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## A SUPPLEMENT TO PEDIATRICS

### Pediatric Obesity: Practical Applications and Strategies From Primary to Tertiary Care

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### Pediatric Obesity: Practical Applications and Strategies From Primary to Tertiary Care

*Sandra G. Hassink, MD, Karen Seaver Hill, and Stacy Biddinger, MPA,  
Supplement Editors*

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**C O N T E N T S**

- S45 **Introduction: Pediatric Obesity and the Role of Children's Hospitals**  
Sandra G. Hassink et al
- S47 **Identification and Treatment of Obesity as a Standard of Care for All Patients in Children's Hospitals** Karen L. Young et al
- S51 **Assessment of Obese Children and Adolescents: A Survey of Pediatric Obesity-Management Programs** Joey C. Eisenmann
- S59 **Patient Engagement and Attrition in Pediatric Obesity Clinics and Programs: Results and Recommendations** Sarah Hampl et al
- S65 **Developing Criteria for Pediatric/Adolescent Bariatric Surgery Programs**  
Marc Michalsky et al
- S71 **Building Capacity for Childhood Obesity Prevention and Treatment in the Medical Community: Call to Action** Matthew Haemer et al
- S78 **Payment for Obesity Services: Examples and Recommendations for Stage 3 Comprehensive Multidisciplinary Intervention Programs for Children and Adolescents** Wendy Slusser et al
- S86 **Perspectives on Obesity Programs at Children's Hospitals: Insights From Senior Program Administrators** Ihuoma Eneli et al





# Introduction: Pediatric Obesity and the Role of Children's Hospitals

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## KEY WORDS

childhood obesity, obesity

## ABBREVIATION

NACHRI—National Association of Children's Hospitals and Related Institutions

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The National Center for Health Statistics estimates that 16.9% of children and adolescents aged 2 to 19 years are obese.<sup>1</sup> These most recent data follow a trend in increased prevalence of overweight or obesity that has spanned the last 30 years.<sup>1</sup> The public's perception of the gravity of childhood obesity as a health threat mirrors national prevalence data. In a recent poll, 81% of respondents identified childhood obesity as a serious problem, and approximately two-thirds agreed that it is getting worse.<sup>2</sup>

An array of private and public-sector organizations are responding to what is often referred to as the "obesity epidemic," chief among them is the health industry. Children's hospitals find themselves on the frontlines of obesity diagnosis, treatment, and prevention; 68% of them have indicated that they provide services through an obesity clinic or weight-management program.<sup>3</sup> The 2007 Survey of US Pediatric Obesity Programs at Children's Hospitals revealed a challenging environment for hospitals that want to meet the overwhelming demands of an ever-increasing population of obese children in their communities. Stability and sustainability of hospital-based programs are hindered by lack of reimbursement and reliance on grant funding. There is a need for mechanisms to drive consistency in services provided, program outcome evaluation, and avenues to build support and partnerships among colleagues in the field.<sup>4</sup> Understanding the need to advance and secure obesity care for children, the National Association of Children's Hospitals and Related Institutions (NACHRI) Board of Trustees approved childhood obesity as 1 of the association's 3 child health priorities.

In September 2008, the NACHRI invited its member institutions to apply to join a childhood obesity workgroup, Focus on a Fitter Future, funded by the Mattel Children's Foundation. Criteria for inclusion were based on diversity in institutional structure, regional representation, multidisciplinary clinical expertise and a range of weight-management program sophistication, longevity, and size. Forty-seven children's hospitals applied, and 15 were selected by the NACHRI to assemble a multidisciplinary team to participate in Focus on a Fitter Future. Once assembled, the teams represented pediatric specialties that mirror the multidisciplinary treatment response to obesity, including dietary and nutrition, endocrinology, exercise physiology, gastroenterology, kinesiology, nephrology, nursing, general pediatrics, adolescent medicine, physical therapy, psychology, social work, surgery, and program/clinic administration.

The workgroup's charge was to study clinical pediatric weight-management programs and build consensus on practice improvement. Once convened, the group's reach expanded beyond practice-change opportunities because of the organic, participant-led design of the NACHRI's Focus group process. The expanded charge reflected the

interests of the group and the multifaceted complexities of how childhood obesity affects children's hospitals. Participants worked to develop guidance, new understanding, and consensus for a coordinated medical approach to childhood obesity. Each article in this supplement to *Pediatrics* represents the collaborative work and thinking of a Focus on a Fitter Future subcommittee. The group organized according to interest area into 7 subcommittees, and the articles in this supplement represent each subcommittee's work: healthy hospital environment; assessment in pediatric obesity-management programs; long-term patient care and family engagement; bariatric surgery; outreach to

primary care providers; reimbursement and payment; and sustainability and return on investment. The methods section in each article indicates if the authors collected data and/or opinion from sources outside of the 15 participating hospitals.

Financial support for this supplement was provided by the NACHRI, Alfred I. duPont Hospital for Children, Arkansas Children's Hospital, Children's Hospital Los Angeles, Children's Hospital of Wisconsin, Children's Medical Center Dallas, Children's Mercy Hospitals and Clinics, Doernbecher Children's Hospital at the Oregon Health & Science University, Duke University Hospital and Health System, Helen DeVos Children's Hospital, Mattel Children's Hospital,

University of California Los Angeles, Mt Washington Pediatric Hospital, Inc, Nationwide Children's Hospital, Seattle Children's, Children's Hospital (Denver), and University of Virginia Children's Hospital.

The readership of *Pediatrics* is diverse, and so too is the topic of childhood obesity and the issues dealt with in the following articles. The practical applications and strategies found in this supplement to *Pediatrics* are intended for any clinician with an interest in the topic—from a practitioner who wants to start an obesity clinic or program to one who simply wants to be better prepared for the overweight and obese children seen in his or her general pediatrics practice.

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# Identification and Treatment of Obesity as a Standard of Care for All Patients in Children's Hospitals

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## KEY WORDS

pediatric obesity, children, adolescents, obesity treatment, hospital environment, children's hospitals

## ABBREVIATION

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## abstract

Obese children and adolescents have unique needs for specialized medical equipment while hospitalized and might require special diets and physical activity options as part of their medical treatment. It is important that patients with a diagnosis of obesity be identified on admission so that appropriate equipment and resources can be provided. We examined what components a healthy hospital environment should include and sought to determine if children's hospitals provide a healthy hospital environment that offers these components. In addition, we sought to determine if children's hospitals have policies in place to identify children with obesity so that appropriate resources and services can be offered to treat that diagnosis. We surveyed National Association of Children's Hospitals and Related Institutions member hospitals via a Web-based questionnaire and found that the majority of them do not have policies in place to identify patients with obesity. We did find that the majority of hospitals reported innovative programs or services to provide a healthy hospital environment for their patients, visitors, and staff but acknowledged limitations in providing some services. Specifically, children's hospitals can and should improve on their identification and management of obese pediatric patients. *Pediatrics* 2011;128:S47–S50

Obesity is defined as a BMI at  $\geq 95$ th percentile for age/gender according to Centers for Disease Control and Prevention 2000 growth charts for patients who are aged 2 years or older. Weight-for-length growth charts should be used for children younger than 2 years.<sup>1</sup> Obese children and adolescents are at risk for developing significant medical conditions and complications, many of which might require inpatient treatment. They might also have unique needs for specialized medical equipment that is not normally supplied for patients admitted to children's hospitals. Although identification and treatment of obesity is considered important, few children's hospitals address this issue in a consistent fashion, even in ambulatory clinics. In addition, these children might require special diets and physical activity options as a part of their medical treatment; therefore, it is important that obese patients be identified on admission so that appropriate equipment and resources can be used and the patients' diagnoses of obesity can be addressed. In addition, because patients who have been diagnosed with obesity have greater resource use,<sup>2</sup> there is a financial need to identify these patients early in an effort to contain costs, a medical need to help them with their weight to decrease their risk for comorbid conditions, and a safety need to assess risk and identify appropriate equipment. We sought to determine if pediatric hospitals are routinely identifying patients with obesity as a diagnosis and, if so, if physicians and hospitals are addressing pediatric obesity.

## METHODS

A survey designed by the Healthy Hospital Environment Subcommittee of FOCUS on a Fitter Future was sent to 47 National Association of Children's Hospitals and Related Institutions (NACHRI) member hospitals through a

Web-based questionnaire service. It was received by the medical director of the obesity clinic at each hospital, who was asked to complete it or send it to the person most knowledgeable about their program to complete it. The survey addressed components of a healthy hospital environment that included physical activity, food service options, and wellness programs, in addition to information about policies that identify children with obesity and whether appropriate resources are in place to treat or manage pediatric obesity. The survey was intended to determine if appropriate obesity screening and intervention were in place in children's hospitals and included open-ended questions to determine what innovative practices were occurring in these hospitals. A total of 19 of 47 (40%) of the children's hospitals that were polled responded to the survey. Survey results were compiled by the NACHRI and interpreted by the subcommittee members. The responses were used to help determine current practices regarding pediatric obesity in children's hospitals. Innovative practices reported by these hospitals in the survey, expert guidelines previously published, and consensus by the obesity expert committee members were compiled into best practices and guidelines that might be used by children's hospitals and other medical facilities.

## RESULTS

In September 2009, 19 NACHRI member hospitals responded to a survey regarding the healthy hospital environment. Only 37% of the respondents reported that they had a policy for identifying patients who are overweight or obese or a policy to treat those patients once they are identified. Thus, 63% of the responding children's hospitals did not have a policy in place to identify or treat obese pediatric patients once identified. Weight-

reduction support groups for patients were offered at 2 hospitals (2 of 15 [13%]). Several hospitals reported a mechanism for identification of overweight or obese patients that triggered a referral to the weight-management program.

The majority of hospitals (84%) reported that their hospital has taken steps to make it a healthier hospital environment, including displaying healthy lifestyle messages throughout the hospital, having healthy foods available at all times, providing easy access to stairs, and providing walking paths around the hospital.

Children's hospitals are also making strides to increase their patients' physical activity and decrease television and video-game time when appropriate during hospitalization or outpatient visits to the hospital. Examples of this effort include access to exercise equipment, outdoor green space and playgrounds, rooftop basketball courts, teen lounges with pool tables, activity rooms, fitness classes offered on-site, and activities planned by child life specialists or recreation therapists (eg, scavenger hunts, community outings).

In the survey, hospitals were asked about the biggest barriers or challenges in promoting physical activity and making hospitals healthier from a nutrition perspective; their responses are listed in Table 1.

**TABLE 1** Barriers to Health Promotion in Children's Hospitals (*N* = 18)

	Barrier	No. (%) of Hospitals
Physical activity	Financial	14 (78)
	Not a priority	5 (28)
	Space	13 (72)
	Other	4 (22)
Nutrition	Financial	10 (59)
	Not a priority	7 (41)
	Space	2 (20)
	Other	5 (29)

## DISCUSSION

Children's hospitals need to work to improve the identification of overweight and obese pediatric patients admitted to their hospitals to provide appropriate services. Although only 40% of the 47 hospitals surveyed responded, we believe that it is likely representative that only 37% of respondents reported that they have a policy in place for identifying overweight or obese patients. Therefore, the majority (63% of children's hospitals) have no policy to either identify or treat overweight or obese children in their hospitals.

