complexities of management, dietitians and other team members will continue to play an integral role in the management of childhood obesity.

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Table 1**Framework for Dietary History of an Obese Child**

Restaurants and fast food	Meals eaten away from home increase portion size and total energy intake and are of poorer nutrient quality. ⁴⁸⁻⁵³ Increased frequency associated with increased body mass index. ^{54,55}
Sweetened beverages	Increasing intake linked to increased prevalence of obesity in children ⁵⁶⁻⁵⁸ but relationship not clear. ⁵⁹ Consider fruit juice a sweetened beverage.
Portion sizes	Larger portions lead to increased energy intake. ^{60,61}
Energy-dense foods	No clear evidence of link between energy density of foods and obesity in children but link has been established in adults. ⁷
Fruits and vegetables	May displace more energy-dense foods and increase satiety. Some evidence of increasing obesity with decreased consumption. ⁶²⁻⁶⁴
Breakfast	Skipping breakfast associated with increasing obesity in children despite perceived decrease in daily caloric intake ⁶⁵⁻⁶⁹ and has adverse effects on school performance. ⁷⁰⁻⁷²
Meal frequency and snacking	Link of increased snacking to obesity not clear in children, but frequent snacking may result in increased energy intake and poorer quality of diet.

Table 2**Stages of Obesity Treatment**

Stage	Location of Care	Staff and Skills	Nutrition Goals
1: Prevention	Primary care office	Primary care physician or trained provider	Encouragement to consume >5 servings fruit or vegetables daily, minimize sugared beverage consumption, eat breakfast every day, eat more meals at home and as a family, avoid overly strict eating regimens
2: Structured weight management	Primary care office	Primary care physician/secondary provider; dietitian; additional training (behavioral counseling, parenting skills, nutrition)	Stage 1 plus structured meals and snacks, behavior goal targets
3: Comprehensive multidisciplinary intervention	Primary care office coordination; pediatric weight management center	Multidisciplinary team with expertise in childhood obesity; primary care-based program with counselor, dietitian, and use of outside activity program	Structured diet and physical activity to provide for negative energy balance, structured behavioral modification program incorporating monitoring and goal setting, modification of home environment
4: Tertiary care intervention	Pediatric weight management center; residential program; access to subspecialty care	Multidisciplinary team with expertise in childhood obesity, including experienced physician/secondary provider to assess comorbidities	Per established protocol: various modalities including restrictive diets, medications, or bariatric surgery

Table 3**Multidisciplinary Scope of Treatment for Obesity**

Provider	Roles in Multidisciplinary Setting
Registered dietitian	Assess dietary patterns and preferences Develop and implement nutrition goals with formal monitoring
Behavioral counselor	Counsel patient and family as needed Structure a behavioral program Identify behavioral issues interfering with treatment
Exercise specialist	Assess musculoskeletal and physical activity Develop and implement rehabilitation and activity plan Assess and manage comorbidities; coordinate subspecialty care
Physician	Coordinate multidisciplinary team