Hospitals have a financial interest in identifying obese or overweight children because these children have longer lengths of stay. The mean length of stay in the hospital for all pediatric patient subgroups is 3.9 days.<sup>3</sup> The extra cost per hospitalized obese pediatric patient is approximately \$1200 and a half-day longer stay in the hospital as a result of complications caused by obesity.<sup>4</sup>

Having hospitals adopt standard BMI-recording practices is an imperative first step in addressing childhood obesity. With the increased use of electronic medical records, BMI for children could be automatically calculated and categorized on the basis of percentile once height and weight are entered. Patients whose BMI or weight/length is at the  $\geq 95$ th percentile should be identified as obese, and a standard care plan for the hospitalized obese patient should be initiated by appropriate hospital personnel.

Some pediatric patients and their families do not seek weight-management treatment on their own; an inpatient admission or outpatient visit could provide an opportunity for education and resources for obesity treatment. Hospitals can help to encourage treatment by proactively screening all pa-

tients identified as overweight or obese for readiness to change.

The obesity experts on the Healthy Hospital Subcommittee reached consensus on management of obese pediatric patients in children's hospitals by using the results of the survey of NACHRI hospitals and extrapolating from research and the 2007 expert committee outpatient guidelines. We recommend the following guidelines for these patients.

### Inpatient

After a patient has been identified as being overweight or obese, notification should be sent to the medical team and the clinical dietitian staff.

### Diet

The patient's diet order should be specified as a "healthy options" or "healthy choice" menu, which will offer healthier, lower fat/sugar/calorie foods. The medical team, in consultation with the registered dietitian, will choose a daily caloric intake level appropriate for each individual patient. The inpatient dietary service, using appropriate resources, will have or develop guidelines for this menu.

### Factors Related to Addressing Obesity During Admission

Consider the appropriateness of addressing the issue of obesity during the hospitalization. Factors to consider include the patient's length of stay, reason for admission, the severity of obesity, readiness to change, and likelihood of family outpatient follow-up with the primary care physician.

### Assessment and Treatment

If it is deemed appropriate to move forward with identifying risk factors related to obesity during the hospitalization, appropriate additional history, physical examination, and ancillary testing should be initiated. Assess underlying causes of abnormal weight

gain, discuss family history that can place the child at increased risk of comorbidities, assess for psychological issues that might need urgent attention, and uncover medical problems related to obesity that have not yet been recognized but can help the inpatient team stabilize the ill obese patient. Nutritional, behavioral, and physical activity changes can be started for both the patient and family, depending on their identified needs. Screening laboratory tests, as referenced in the 2007 Expert Committee recommendations regarding the prevention, assessment, and treatment of child and adolescent overweight and obesity<sup>1</sup> should include, but are not limited to:

- a fasting lipid profile for patients with a BMI at the 85th to 94th percentile;
- alanine transaminase and aspartate transaminase measurement, fasting lipid profile, and blood glucose measurement for patients with a BMI at the  $>95$ th percentile (or BMI at the 85th–94th percentile if they have risk factors such as high blood pressure or family history of cardiac disease or diabetes); and
- hemoglobin A1c measurement (a new recommendation).<sup>5</sup>

### Education and Follow-up

For patients and families who are interested in receiving education and/or further information, a formal visit with a dietitian is recommended. The dietitian can provide basic nutrition information in the inpatient setting and resources available for outpatient counseling and treatment. Other comorbidities that are identified might require referral to specialists or further workup.

### Outpatient

All children should have their height and weight measured and BMI calculated at the first visit and at least annually<sup>6</sup> for all primary care and spe-

cialty clinic visits. The BMI percentile and category (underweight, normal or healthy weight, overweight, or obese) should be determined and the family informed of this information, if appropriate. If the BMI category is in the overweight or obese category, steps should be taken to screen and initiate treatment/referral after assessing for readiness to change.

### Primary Care Clinic

Hospital-based primary care clinics should check children's BMI annually as part of their well-child visits and follow the BMI percentile trend over time to catch abnormal growth.

### Specialty Clinics

The priority in most specialty clinics is to take care of the primary reason for the visit. If the child is either overweight or obese, alerting the primary care physician is part of normal documentation and communication. Certain specialty clinics (eg, medical home, hypertension, sleep clinic, and others) might manage overweight and obesity as part of their care.

### CONCLUSIONS

On the basis of the 2007 Expert Committee recommendations,<sup>2</sup> to screen with BMI all children over 2 years, and all chil-

dren younger than 2 years with weight/length, and the US Preventive Task Force recommendations to use BMI to screen all children older than 6 years,<sup>7</sup> consensus of national obesity experts<sup>8</sup> in the NACHRI FOCUS group was reached to submit the following key recommendation: identification of obesity and treatment (or referral for treatment) should occur in all inpatient and outpatient settings in children's hospitals.

### LIMITATIONS AND FURTHER RECOMMENDATIONS

There were a few limitations to this study. The survey did not specifically include questions related to ambulatory clinics based at children's hospitals. The number of hospitals that responded was small. Many of the questions were intentionally open-ended to invite innovative ideas. Research is needed in this area to develop guidelines for the management of obese pediatric inpatients.

Promotion of healthy, active ideas for all patients/family members who visit a children's hospital provides a positive message. The following are more ideas on creating a healthy office or hospital environment<sup>9</sup>:

- Promote physical activity and healthy eating through health-

related posters and educational material readily available in waiting rooms and examination rooms.

- Display books, puzzles, and activity sheets that support healthy living to entertain children in waiting rooms and examination rooms.
- Use the 5-2-1-0 message (daily: 5 servings of fruit and vegetables, <2 hours of screen time, at least 1 hour of physical activity, and no sugar-sweetened beverages).
- Provide and promote seasonal activities and healthy eating during holidays.
- Feature healthy foods and a variety of fruits and vegetables in the cafeteria, vending machines, and other hospital food sources.
- Use activity-related rewards, and encourage nonfood items to be used as rewards.

### ACKNOWLEDGMENTS

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# Assessment of Obese Children and Adolescents: A Survey of Pediatric Obesity-Management Programs

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**KEY WORDS**

children, overweight, clinical evaluation

**ABBREVIATIONS**

NACHRI—National Association of Children's Hospital and Related Institutions

BP—blood pressure

CDC—Centers for Disease Control and Prevention

BIA—bioelectrical impedance analysis

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## abstract

This article provides descriptive information on the assessments conducted in stage 3 or 4 pediatric obesity-management programs associated with National Association of Children's Hospital and Related Institutions hospitals enrolled in FOCUS on a Fitter Future. Eighteen institutions completed a survey that considered the following assessments: patient/family medical history; physical examination; blood pressure; body size and composition; blood chemistry; aerobic fitness; resting metabolic rate; muscle strength and flexibility; gross motor function; spirometry; sedentary behavior and physical activity; dietary behavior and nutrition; and psychological assessments. Frequency distributions were determined for each question. Overall, the results indicate that most programs that participated in this survey were following 2007 Expert Committee assessment recommendations; however, a variety of measurement tools were used. The variation in assessment tools, protocols, etc is partially caused by the program diversity dictated by personnel, both in terms of number and duties. It also shows the challenges in standardizing methodologies across clinics if we hope to establish a national registry for pediatric obesity clinics. In addition to providing a better understanding of the current assessment practices in pediatric obesity-management programs, the results provided herein should assist other clinics/hospitals that are developing pediatric obesity programs. *Pediatrics* 2011;128:S51–S58

In 1998, the Maternal and Child Health Bureau (Health Resources and Services Administration, Department of Health and Human Services) convened a committee of pediatric obesity experts to develop recommendations for the evaluation and treatment of childhood obesity.<sup>1</sup> These recommendations were noted to be for primary care physicians, nurse practitioners, and nutritionists to guide them in the evaluation and treatment of overweight children and adolescents. In 2007, the Expert Committee recommendations<sup>2</sup> regarding the prevention, assessment, and treatment of child and adolescent overweight and obesity described how the chronic care model encompasses the necessary components for a health care system to be effective in caring for childhood obesity. One critical component within the chronic care model is the use of practice guidelines in each of the areas of prevention, assessment, and treatment. In terms of assessment, 2 major categories—medical and behavioral assessment—were considered, and it was emphasized that accurate and appropriate assessment is important.<sup>3</sup> The article was written to provide a comprehensive approach to assessment based on available evidence to support the assessment of key constructs.

Following the 1998 Expert Committee article, Barlow et al<sup>4</sup> published the results of a survey of 940 providers (203 pediatricians, 293 pediatric nurse practitioners, and 444 dieticians), which examined the attitudes and practices related to the recommendations. More specifically, information was provided on the attitudes toward, barriers to, perceived skill level in, and methods used for the identification of the degree of overweight and associated medical conditions outlined in the 1998 recommendations. It was found that, in general, the medical evaluation

of the obese patient fell short of the recommendations. Given that their survey (1) targeted primary care offices and personnel and (2) did not provide information about specific measurement protocols or the assessment of physical activity and dietary behaviors and (3) that there are now updated recommendations for assessment, it is important to examine how pediatric obesity-management programs are following the 2007 recommendations and what specific assessment practices occur in these programs. The aim of this article is to provide descriptive information on the assessments conducted in stage 3 or 4 pediatric obesity-management programs associated with National Association of Children's Hospital and Related Institutions (NACHRI) FOCUS on a Fitter Future hospitals. The staged approach to child obesity treatment was outlined in the 2007 Expert Committee recommendations. Stage 3 and 4 programs are considered comprehensive, multidisciplinary interventions conducted in a weight-management specialty clinic. Stage 4 programs often treat severely obese patients and involve medications, meal replacements, very low calorie diets, and/or bariatric surgery. Stage 1 and 2 programs are conducted by primary care providers; stage 1 includes monthly visits that include dietary and physical activity counseling, whereas stage 2 includes more specific behavioral counseling by a health care professional with specific training in weight management (eg, dietician).

## METHODS

### Survey Development and Administration

The Childhood Obesity Assessment Survey was developed by the subcommittee on Assessment in Pediatric Obesity Programs from November 2008 through April 2009. Survey develop-

ment centered around capturing information on the assessment of key variables in 4 domains (medical, physical activity, nutrition, and psychological) related to instrumentation, personnel, protocol, and timing of the measurements (baseline, monthly, etc). On May 1, 2009, the survey was fielded to 47 NACHRI member hospitals (both hospitals that participated [ $n = 15$ ] and did not participate [ $n = 31$ ] in the FOCUS group) via the NACHRI survey center. Twenty-eight of 47 (60%) institutions completed the hospital profile (15 of 15 [100%] NACHRI FOCUS group members and 12 of 32 [38%] others). If the hospital administered a pediatric obesity-management program at different stages as defined in the Expert Committee recommendations, then they completed a survey for each stage. The sample size for each stage was 9 (stage 1), 13 (stage 2), 16 (stage 3), and 6 (stage 4). For the purpose of this article, only data from stage 3 and 4 clinics were analyzed ( $n = 18$ ). The total number of hospitals that offered stage 3 or 4 programs was not determined; thus, the response rate for this level of programs cannot be determined. Frequency distributions for each question are based on this sample size.

### Components of the Survey

The following assessments were considered in the survey: patient/family medical history; physical examination; blood pressure (BP); body size and composition; blood chemistry; aerobic fitness; resting metabolic rate; muscle strength and flexibility; gross motor function; spirometry; sedentary behavior and physical activity; dietary behavior and nutrition; and psychological assessments. In addition, respondents were asked about program description and personnel and were able to add comments after each section to clarify or expand on various responses.

**Statistical Analysis**

Because the intent of this survey was to provide descriptive information on the current assessment practices in pediatric obesity-management programs, frequency distributions for each question were determined by using SPSS 17.0 (SPSS Inc, Chicago, IL).

**RESULTS AND DISCUSSION**

In pediatric obesity, assessment of clinical variables hinges on the key feature used in the diagnosis of obesity (excess fat) and its associated etiologic risk factors and medical consequences. As stated in the Expert Committee report, the primary goal of obesity treatment is “improvement of long-term physical health through permanent healthy lifestyle habits.”<sup>2</sup> If this is the goal and treatment programs are developed around accomplishing this goal, then reliable and valid assessments are necessary to determine if this goal is met. However, given the time demands of clinical practice, feasibility also becomes an important consideration in choosing assessments. A summary of key survey results is shown in Table 1 and discussed below according to various components of the survey (indicated by the subheading).

**Body Size and Composition**

BMI is the currently recommended screening tool for child obesity,<sup>3,5</sup> and as expected, all (100%) programs that participated in this survey measured standing height and weight and calculated BMI. A variety of personnel are responsible, but most often it is a nurse or medical assistant who takes the measurements. It should be noted that the proper methodology for measuring height and weight are important for accurate measurements, including equipment for and technical aspects of measurement. In this sur-

**TABLE 1** Summary of Survey Results on Assessments in Pediatric Obesity Clinics

	%
Body size and composition	
Assess height, weight, and calculate BMI	100
Measure height and weight on hard (noncarpeted) surface	83
Assess body mass with patient in gown (eg, nude body mass)	56
Percentiles derived from CDC BMI growth chart	100
Utilize International Obesity Task Force cut points	0
Assess body fatness/body composition	56
Assess waist circumference	83
Provide anthropometric training	78
Key etiologic risk factors	
Determine parental weight	100
Assess physical activity	100
Assess screen time	100
Assess diet/nutrition	100
Nontraditional etiologic risk factors	
Birth weight	94
Maternal gestational diabetes	94
Breastfeeding	94
Pregavid weight and pregnancy weight gain	17
Aspects of comorbidities	
Physical examination	100
Family history	100
BP	100
Blood cholesterol	100
Triglycerides	100
Glucose and insulin	100
Liver enzymes	94
Other physiological measures	
Resting metabolic rate	17
Aerobic fitness	44
Muscle strength	67
Gross motor function	56
Flexibility	56
Spirometry	27
Psychological	
Depression	100
Anxiety	100
Sense of competence	100
Family dynamics	94
Self-esteem	100
Overall behavior and emotion	94
Eating disorders	94
Quality of life	56
Readiness for change	100

vey, a variety of instrument models were used, and most (83%) programs measured the patient on tile or a hard surface, but not all of them did so (eg, some measured the patient on a carpet). In addition, measured weight can

be affected by clothing. It was reported that approximately half of the programs measured body mass while the patient was in a gown. However, there are feasibility issues with having the patient wear a gown (eg, time, comfort of the patient, etc). If weight is measured in typical clothing, clinicians should ask about objects in the patient’s pockets and ask the patient to remove bulky clothing (jackets, sweaters, etc), if appropriate. Once BMI is calculated, it is important to evaluate appropriately. The results indicate that BMI is expressed several ways, including raw BMI (kg/m<sup>2</sup>).

The Expert Committee<sup>3</sup> recommends deriving percentiles on the basis of the Centers for Disease Control and Prevention (CDC) growth charts ([www.cdc.gov/growthcharts](http://www.cdc.gov/growthcharts)). All (100%) the programs we surveyed used this approach. To eliminate plotting errors directly on the CDC growth chart, it is encouraged to use software programs or Web sites that calculate the specific percentiles. In compliance with the Expert Committee recommendations, none of the programs we surveyed used the International Obesity Task Force cut points.<sup>6</sup>

Because BMI is considered a proxy for adiposity, additional measures of adiposity can be considered. In this survey, approximately half of the programs assessed body fatness, and most programs (56%) assessed waist circumference as a surrogate of abdominal fatness. Body fatness can be determined by a variety of techniques,<sup>7,8</sup> and several methods (including skinfold-thickness measurements, bioelectrical impedance analysis [BIA], and dual-energy radiograph absorptiometry) were used by individual programs. The Expert Committee did not recommend the routine use of skinfold-thickness measurements in the clinical assessment of pediatric obesity. The basis for this recommen-

dation was threefold: (1) lack of readily available reference data on skinfold thicknesses; (2) concern for measurement error; and (3) lack of criteria/cut points. It should also be noted that it is difficult to locate the appropriate skinfold site in obese patients, and this procedure introduces a level of psychological discomfort for the patient.

The other method of assessing body fatness that was more common among the programs surveyed is BIA. One important issue related to BIA is the specific device. There are several BIA devices available that range in functionality (arm-to-arm; foot-to-foot; tetrapolar) and price.<sup>9</sup> It is important to carefully choose among these devices, because the validity of some of them is unknown. Another important consideration is subject preparation, because several factors are known to influence results, including hydration status and previous exercise. Related to both skinfold thickness and BIA is the prediction equation used to generate estimated percentage body fat. There are several prediction equations for both methods, and there is no consensus on which prediction equation is most suitable for obese children or adolescents. Furthermore, some BIA devices do not provide the prediction equation housed within the unit. Finally, to reiterate 2 of the concerns of the Expert Committee regarding reference standards and clinical cut points, it is important to consider what is done with these values once they have been obtained, because there are no widely accepted reference standards or clinical cut points for skinfold thicknesses or percentage body fat. In addition, when examining change in these values, it is important to recognize that the measurement error may be 2% to 5%; thus, observed changes may be within measurement error. Further re-

search is warranted to develop clinically appropriate methodologies and evaluation of body fatness.

Although waist circumference is a surrogate of visceral adipose tissue,<sup>10</sup> and some studies have shown its implications beyond BMI alone for cardiovascular disease risk factors,<sup>11</sup> the Expert Committee withheld recommendation of the routine use of it in the clinical assessment of pediatric obesity. The basis for this recommendation was incomplete information on its utility in predicting risk and a lack of specific guidelines for clinical application. Despite this recommendation, most of the programs we surveyed (83%) assessed waist circumference, and most of them measured it at the border of the iliac crest (recommended in the Expert Committee report and by the National Institutes of Health National Cholesterol Education Program) or the level of the umbilicus, and others measured at the midpoint between the lowest rib and the iliac crest (as recommended by the World Health Organization). However, an important consideration for some obese patients, especially those who are severely obese, is the difficulty of finding these anatomic locations.

The Expert Committee stated the importance of accurate measurements of height and weight; thus, it is encouraging that most of the respondents (78%) provided training in anthropometry. However, the methodology or effectiveness of such training remains unknown. Besides anthropometric reference manuals,<sup>12</sup> the CDC provides good information on anthropometric training, which includes interactive training modules ([www.cdc.gov/growthcharts/educational\\_materials.htm](http://www.cdc.gov/growthcharts/educational_materials.htm)). Documentation of intrareliabilities and interreliabilities is also encouraged, as is the calibration of anthropometric equipment on a regular schedule.

### **Determination of Key Etiologic Risk Factors: Parent Weight, Physical Activity, Screen Time, and Diet**

Understanding the etiologic risk factors of pediatric obesity is important when determining the cause of obesity and for focusing intervention efforts on target behaviors. Parental weight status has been shown to be a major risk factor for child obesity. All (100%) programs assessed parental weight; however, the method (self-report or measured) was not ascertained.

Physical activity level, sedentary behavior, and diet are considered key behavioral factors in pediatric obesity.<sup>13</sup> Although all (100%) the programs assessed these key constructs, there was considerable variation in their assessment procedures. For example, several methods were reported for assessing physical activity, including both self-report/interviewer-assisted and objective measures. There is considerable inconsistency in the self-report instruments being used, and some programs reported the use of home-grown tools. In general, the reliability of self-report tools is good, whereas validity is moderate at best.<sup>14,15</sup> Of those using objective assessment tools, approximately half used pedometers, whereas others used accelerometers or heart rate monitors ( $n = 2$ ). For those using pedometers, it is important to understand that not all pedometers provide accurate values and that some pedometers have not been tested for validity; however, we did not ascertain information about the pedometer model.<sup>16</sup> It is not surprising that few used accelerometers because of the costs (approximately \$400) and labor required for data management. One program reported using the SenseWear Pro armband ([www.sensewear.com](http://www.sensewear.com)). This armband is a pattern-recognition activity monitor that integrates motion-sensor data with a variety of heat-

related sensors to estimate the energy cost of free-living activity. In contrast to accelerometry, it offers user-friendly software that calculates total energy expenditure, activity energy expenditure, and time spent in moderate-to-vigorous physical activity and reports actual wear time (thereby avoiding the considerable challenge in determining if a monitor was worn as directed). Recent articles have documented its validity in children and adolescents.<sup>17,18</sup> It is encouraging that all programs captured screen time by inquiring about television, video-game, and computer use. This information is nearly always captured by child or parent interview or questionnaire response.

Several programs assessed diet through 24-hour recall, 3-day food diaries, and/or food-frequency questionnaires despite the Expert Committee stating that these tools were impractical for use in most clinical settings; however, most programs we surveyed used a dietician, which might have influenced the inclusion of this dietary assessment tool. None of the programs responded that they used any of the instruments mentioned in the Expert Committee article (eg, WAVE, REAP, You're Your Plate). All the programs inquired about breakfast, fruit and vegetable intake, sweetened beverages, fast-food intake, family meals, and food insecurity or food assistance. We found it somewhat surprising from a clinical nutrition standpoint that resting energy expenditure or metabolic rate was not determined by more programs (only 3 [17%] programs did so). Although not addressed in the Expert Committee recommendations, resting metabolic rate has a long history in the assessment of the obese patient, because it provides a basis for nutritional counseling of energy intake and weight loss. Resting metabolic rate is measured by the exercise spe-

cialist or dietician using either a prediction equation or indirect calorimetry. A variety of prediction equations are used. In addition to gathering information on physical activity, sedentary behavior, and diet, it is also important to be informed about the context and patterns of these behaviors (access to space, equipment, who buys food, etc).

The Expert Committee article on assessment commented that an ideal tool would capture both components of energy balance. Recently, such tools have been developed (eg, Patient-Centered Assessment and Counseling for Exercise,<sup>19</sup> Family Nutrition and Physical Activity,<sup>20</sup> Home Environment Survey<sup>21</sup>). However, the utility of these screening tools in pediatric obesity clinics has not been investigated. Caution should be advised for the parental proxy of physical activity and diet; however, it is recognized that reliable and valid reporting of these behaviors in children younger than 10 years is challenging. All (100%) the programs also determined the health behavior stage of change, which is critical to the success of the intervention programs.

### Determination of Other Etiologic Risk Factors

Beyond physical activity and diet, there has been increased recognition and emphasis on "nontraditional" risk factors, because it has been realized that obesity is a complex multifactorial condition.<sup>22,23</sup> Nontraditional risk factors surveyed included prenatal aspects, breastfeeding, stress, and sleep. Most programs also collected information on birth history, patient sleep history, and depression/anxiety. In terms of the birth history, most (94%) of the programs considered maternal gestational diabetes, birth weight, and infant feeding history. In contrast, few (17%) of them considered the mother's weight before

pregnancy or weight gain during pregnancy. Several recent reports indicated a significant relationship between these 2 prenatal factors and child obesity.<sup>24–29</sup>

### Assessment of Comorbidities: BP, Blood Chemistry, and Physical Examination

Assessing the consequences of pediatric obesity is also important, because a plethora of comorbidities accompany child obesity.<sup>30</sup> Cardiovascular disease risk factors, type 2 diabetes, hypertension, and/or the metabolic syndrome get much of the attention. As expected, all (100%) the programs screened for blood cholesterol, triglyceride, glucose, and insulin levels, BP, and a family history of cardiovascular disease and type 2 diabetes. In screening for type 2 diabetes, all or most of the programs assessed blood glucose and insulin levels as noted above; approximately half of them calculated homeostasis model assessment of insulin resistance (HOMA-IR) as an indicator of insulin resistance, and a few (17%) of the programs conducted oral glucose-tolerance tests. Other blood-chemistry indicators of cardiovascular and metabolic health used by some programs include measuring uric acid, apolipoproteins, microalbumin, and C-reactive protein level. No program considered fibrinogen or cortisol. Most programs (94%) also measured liver enzyme levels (aspartate aminotransferase and alanine transaminase) to screen for fatty liver disease. There is no preferred method of assessing BP. Manual, automated, or a combination of the 2 methods are used, and a variety of clinicians (eg, physician, exercise specialist, nurse) assess it. Automated and manual devices should be checked for accuracy and calibrated periodically. Good intertester reliability is important, because several members of the clinical team measure BP. All the programs

compared BP values to age-, gender-, and height-specific percentiles to determine hypertension. Half of the programs assessed ambulatory BP.

As for the remainder of the physical examination and review of systems, it is assumed that all other aspects noted in the Expert Committee article were considered, although we did not ask about each specific component (eg, sleep disorders, menstrual irregularities, abdominal pain). It was stated that although this information is included in all the programs, some programs reported that they rely on obtaining this information from the primary care physician.

### Other Physiologic Measures

Tests for other physiologic measures are more variable than the others discussed. None of these tests were mentioned in the Expert Committee article. About half of the programs (44%) assessed aerobic fitness with an exercise specialist conducting the test. A variety of tests were used, but submaximal treadmill tests were most common. A few used the bicycle ergometer, and a few also conducted maximal-effort tests. Similarly, muscle strength, flexibility, and gross motor function were determined by a variety of methods (eg, push-up, handgrip, isokinetic device, sit-n-reach, goniometer, etc). Most programs (72%) assessed flexibility via sit-n-reach, whereas others use a goniometer for joint-specific flexibility measures. An exercise specialist usually measured these traits. Approximately one-quarter of the programs (27%) assessed spirometry as part of the routine clinical examination. Other programs reported that this is performed in the sleep or pulmonary laboratory.

### Psychological Aspects

It is well known that obesity presents with several psychological problems

**TABLE 2** Recommendations for Best-Practice Assessment of the Obese Patient

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Calculate decimal age from observation date and birth date
Provide anthropometric training for clinical personnel
Measure height and weight on hard surface using calibrated equipment
Record BMI (including past BMI pattern)
Calculate BMI percentile according to CDC BMI growth chart
Determine body composition by BIA or air-displacement plethysmography (skinfolds should not be assessed in the obese patient)
Track resting metabolic rate via prediction equation or calorimetry
Inquire about parental obesity and family medical history
Evaluate weight-related problems
Assess diet and physical activity
Assess eating behavior to examine
Self-efficacy and readiness to change
Frequency of eating outside the home at restaurants or fast-food establishments
Excessive consumption of sweetened beverages
Consumption of excessive portion sizes for age
Excessive consumption of 100% fruit juice
Breakfast consumption (frequency and quality)
Excessive consumption of foods high in energy density
Low consumption of fruits and vegetables
Meal frequency and snacking patterns (including quality)
Conduct physical activity assessment to determine
Self-efficacy and readiness to change
Reliable and valid self-report physical activity instruments
Environment and social support and barriers to physical activity
Whether the child is meeting recommendations of 60 min of at least moderate physical activity per day
Level of sedentary behavior, which should include hours of behavior using television, video games, and computer, and comparison to a baseline of <2 h/d
Routine activity patterns, such as walking to school or performing yard work
Assess practical resources and barriers (eg, neighborhood parks, grocery stores, recreation centers, and neighborhood children with whom to play can all support a healthier lifestyle)
Inquire about family cultural values, ethnicity, religion, and educational background

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and that obese patients have a lower quality of life.<sup>31</sup> Nearly all the programs (94%–100%) that participated in the survey assessed the following psychological traits: depression; anxiety; sense of competence; self-esteem; family dynamics; overall behavior and emotion; and eating disorders. The most inconsistencies in assessment were observed in the psychological domain. Approximately half of the programs (56%) assessed quality of life, of which half used the pediatric quality-of-life survey.

### Calculation of Chronological Age

Calculation of chronological age should be considered, because it influences the interpretation of all of the previously described measurements. Although simple, it is important to measure accurately in pediatrics, be-

cause growth and maturation reference standards (eg, BMI, BP) are age-specific. Although we found that a majority of the programs (83%) calculated age as decimal age (observation date minus birth date), some did not (eg, age at last birth date) and, thus, considered age as a whole number. Approximating ages can lead to erroneous determination of centiles and, in turn, diagnosis.

### SUMMARY AND CONCLUSIONS

The results of this survey indicate the diversity of pediatric obesity-management programs. The variation in assessment tools, protocols, etc is probably a result of the diversity of programs, which in turn may be dictated by personnel, both in terms of number and duties and experience with assessment techniques. Hospi-

tals face myriad challenges related to overweight services, including limited resources.<sup>32</sup> These results also reveal the difficulty/challenges in standardizing methodologies across clinics if we hope to compare outcomes across clinics or establish a national registry. A more general comment about assessment is the importance of selecting valid instruments. We found that some instruments used were not reliable or valid. Use of appropriate tools is important for obtaining “good” data that can be used in patient evaluation and assessment. Nonetheless, most programs that participated in this survey followed 2007 Expert Committee assessment recommendations (eg, using CDC reference values, assessing readiness to change, diet, physical activity, lipid profile, glucose level, liver

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**TABLE 3** Future Directions for Research: Assessment in Pediatric Obesity-Management Programs

Use bioelectric impedance analyzers to determine body composition with accurate devices and prediction equations
Determine waist-circumference centiles that confer elevated risk of cardiovascular disease risk factors
Assess physical activity and diet with reliable, valid, and feasible clinical instruments
Understand the clinical utility of behavioral instruments that comprehensively assess the combined factors of diet, physical activity, and lifestyle in the child, family, and environment

enzyme levels).<sup>3</sup> In addition to providing a better understanding of the current assessment practices in pediatric obesity-management programs, these results should assist other clinics/hospitals that are developing clinics and provide information that will better inform and equip clinicians to assess pediatric obesity. On the basis of the previous recommendations of the 2007 Expert Committee and the results of this survey, the considerations in Table 2 should also be taken into ac-

count. Future directions for research are provided in Table 3.

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# Patient Engagement and Attrition in Pediatric Obesity Clinics and Programs: Results and Recommendations

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## KEY WORDS

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## ABBREVIATION

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## abstract

Pediatric tertiary care institutions are well positioned to provide multidisciplinary, intensive interventions for pediatric obesity known as stage 3 treatment. One contributor to the difficulty in administering this treatment is the high rate of patient attrition. Little is known about the practices used by pediatric weight-management clinics and group-based programs to minimize attrition. Hospital members and non-members of FOCUS on a Fitter Future were surveyed on the methods used to engage and retain obese children in their clinics and programs. Shortly thereafter, a benchmarking activity that centered on rates of patient nonattendance at initial and follow-up clinic visits was initiated among FOCUS-group-participating hospitals. Clinic- and group-based program results were contrasted. Staff from group-based programs reported that the majority of patients did not complete even 50% of program follow-up visits. Multiple patient/family- and clinic/program-level barriers to retention were identified. Attention to successful techniques should be paid during planning for new programs and improvement of established ones. *Pediatrics* 2011;128:S59–S64

The prevalence of overweight and obesity has increased significantly among children in all age groups in the last 30 years, according to data from the most recent National Health and Nutrition Examination Survey.<sup>1</sup> Despite evidence that the rates of overweight and obesity might be leveling off,<sup>2</sup> severe obesity (children with a BMI at the  $\geq 99$ th percentile) has increased 300% in the past 30 years; the highest rates are seen in black, Latino, and lower-socioeconomic-status children.<sup>3</sup> In 2007, the Expert Committee on the Assessment, Prevention and Treatment of Child and Adolescent Overweight and Obesity recommended that obese children and teenagers who fail to lose a significant amount of weight during primary care-based stage 1 and 2 interventions should be referred to multidisciplinary weight-management programs in pediatric tertiary care centers, known as stage 3 interventions.<sup>4</sup> Stage 3 interventions consist of multidisciplinary visits with frequent (up to weekly) visits for 8 or more weeks. Although the recommendations are based on available and mounting evidence of the efficacy of these multidisciplinary, moderate- to high-intensity interventions,<sup>5,6</sup> stage 3 childhood obesity treatment is practically challenging to deliver. This difficulty is multi-level; there are patient-, provider-, institutional-, managed care-, and community-level barriers that affect the achievement of successful outcomes. One such barrier is the high rate of patient attrition from stage 3 weight-management clinics and programs<sup>7-9</sup> in both the initial treatment and maintenance phases of these programs.<sup>10</sup>

Minimizing attrition is crucial for individual patient success. Patient retention in treatment is also critical for weight-management programs to be able to demonstrate improved out-

comes, to optimize the use of staff, and for continuing quality improvement. A small but significant literature exists regarding patient-level predictors of attrition. Common predictors of attrition include Medicaid status, black ethnicity, older age, depression, lower self-concept,<sup>8</sup> elevated parental BMI, race/ethnicity,<sup>9</sup> overall health status, overall quality of care, difficulty with medical insurance coverage, location and timing of program visits, unfulfilled parental expectations, and a child's desire to leave the program.<sup>7,11</sup> In the adult literature, women who had more previous weight-loss attempts were more likely to not complete a program.<sup>12</sup> It is possible that caregivers who have made multiple attempts at weight loss might negatively affect their child or adolescent's completion of a pediatric weight-management program. Other possible predictors of attrition include ambivalence around engaging in weight-management treatment, fear of weight bias or stigmatization, cultural incompetence of weight-management providers, and the length of visits. Although experiences of single weight-management programs with patient attrition have been reported, there is a lack of comparison of the methods that multiple clinics and programs use to maximize patient engagement before the first visit and minimize attrition thereafter. In addition, comparison of clinic-based strategies (more likely to be individual patient visits) versus program-based strategies (more likely to be group visits) has not been described.

Therefore, this study's aims were to (1) examine and contrast patient engagement and retention practices among a group of children's hospital-based weight-management clinics and programs through the National Association of Children's Hospitals and Related Institutions (NACHRI) FOCUS on a Fitter Future program, (2) report

FOCUS-group member hospitals' aggregate experience with patient nonattendance at initial and follow-up appointments, and (3) identify common engagement and retention practices among programs with the lowest average nonattendance rates to make recommendations to other pediatric tertiary care facilities with current and future stage 3 programs.

## METHODS

The FOCUS-group long-term patient care and family engagement subcommittee met in person and via conference call to design 2 surveys to query colleagues on their practices related to initial and subsequent patient and family engagement at clinic or program visits. Questions regarding the characteristics of these clinics' and programs' initial and maintenance or follow-up period, methods used to minimize attrition during this period, and perceived barriers to patient retention were also included in the surveys. The survey questions were refined, electronically formatted, pilot-tested with several subcommittee members and NACHRI staff, and revised into final form before being sent to FOCUS and non-FOCUS program champions for completion. These program champions were asked to complete separate surveys for weight-management clinics and group-based weight-management programs. The survey results were compiled by NACHRI staff and synthesized by the subcommittee co-chairs.

Simultaneously, and in similar fashion to previously convened NACHRI FOCUS groups (eg, pediatric critical care medicine), FOCUS on a Fitter Future member hospitals were asked to identify and develop consensus on a common important patient care topic around which to benchmark their experiences. The topic that received the most consensus among the 15 mem-

ber hospitals was patient engagement at initial clinic visits and patient retention during subsequent clinic visits. NACHRI staff then facilitated a benchmarking project to determine member hospitals' aggregate retrospective and prospective experiences with patient nonattendance at initial and follow-up clinic visits (data from January 2008 through November 2009 are reported).

For this project, FOCUS-group hospital-program champions were asked to submit an electronic spreadsheet to NACHRI staff monthly to report the rate of patient nonattendance for initial and follow-up visits. Patient nonattendance was defined as a visit in which the patient and parent/caregiver did not attend and in which the parent/caregiver did not call before the day of the visit to reschedule. The long-term patient engagement subcommittee co-chairs collaborated with NACHRI staff to determine average initial and follow-up visit nonattendance rates for the reporting period, the number of months in which data were reported, and the average number of clinic visits per month for each FOCUS-group hospital. Survey responses from FOCUS-group member hospitals with average initial and follow-up nonattendance rates lower than the group aggregate average were then examined to search for common characteristics, including common practices designed to minimize patient attrition.

## RESULTS

Of the 47 member and nonmember hospitals queried, 24 hospitals responded to the clinic- or group-based program survey, or both (response rate: 51%). Of these hospitals, all 24 completed a survey for weight-management clinics, and 14 hospitals additionally completed a survey for group-based programs.

### Patient Engagement and Retention Practices: Clinic and Program Similarities and Differences

Fifty-two percent of the clinics and 43% of the programs were staffed with a specific person to make patient appointments. Some locations also used a centralized scheduling system. The wait for an initial clinic appointment ranged from <1 month to 10 to 12 months, and 58% of the clinics reported an average wait time of [2 months]. Seventy-eight percent of group-based programs reported an average wait time of <2 months. All the clinics and programs involved at least the caregiver with the child, and more than half of them allowed other family members, including siblings, to attend. Eighty-nine percent of the program respondents from programs that allowed siblings reported that the siblings received education about healthy lifestyles when they attended. Seventy-four percent of the clinics and 78% of the programs reported that the frequency of patient visits was bi-weekly to monthly. Fifty-seven percent of the programs reported seeing patients every 1 to 2 weeks, and 42% reported seeing patients every 3 to 6 weeks.

Hospitals used a variety of methods aimed at maximizing patient and family engagement at initial and follow-up visits. Seventy-nine percent of the clinics and 86% of the programs reminded patients with a telephone call before the patient's initial visit. In addition, many clinics and programs reported using methods such as a staff phone call, printed educational materials, dietitian-only visits, and orientation sessions about the clinic or program to interest patients before the initial visit. Fifty-four percent of the clinics and 79% of the programs gave a reminder before follow-up visits, most often by telephone or with printed educational materials. In addition to staff

phone calls, other methods of maintaining patient engagement between clinic and program visits included visits with a personal trainer, fitness club activities, exercise classes, and provision of physical activity and nutrition diaries.

Although 79% of the respondents with group-based weight-management programs reported that their programs had a fixed number of treatment visits, 70% of weight-management clinics had an open-ended policy in which patients were allowed to return for an unlimited number of visits. Most group-based programs allowed patients who had completed the program to reenroll and/or return to the associated clinic. Seventy-one percent of the programs had a defined follow-up or maintenance period; 2 programs (14%) followed patients indefinitely. Incentives or rewards used to enhance patient retention in group-based programs ranged from gift cards to physical activity—promoting games and toys to music downloads. Both clinic and program respondents considered patients ready for discharge if they met their goals and were independently implementing healthy weight strategies.

### Clinic and Program Attrition Experiences and Perceived Barriers

For clinic-based programs, the most commonly encountered barriers to patient follow-up were the inability of caregivers to miss work (64%) and transportation difficulties (59%). Other barriers included children having to miss school (55%), the parent or child perceiving no benefit from the visits (36%), and the cost of clinic visits (23%). All 14 weight-management program respondents reported that the parent or child perceived no benefit from the program as a primary barrier. Seven of the 8 (88%) program re-

spondents with a maintenance program stated that the majority of patients did not complete one-half of the maintenance visits. These families were contacted by phone by all programs to determine their reasons for nonattendance.

### **Benchmarking Patient Attrition and Identifying Successful Practices**

The FOCUS-group hospital clinics implemented a benchmarking process to determine patient nonattendance rates for initial and follow-up visits. Monthly data were collected between January 2008 and November 2009. Only clinics that reported a minimum of 6 months of benchmarking data were included in the analysis. The mean reporting period for benchmarking at initial and follow-up visits was 14.6 months (range: 3–23 months) and 14.8 months (range: 4–23 months), respectively. Clinics saw an average of 40.8 new (initial) patients per month and an average of 76.8 follow-up patients per month. The average rate of patient nonattendance at initial clinic visits was 28.3% (range: 5%–69.3%) and 32.1% (range: 10%–75.7%) for follow-up visits.

The 11 clinics with greater-than-average initial and follow-up patient visit attendance shared several common patient engagement and retention practices, which included use of a clinic-specific scheduler, use of reminder phone calls, and involvement of the entire family in the treatment program. The clinics with the lowest initial patient-nonattendance rates reported limiting their capacity to see new patients to <5 per week. Conversely, the clinics with the lowest follow-up patient-nonattendance rates reported that they had the capacity to see >20 follow-up patients per week. The majority of clinics with the lowest initial and follow-up nonattendance

rates did not use methods to engage patients before or after the initial visit. For those clinics that did, this contact was provided via telephone, mailed educational materials, an orientation session, and visits with a registered dietitian. Wait times for new patient appointments among these clinics ranged from 1 to 12 months. The majority of clinics saw patients monthly and would see patients for an indefinite time period. Most of the clinics would allow patients who had completed or not completed their treatment program to return to clinic.

### **DISCUSSION**

The results of this study shed additional light on patient engagement and retention practices in children's hospital pediatric weight-management clinics and programs. The clinics and programs surveyed shared a number of common characteristics including family-targeted interventions, a clinic/program-specific scheduler, short wait times for initial visits, and bi-weekly to monthly patient visits thereafter. Common barriers to follow-up for both clinics and programs included treatment schedules that were inconvenient because of school and work commitments and difficulties with transportation. These results are similar to those found by others<sup>7,11,13</sup> and can prompt programmatic changes such as after-hours clinic or program visits, open-enrollment group programs, and improving families' and providers' knowledge about alternative transportation options such as those that might be offered through insurance.

Although clinics and programs differ in their approach to patient follow-up during treatment and after the treatment has ended, they both measure clinical, behavioral, and psychosocial outcomes. Group-based treatment programs struggle especially with pa-

tient attrition; nearly 90% of them reported that the majority of patients complete fewer than half of the follow-up visits. The identified patient/family-level barriers to both clinic and program follow-up highlight the need for new and continued efforts to successfully engage patients and families. Programs need to develop a systematic approach to addressing insurance coverage before program onset and should consider local insurer reimbursement patterns in determining program structure.

Initial patient-nonattendance rates for these hospital-based weight-management clinics averaged 28%, which is similar to rates found in some pediatric specialty clinics.<sup>14,15</sup> This information is important for clinic and hospital leadership to know to set reasonable expectations for clinic expenses and revenues and to plan for staffing needs. It also points to the need for clinic staff to be in contact with referring primary care providers to potentially enlist them in motivating families to attend these initial evaluations. The majority of clinics had an average wait time of <2 months for a new patient appointment, which is comparable to that of other subspecialty clinics surveyed by the NACHRI.<sup>16</sup> Shared patient engagement and retention practices of FOCUS-group hospitals with lower-than-average patient-nonattendance rates included having a clinic-specific appointment scheduler, using reminder telephone calls, seeing patients monthly for an indefinite time period, allowing patients to return to the clinic after the initial treatment period, and involving the entire family in clinic visits. It is interesting to note that most of these clinics/programs had lengthy initial wait times of 5 to 6 months. It is possible that families place a higher value on these initial visits because they were challenging to obtain. Hospitals with the lowest initial

patient-nonattendance rates limited their new patients to <5 per week, which might suggest provision of particularly comprehensive initial visits. Hospitals with the lowest patient-nonattendance rates at follow-up reported the capacity to schedule a larger number of patients, which potentially suggests that patients are able to be seen for follow-up frequently.

Given the well-known difficulty in retaining patients in pediatric weight-management programs, this study's findings are relevant and intended to be useful to both new and established programs. The geographic distribution of the children's hospitals surveyed was broad, and the responses represent unique clinics and programs of varying lengths and number of years of experience. Because many of the barriers to engagement and retention were shared among clinics and programs, the opportunity exists to devise solutions that can be generalizable to most programs.

There are limitations to this study. The small sample size indicates that its findings might not be indicative of the majority of stage 3 pediatric weight-management clinics and programs in

the United States. Also, the surveys did not capture all patient engagement and retention practices, and they did not address staff or patient perceptions about the reasons for attrition. Finally, because the outcomes of clinics and programs were not assessed, we could not establish an association between lower nonattendance rates and patient success.

## CONCLUSIONS AND RECOMMENDATIONS

Children's hospitals with pediatric weight-management programs are making many efforts to engage and retain patients and families. Despite these efforts, the majority of patients in group-based programs are not completing the entire course of treatment. More emphasis needs to be placed on studying best practices in engagement and retention in clinics and programs, including surveying a larger number of clinics and programs with a more comprehensive instrument and potentially using individual structured interviews. In addition, quantitative and qualitative studies that target parents and children enrolled in these programs should be performed. Eliciting barriers as perceived by obese patients and families is necessary to

provide more acceptable treatment programs. For instance, definitions of treatment success in clinics and programs might differ between families and program staff. The engagement and retention of patients and families is a crucial component in current and future stage 3 obesity programs. New programs should assess and address known clinic/program- and patient/family-related barriers during program development and subsequently institute quality-improvement measures to minimize attrition and improve patient and program outcomes.

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# Developing Criteria for Pediatric/Adolescent Bariatric Surgery Programs

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## KEY WORDS

adolescent, morbid obesity, adolescent bariatric surgery, centers of excellence

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## abstract

The prevalence of morbid obesity in adolescents is rising at an alarming rate. Comorbidities known to predispose to cardiovascular disease are increasingly being diagnosed in these children. Bariatric surgery has become an acceptable treatment alternative for morbidly obese adults, and criteria have been developed to establish center-of-excellence designation for adult bariatric surgery programs. Evidence suggests that bariatric surgical procedures are being performed with increasing numbers in adolescents. We have examined and compiled the current expert recommendations for guidelines and criteria that are needed to deliver safe and effective bariatric surgical care to adolescents. *Pediatrics* 2011;128:S65–S70

In 1991 the National Institutes of Health Consensus Panel published its findings on the benefits of bariatric surgery; since then, the role of bariatric surgery in the treatment of adult morbid obesity and its comorbidities has been well established.<sup>1-4</sup> Although widely accepted, this consensus excluded the application of bariatric procedures to severely obese adolescents. In the 2004 update, the unique challenges of caring for adolescents were addressed with specific recommendations that adolescent patients “be referred to specialized centers with a multidisciplinary bariatric team capable of providing long-term follow-up care.” In addition, a “commitment to clinical data collection and participation in a central database registry” was also encouraged.<sup>5</sup> The American Society for Metabolic and Bariatric Surgery and the American College of Surgeons have created comprehensive outcomes databases and developed criteria for center-of-excellence designation for adult bariatric surgery centers.<sup>5</sup> Bariatric surgical case volume has been a primary driver of quality outcomes in this model, although recent evidence suggests that other factors may play an important role.<sup>6</sup>

## ADDRESSING THE NEEDS OF ADOLESCENTS

The incidence of obesity in the adolescent population, as defined by the Centers for Disease Control and Prevention, currently approaches 18%. Even more alarming is that an estimated 1% to 2% of US adolescents are considered to be morbidly obese (BMI > 40).<sup>2,7</sup> Within this subgroup of the pediatric population, the likelihood of subsequently becoming a morbidly obese adult is ~80%. Furthermore, there is mounting evidence that cardiovascular risk factors rise quickly, which leads to increased morbidity and mortality in adulthood.<sup>8</sup> On the basis of

these estimates, as well as increased public awareness, it is likely that bariatric surgical case volumes among adolescent patients will continue to increase. A recent review of hospital discharges estimated that 770 adolescents underwent bariatric surgical procedures in 2003 compared with ~105 000 adults.<sup>9</sup> In addition, a review of the Bariatric Outcomes Longitudinal Database, developed by the Surgical Review Corporation to track all patients cared for in American Society for Metabolic and Bariatric Surgery–designated bariatric surgery center-of-excellence programs, revealed that records of only 662 adolescents (aged 14–18 years) have been captured, compared with >260 000 adults during the same time period (Surgical Review Corporation, verbal communication, 2010). What is not clear, however, is how many total surgeries are being performed on an annual basis and what proportion are being entered into databases designed to assess longitudinal outcomes. Although multi-institutional data examining the longitudinal safety and efficacy of adolescent bariatric surgery are currently the main focus of several ongoing studies in the United States, current literature in support of this treatment algorithm remains sparse, as evidenced in a recent comprehensive meta-analysis of available world literature.<sup>10</sup> However, it seems clear that the criteria set for the adult center-of-excellence designation do not adequately address the special needs and issues that arise when caring for extremely obese adolescents.

To promote excellence and safety in the delivery of bariatric surgical care to adolescents, guidelines and criteria for assessing surgeons, clinical programs, and institutions that offer surgical care to this population are needed. Members of the National Association of Children’s Hospitals and Re-

lated Institutions obesity focus group have proposed the following criteria for a pediatric and adolescent bariatric surgery specialty program. Such a center should be designed to meet specific characteristics and have processes in place that will promote excellence in the care of the obese adolescent. The proposed guidelines would apply to all surgeons or institutions performing bariatric surgery on any number of patients who are younger than 18 years.

All centers involved in adolescent bariatric care should be encouraged to participate in a national longitudinal database in an effort to objectively refine the criteria for adolescent bariatric surgery specialty programs. The goals of creating such criteria include standardization of practices and process that promote quality care and ensure measurement and reporting of outcomes. These activities will allow for the development of risk-stratification models and refinement of clinical processes and criteria based on objective outcomes data; the ultimate goal is to define best-practice criteria and benchmarks for adolescent bariatric surgery programs.

Although there are many similarities between the proposed criteria and established adult center-of-excellence criteria,<sup>5</sup> several requirements of the pediatric and adolescent bariatric surgery specialty program would differ from those that need to be met by adult centers to better address the needs of this group of patients.

- The surgeon-training requirement could be satisfied by completion of bariatric coursework from relevant professional organizations that offer training in bariatric care (eg, American Society for Metabolic and Bariatric Surgery, American College of Surgeons), co-surgeon experience, and/or proctoring of the initial

case series by an experienced bariatric surgeon. Outcomes for the performance of complex, nonbariatric upper-intestinal procedures could supplement bariatric procedure data for lower-volume surgeons.

- There are no initial hospital/program volume requirements specified. These guidelines are not meant to exclude the development of centers in facilities where services have not previously been offered. However, the multidisciplinary care team should be trained in perioperative and postoperative care of the patient receiving bariatric care.
- An age-appropriate ICU is required for this program compared with a physician certified in Advanced Cardiac Life Support on call 24/7 in the adult program.
- A medical director for the pediatric/adolescent program who is a physician with pediatric expertise is required. The purpose of this requirement is to provide the bariatric team with expertise to evaluate and manage the developmentally unique aspects of pediatric patients and their families.

## **PEDIATRIC/ADOLESCENT BARIATRIC SURGERY SPECIALTY PROGRAMS**

### **Ten Criteria for Proposed Specialty Programs**

#### *Institutional Commitment*

The highest levels of an institution's medical staff and administration must commit to excellence in the care of pediatric patients undergoing bariatric surgery. Particularly important is a commitment from both surgery and pediatrics departments in the form of philosophical support of the importance of treating pediatric/adolescent obesity with bariatric surgery and financial support. Evidence of this commitment should include ongoing

in-service education programs in adolescent bariatric surgery and regular administrative review of the program. This requirement refers to a culture in which the staff is prepared to manage morbidly obese adolescent patients with understanding and compassion and to appreciate the medical and psychosocial comorbidities of the disease in this population. The staff should be aware of the basic concepts of bariatric surgery through in-service programs. Direct caregivers should be able to recognize the early signs of common clinical complications (eg, pulmonary embolus, anastomotic leak, infection, bowel obstruction, and other specific device- or procedure-related complications) so that they can be managed promptly.

#### *Medical Home*

The adolescent bariatric care team must demonstrate direct and regular communication with a primary care physician defined as the patient's "medical home" before surgical weight-loss procedures can be considered and/or executed.

#### *Routine Experience*

The institution should be routinely engaged in advanced open and laparoscopic abdominal procedures and be staffed with allied health workers who are familiar with the perioperative care of adolescents with complex abdominal conditions.

#### *Program Staffing*

It is critical that the institution commit to providing adequate staffing for the adolescent bariatric surgical program. The following people are considered vital for providing safe and effective bariatric surgical care to adolescents:

- Surgical director and medical director: Both should be present and involved in bariatric program decisions. They should document

regularly scheduled meetings to address the bariatric program in the institution. These meetings should involve medical staff, nursing, administration, central supply, operating room personnel, and the business office and quality-assurance review.

- The surgical director must be or have been certified by the American Board of Surgery or the American Osteopathic Board of Surgery and/or the Royal College of Physicians and Surgeons of Canada. This person should spend a significant portion of his or her efforts in the field of bariatric surgery. Qualified coverage must be available in the absence of the bariatric surgeon. This person may be primarily an adult bariatric surgeon or a pediatric surgeon with experience in bariatric surgery.
- The medical director will evaluate potential candidates for bariatric surgery and partner with the surgical director to ensure that they meet established operative criteria and have had appropriate medical and behavioral screening to maximize the safety and efficacy of any proposed procedure. Equally important is to identify patients who, by virtue of their medical, psychological, social, or behavioral status, are not acceptable candidates for surgical therapy and whose treatment, therefore, should be postponed or excluded. A critical part of this evaluation process is the mandated participation in a medical weight-loss program for at least 6 months. During this process, screening and treatment of comorbid conditions should be performed. This evaluation should generally be led by the medical director, and the implications of

this workup on the patient's candidacy for a bariatric procedure should be discussed thoroughly as part of the multidisciplinary team meetings and communicated effectively with the patient's primary care provider. In addition, the medical director will assume the responsibility for treatment of any comorbidities identified in the screening process or direct the referral of the patient for subsequent subspecialty evaluation. This person will continue to monitor the various comorbidities through the evaluation process and leading up to the time of surgery.

- The role of the medical director, however, does not end with the bariatric surgery. Rather, the medical director should remain actively engaged with patient care throughout the postoperative period by monitoring excess body-weight loss, nutritional status, and changes in obesity-related comorbid conditions (including necessary alterations in associated medication regimens). Specifically, presurgical pharmacologic treatment modalities associated with various comorbid conditions will require regular reassessment by the medical director, with development of weaning regimens as appropriate during the period of weight loss. In addition, long-term monitoring beyond the immediate postoperative period must be provided to help achieve and maintain optimal weight loss. As such, the medical director will also assume an important role in the process of transitioning the medical care of the patient to an age-appropriate practitioner or program as the patient reaches adulthood.

- Allied health worker: A qualified and specially trained allied health worker (eg, physician's assistant or advanced practice nurse) with experience in the management of morbidly obese pediatric and adolescent surgical patients is needed to act as a bariatric patient care coordinator. This role is dedicated to the coordination of care, close monitoring, and continuing education needed in the preoperative and postoperative care of adolescent patients undergoing bariatric care. There must be a smooth transition between the primary care provider, the outpatient weight-management clinic, and the perioperative inpatient stay. The coordinator functions as the patient and family advocate throughout the process.
- Psychologist/psychiatrist: A dedicated child and adolescent psychologist/psychiatrist with significant experience in pediatric obesity, bariatric evaluation, perioperative support, and eating disorders is needed to provide comprehensive assessment to identify risk factors associated with poor adherence to medical recommendations, protective/supportive factors that would assist in medical adherence, and comorbid psychosocial conditions that would require additional referral and treatment. Information about risk-taking behavior and protective factors and comorbid psychosocial conditions can be integrated into goal-setting to increase the likelihood that initial goals are realistic and able to be maintained. In addition, the psychologist should provide overarching interventions to enhance motivation to change and target barriers to medical adherence within the multidisciplinary treatment setting.
- Social worker: A dedicated social worker is strongly recommended

to assist the bariatric team in evaluation of the psychosocial needs that may arise postoperatively and to assist with triage/referral to mental health professionals when indicated.

- Dietitian: A dedicated registered dietitian with professional credentialing in pediatric weight management and experience in weight-loss surgery is required. Nutritional recommendations for the treatment of the adolescent undergoing weight-loss surgery can be classified into 4 areas: nutritional assessment; education; nutritional needs; and monitoring of nutritional status. The assessment should include a review of current eating habits and behaviors as well as assessment of family support regarding provision of a supportive environment. The registered dietitian should also review laboratory parameters before surgery and correct, either via counseling or supplementation, any apparent nutrient deficiencies. The educational component should incorporate the adolescent's cognition and learning style and should cover healthy food choices, development of meal plans, and dietary modifications specific to the proposed procedure. Preoperatively, the clinician should establish nutritional goals with the adolescent that reinforce principles to be used in the postoperative period. The approach to ensuring optimal postoperative nutritional needs should be evidence-based whenever possible. Protein requirements are estimated at 60 to 90 g/day in adolescents who have undergone gastric bypass, gastric-banding, and gastric-sleeving. Energy needs should be established at or ~10% below estimated basal metabolic rate to maximize weight loss. Micronutrient needs depend on the nature of the surgical procedure. Mon-

itoring of nutritional laboratory values with the medical director should occur before surgery, at regular intervals during the first 12 months, and annually thereafter. In addition to ensuring that nutritional needs are met, it is also important to evaluate the potential barriers/issues that are unique to the adolescent population. Examples may include, but are not limited to, influences associated with peer group environment, social aspects of eating, mindful eating principles, and pregnancy/breastfeeding in females.

- Exercise specialist: An exercise physiologist or physical therapist with experience in the treatment of morbidly obese adolescents is highly encouraged to optimize associated parameters in the postoperative period, including musculoskeletal conditioning, postural alignment, flexibility, strength, tone, balance, gait, developmental skills, cardiovascular tolerance, and pain control. Providers should be knowledgeable of local resources for physical activity available to their patients within the community and should be available to educate hospital and clinic staff in appropriate mobility logistics within the perioperative period (including the safe use of bariatric-specific patient-transfer equipment).
- Consultative services: a full complement of consultative specialists is required for the care of morbidly obese pediatric or adolescent surgical patients, including the immediate availability of critical care services. At a minimum this includes an anesthesiologist, pulmonologist, cardiologist, interventional radiologist, endocrinologist, infectious disease specialist, and respiratory therapist. Flexible endoscopy (experienced surgeon or gastroenterologist) should be readily available. The

facility must have an ICU staffed 24/7 with qualified intensivists experienced in managing critically ill morbidly obese pediatric patients with ventilators and invasive hemodynamic monitoring.

#### *Multidisciplinary Review*

The adolescent bariatric surgery program should maintain a multidisciplinary pediatric and adolescent bariatric surgery committee for regular discussion and review of each candidate for surgery. Documentation of committee activity should reflect involvement of the surgical director, medical director, program coordinator, behavioral health practitioner, physical activity specialist, and nutritionist/dietician. Ad hoc members of the care team could include other specialists such as a pulmonologist, endocrinologist, cardiologist, gastroenterologist, otolaryngologist, orthopedist, and/or ethicist (or ethics committee).

#### *Specialized Equipment*

The institution must maintain medical equipment and specific instrumentation designed for the care of morbidly obese patients throughout the patient care environment, which might include a range of equipment deemed suitable for the full spectrum of extremely obese patients.

- Hospital beds, gurneys, gowns, blood pressure cuffs, walkers, clinic examination room and waiting room furniture, scales, wheelchairs, and toilets must accommodate obese patients and family members.
- Patient-transfer systems for morbidly obese patients must be in place wherever care is provided. Staff must be trained in the handling of morbidly obese patients so that they do not injure the patients or themselves.
- Operating room tables and surgical equipment designed to accommo-

date morbidly obese patients must be available.

- Computed-tomography units, fluoroscopy tables, and nuclear medicine equipment with sufficient weight capacity to handle morbidly obese patients should be locally accessible.

#### *Standardized Care*

The adolescent bariatric program should use clinical pathways, both in the ambulatory and inpatient settings, that facilitate the standardization of care for the relevant bariatric procedure. It is the surgeon's responsibility and duty to select which primary operation(s) he or she will perform, but the expectation is that the procedure(s), regardless of the choice, will be performed in a standardized manner. Similarly, the surgeon should determine the details of the planned perioperative care. These details will be documented so that each member of the surgeon's team is aware of the care plan and is prepared to follow the outlined process.

#### *Follow-up Care*

The adolescent bariatric program must be dedicated to a goal of long-term patient follow-up of at least 75% at 5 years with a monitoring and tracking system for outcomes and agreement to provide deidentified patient data in a manner consistent with Health Insurance Portability and Accountability Act (HIPAA) regulations. In an effort to optimize longitudinal database analysis, all patients who undergo surgery will be entered and tracked in a prospective manner. Compliance with long-term postoperative follow-up care is critical for appropriate monitoring of weight-loss velocity and to provide anticipatory guidance and goal-setting for both the patient and his or her family. Specific areas of concern include weight regain, pregnancy, and malnutrition. Given the importance of micronutrients for vital metabolic and developmental functions (for

patients and for potential fetuses), programs must document long-term nutritional status including the assessment of macronutritional and micronutritional elements appropriate for the specific bariatric procedure and communicate with the treating obstetrical services.

### Support Groups

The adolescent bariatric program should sponsor organized and super-

vised support groups using in-person and/or electronic formats for all patients who have undergone or are considering undergoing bariatric surgery at the institution. Support-group activities should be documented, including group locations, meeting times, supervisor, curriculum, and attendance.

### Transition Care

Adolescent programs should have a transition plan in place for the long-

term monitoring and care of its patients. This transition may take the form of a paired adult program in which appropriate long-term care can be provided if the procedure is performed in a dedicated pediatric facility.

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# Building Capacity for Childhood Obesity Prevention and Treatment in the Medical Community: Call to Action

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## KEY WORDS

childhood obesity treatment, childhood obesity prevention, medical training, continuing medical education

## ABBREVIATION

CME—continuing medical education

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## abstract

Large gaps exist in the capacity of the US medical system to participate meaningfully in childhood obesity-prevention efforts and to meet the treatment needs of obese children. Current primary care practice for the prevention and treatment of childhood obesity often varies from evidence-based recommendations. Childhood obesity specialists have partnered successfully with schools of medicine, professional societies, and other organizations to collaboratively engage with primary care providers in quality improvement for obesity prevention and treatment. This review and commentary targets 2 audiences. For childhood obesity experts and their organizational partners, methods to support change in primary practice and the evidence supporting their use are outlined. For primary care providers and non-obesity specialists, effective strategies for changing practice and the potential benefits of addressing childhood obesity systematically are discussed. *Pediatrics* 2011;128:S71–S77

The need to adapt pediatric clinical care to address the prevention, identification, and treatment of childhood obesity is urgent. The profound scope of the childhood obesity epidemic has been well described. The cost of hospitalizing children for conditions caused or worsened by obesity has increased dramatically.<sup>1-3</sup> The negative effects of obesity on physical and emotional quality of life are equally, if not more, concerning.<sup>4</sup> Furthermore, gaps exist between the most basic standards of clinical care for obesity prevention and treatment and current practice; for example, only 52% of primary care providers reported routinely plotting a BMI percentile in 2006.<sup>5-7</sup> The use of BMI has slowly expanded after publication of BMI percentile charts in 2000 by the Centers for Disease Control and Prevention and strong recommendations by the American Academy of Pediatrics that have been repeated since 2003.<sup>8-10</sup> In the National Ambulatory Medical Care Survey from 2005 to 2007, obesity was diagnosed at 18% of well-child visits for obese children. Diet and activity counseling, recommended for all pediatric visits regardless of weight status, was documented for only 51% of obese children and only 44% of nonobese children.<sup>11</sup> Considering the wide scope and >20-year entrenchment of the childhood obesity epidemic, the US medical system response has gained momentum slowly with regard to screening, identification, lifestyle counseling, and treatment.<sup>12</sup>

Across the spectrum of clinical care, the level of evidence for preventive or treatment interventions varies on the basis of the clinical scenario, patient demographics, and available resources. However, there is at least 1 example of a common clinical task for which the level of evidence meets a high standard and recommendations are clear: screening and referral for

treatment. The US Preventive Services Task Force recently reviewed evidence for obesity screening and treatment and recommended that primary care providers screen and refer children aged 6 years and older to comprehensive multidisciplinary treatment programs that meet guidelines for treatment intensity.<sup>13</sup> Thus, at the most basic level, practice must be optimized to fulfill the identification-and-referral role. The majority of pediatric providers state a desire to participate in obesity prevention and treatment, beyond mere screening and referral, and have requested resources to help them participate in these activities.<sup>6,14</sup> The White House has partnered with the American Academy of Pediatrics in the "Let's Move" initiative to give providers Internet-based resources for BMI, diet, and activity screening in primary care, plus counseling and advocacy tools.<sup>8,15</sup>

Tertiary referral centers are primary sites of obesity treatment for children, including those children who have comorbid medical conditions that require urgent weight loss. Centers that participate in the National Association of Children's Hospitals and Related Institutions FOCUS on a Fitter Future group have reported that demand for treatment exceeds current capacity, that the weight status of obese children has often not been addressed by primary care providers until well after the onset of obesity, and that children have not received early intervention before referral.<sup>16</sup> In 2007, an Expert Committee proposed a staged approach to the prevention and management of obesity that ranges from stage 1 in primary care settings to stage 4, which is a tertiary care intervention.<sup>17</sup> Building clinical competence and expanding the scope of care in all 4 stages of treatment, including universal screening in primary care, might enable families to take action before obesity reaches a level that requires

intensive treatment. Expanding the availability of treatment programs to fill the void between primary and tertiary care might be an effective strategy for supporting earlier intervention in primary care, because providers with access to referral resources have reported better screening practice.<sup>6</sup>

Clinical capacity for obesity prevention and treatment needs to be built across a coordinated spectrum of care that includes inpatient, outpatient, specialty, and primary care. This article is meant to serve as a guide for obesity specialists, academic institutions, professional organizations, insurers, community agencies, pediatric specialists, hospitalists, and primary care providers, who can collaborate to improve care for child weight status.

## CURRENT EFFORTS

Childhood obesity experts practicing at hospital- and university-based programs have conducted effective interventions to improve obesity prevention and treatment in a variety of practice settings. Capacity-building occurs through educational forums for practicing providers, such as formal continuing medical education (CME) workshops, trainings, or year-long quality-improvement collaboratives to enhance a system-wide approach to obesity identification and management.<sup>18</sup> These forums offer the opportunity for networking among groups engaged in obesity work, including creating linkages with community-based organizations and schools. In some locations, medical students and residents are being targeted, such as with the "Fit for Residents" curriculum being tested in some California pediatric residencies.<sup>19</sup> Other partners in training initiatives have included professional organizations, local public health departments, foundations, community nonprofit organizations, and clinical

practice groups.<sup>18,20,21</sup> National Institutes of Health–funded trials are in progress to evaluate the effects of different strategies for addressing obesity in primary care.<sup>22</sup>

Although some training efforts are ongoing, more are needed. By increasing the comfort and competence of primary care providers, referrals to obesity programs can be tailored to those with more medical necessity and readiness to use the expertise of an interdisciplinary team. Building the relationship between treatment programs and primary care providers can ease the referral process and might also lead to collaborations such as community-based initiatives to promote active living/healthy eating.

In addition to primary care providers, pediatric subspecialty providers will also benefit from training on screening and identification. Subspecialists treat conditions comorbid with pediatric obesity and can facilitate referral and treatment. Rates of obesity in tertiary care subspecialty clinics might range from ~12% to 30%.<sup>23</sup> Pediatric hospitalists and other hospital-based specialists who are aware of the evidence-based principals of screening and treatment for childhood obesity might provide important services to hospitalized obese children. Obese children, especially the 4% of the population who are severely obese (BMI at the >99th percentile for age), can suffer from obesity-related conditions that require inpatient treatment.<sup>24</sup> Inpatient and outpatient treatment of the severely obese child often involves multidisciplinary collaboration between teams of medical professionals including those in intensive care, pulmonary medicine, gastroenterology, endocrinology, orthopedics, hospital medicine, and others. A truly coordinated system of care for the hospitalized obese child is built on a shared understanding and uniformity of

screening and treatment messages between providers from different disciplines within pediatrics.

### BENEFITS TO PROVIDERS

Overall, studies of current practice have revealed low use and documentation of BMI and BMI percentiles for identifying overweight and obese children.<sup>6,25–31</sup> Providers' responses to surveys have indicated tension between a strong desire to address the problem and low confidence in the effectiveness of what they can do.<sup>6</sup>

However, research results have suggested that providers do play an important role in motivating change through systematic screening. Recent studies have found that provider counseling on BMI status is strongly correlated to accurate parental perception of child weight status and that parents who perceived a child's weight as a health problem were almost 10 times more likely to be motivated to make healthy lifestyle changes.<sup>32,33</sup>

Evidence indicates that early identification and referral for treatment during early childhood yields much greater success in treatment. Two large-scale long-term observational studies of treatment programs that served children from 2 to 14 years of age recently demonstrated a large-magnitude increase in long-term treatment efficacy among obese children who were identified and referred for treatment between 2 and 6 years of age compared with those with obesity identified and treated in later childhood.<sup>34,35</sup> Providers who identify obese children early and refer them to successful treatment will positively reinforce their own screening behaviors.

Providers are being asked to meet increasing quality-improvement standards. New in 2009 are Healthcare Effectiveness Data and Information Set (HEDIS) measures that include documentation of BMI category as well as

counseling for nutrition and physical activity via administrative data or medical record review. HEDIS measures are set by the National Committee for Quality Assurance (NCQA). These measures are used as a tool by the majority of health care plans to measure performance on important dimensions of care and service. In addition, the American Board of Pediatrics now requires demonstration of a quality-improvement initiative to obtain recertification. Online quality-improvement support for childhood obesity is offered by the American Academy of Pediatrics through the "Let's Move!" initiative. Obesity-related quality improvement might satisfy this new requirement for maintenance of certification.

There are potential financial benefits to providers who learn how to code for their time in a manner that will be reimbursed by insurers for obesity care. Some insurers reimburse providers at higher rates for demonstrable quality-improvement measures for various conditions. In addition, educational outreach from hospital-based obesity experts can teach providers how to advocate with insurers to obtain higher or appropriate reimbursement for obesity care.

### STUDIES OF PRACTICE-CHANGE INTERVENTIONS

Two collections published as supplements to *Pediatrics* are excellent resources for those seeking more detailed description of the evidence supporting the recommended clinical approach and successful training interventions: "Expert Committee Recommendations Regarding the Prevention, Assessment, and Treatment of Child and Adolescent Overweight and Obesity,"<sup>36</sup> published in December 2007, and "Responding to the Childhood Obesity Epidemic,"<sup>37</sup> a collection of articles that describe a spectrum

of interventions for changing clinical care, which was published in June 2009.

Interventions that have been attempted to support improved obesity prevention and treatment among primary care providers have varied widely on 3 key aspects:

- reach: the number of providers affected;
- intensity: duration, number, and frequency of contacts with expert or practice-change system (increasing intensity is often directly correlated with time and monetary resources required to carry out the intervention); and
- effectiveness: demonstration of changes in practice patterns and sustainability of changes over time (see Table 1).

### **The Most Commonly Used Interventions Have Modest Effectiveness**

In a 2009 survey of 15 National Association of Children's Hospitals and Related Institutions FOCUS group hospitals, 86% of childhood obesity-treatment programs reported being active in educating and training pediatric providers in the community. Didactic CME lectures were the most commonly reported format, whereas interactive and long-term interventions were reported less frequently. However, systematic reviews and meta-analyses have revealed only small changes in primary care practice for CME targeting a variety of health conditions; an average of 6% improved in frequency of following a given guideline.<sup>38</sup> A smaller effect is seen for complex behaviors such as screening, prevention, and treatment of obesity. Combining didactic and interactive sessions increases effectiveness.<sup>38</sup> With this understanding, traditional CME should be used as part of a larger, progressive strategy for sup-

porting practice change. For example, traditional CME can be used as a method for building consensus and interest among providers for more extensive efforts.

### **What Types of Interventions Are Effective?**

Intense interventions tend to be most effective but are limited in reach by available resources. Several moderate-intensity interventions have had moderate effectiveness in changing clinical practices according to a systematic review: repeated interactions with experts, small-group discussions, real-time clinical reminders, and educational outreach visits.<sup>39</sup> Attention should be paid to the importance of training providers in the full spectrum of obesity care, from identification to counseling and referral. When Kaiser Permanente in Georgia trained physicians to screen for obesity, there was poor uptake of screening practices until the physicians were also trained in counseling for treatment.<sup>40,41</sup> This finding suggests that primary care providers might hesitate to screen for excess weight gain without confidence in their ability to provide obesity-prevention or -treatment options. In general, interventions with more intense and longer-term follow-up by the trainers, those that teach quality-improvement methodology to providers, and those that provide booster trainings have reported success in changing primary care practice.<sup>18,20,21</sup>

Most of the available evidence points to effective changes in practice patterns. Data on the effects of adapting clinical practice on child BMI status are beginning to emerge. One-year follow-up data from a planned 2-year study of office-based motivational interviewing and practice redesign show effective BMI reduction in low-income overweight preschool-aged children and girls of any income level.<sup>42</sup> Addi-

tional data are expected from multiple ongoing studies that are using the practice-change techniques described in the next section and examining child BMI outcomes.<sup>43</sup> Although further research in this area could lend even further justification for practice change, other experts agree that change should not wait and that insurers should consider subsidizing these change efforts.<sup>44</sup> There is already sufficient evidence of the need for providers to engage in screening and referral and for increased availability of evidence-based treatment programs, as recommended by the US Preventive Services Task Force.<sup>13</sup>

### **TOOLS AND INTERVENTIONS FOR IMPROVING CHILDHOOD OBESITY PREVENTION AND TREATMENT IN CLINICAL PRACTICE**

The body of literature regarding effective techniques is evolving rapidly. Technological tools might allow effective interventions with wide reach to be delivered at lower cost. These interventions include interactive computer-based training and electronic health records that guide clinical decision-making and counseling.<sup>45</sup>

Table 1 provides a brief overview of interventions and summary ratings of relative intensity, cost (inversely associated with reach), effectiveness (if evidence exists), and an example that has been published or is available on the Internet. Some, but not likely all, of the knowledge and skills that need to be imparted will be amenable to Web-based dissemination.

### **KEY COMPONENTS OF PRACTICE-CHANGE INTERVENTIONS**

Expert Committee recommendations and published studies of successful practice-change interventions highlight content and thematic elements of training that providers should seek and that expert/society-driven inter-

**TABLE 1** Types of Interventions to Improve Primary Care Obesity Practice and Representative Examples.

Type of Educational Tool/Strategy	Relative Intensity	Relative Cost	Effectiveness at Practice Change	Example
Multiday, multisite practice-change collaborative model with instruction in quality-improvement methods	High	High	Evidence of large change in practice maintained long-term	Washington State Steps to Health, King County and Maine Youth Overweight Collaborative <sup>10,13</sup>
Breakthrough-series collaborative plus electronic medical record distribution with integrated obesity decision support	High	High	A large-scale intervention was effective in changing practice, but there were challenges with implementation	Nemours (Wilmington, DE) <sup>30</sup>
One-day trainings with follow-up visits (academic detailing or booster training)	Moderate	Moderate	Low effectiveness without follow-up per Cochrane reviews; moderately effective with follow-up	Envision New Mexico school-based health centers <sup>12</sup>
Webinars/calls on topics of interest	Low to moderate	Low to moderate	Evidence not available	NICHQ-COAN Q-calls ( <a href="http://www.nichq.org/conferences_training/q-calls/index.html">www.nichq.org/conferences_training/q-calls/index.html</a> )
Internet listing of collected resources	Low	Low	Evidence not available	NICHQ childhood obesity implementation guide: best practices and tools ( <a href="http://www.nichq.org">www.nichq.org</a> )
Internet-based distribution of a comprehensive toolkit for providers plus Internet-based quality improvement	Low	Moderate (to develop toolkit)	Evidence not available; the AAP Web site will allow individual practice to compare results with a national reference database	AAP "Let's Move in the Clinic" ( <a href="http://www.aap.org/obesity/letsmove">www.aap.org/obesity/letsmove</a> )
Internet-based interactive training	Low	Moderate (to develop training)	Evidence not available	Kaiser Permanente online tutorial in motivational interviewing ( <a href="http://www.kphealtheducation.org/pwm">www.kphealtheducation.org/pwm</a> )
Traditional didactic CME lectures	Low	Low	Evidence of small effect for multiple conditions	Cochrane reviews <sup>26</sup>

NICHQ-COAN indicates National Initiative for Children's Healthcare Quality Childhood Obesity Action Network; AAP, American Academy of Pediatrics.

ventions should include. Content should include assessment of weight status and contributory history; comorbidity assessment; counseling, including motivational interviewing techniques; treatment staging according to severity and readiness to change; knowledge and building of referral resources; design of an office environment that supports healthy lifestyles; and support for community advocacy activities.<sup>18,20,21,30</sup> Those who seek to deliver or participate in practice-change interventions might examine these references to find example interventions that best suit the organizational structure and resources available.

The most robust interventions use a common set of theoretical frameworks and improvement paradigms that have been used to improve management of many chronic conditions and have been adapted successfully to studies that target childhood obesity:

the model for improvement; the chronic care model; and the collaborative-learning model.<sup>44,46-48</sup> Improvement in practice is accomplished by engaging providers and office staff in "plan-do-study-act" cycles to redesign practice around the chronic care model through redesign of the practice system, patient self-management support, and provider decision support. Collaboratives allows practices to learn from the experience of other participating practices that are facing similar challenges. In addition to using these processes, those who create the most successful interventions have recognized the linkage between providers' self-efficacy in counseling and participation in screening.<sup>18,23</sup> Resources to improve providers' counseling self-efficacy are provided, typically by training providers/office staff in motivational interviewing techniques and providing counseling hand-

outs and/or electronic decision support for the office visit.<sup>45</sup>

**METRICS OF TARGETED OUTCOMES**

We also aim to summarize the evidence for measurements that can be used to evaluate practice change. A Cochrane review meta-analysis of educational interventions for health care providers categorized outcomes as changes in professional practice, changes in patient outcomes, or changes in both.<sup>38</sup> Metrics used to obtain data on changes in the professional practice included participant surveys, patient surveys, and logging tests performed by providers. Studies that measured patient outcomes did so for outcomes that were already established as standard of care, such as laboratory-test levels. From the few publications that addressed the effectiveness of medical provider education on childhood obesity, the metrics used have been lim-

ited. The most detailed of the group, the Maine Youth Overweight Collaborative, used chart reviews for provider documentation along with parent and provider surveys.<sup>21</sup> One group that investigated the effects of educating providers in the school-based health centers on childhood obesity used chart review of well-child checks and sports physicals.<sup>20</sup> Another group, which introduced the 5-2-1-0 (5 servings of fruit and vegetables per day, <2 hours of screen time per day, at least 1 hour of physical activity per day, and no sugar-sweetened beverages) message to schools used surveys of parents and providers to evaluate their success.<sup>49</sup>

Last, a group from the University of Washington collaborated with other organizations to educate providers. In addition to using chart review, the group required its clinic teams to maintain a patient registry that facilitated tracking data.<sup>18</sup> To date, a single randomized controlled trial of the impact of an intervention similar to those just described has found positive BMI-change outcomes in subgroups of overweight preschool-aged children, and BMI outcomes from several other studies are expected soon.<sup>42,43</sup>

### CONCLUSIONS

There is great need to expand capacity for prevention of obesity and care

of obese children throughout the continuum of care in pediatrics. There have been innovative and effective interventions for changing practice, but interventions must extend beyond traditional didactic CME to make a significant impact. Obesity experts engaged in practice-change initiatives can reference evidence-based guidelines for the content and evaluation of these programs to improve obesity care. The justification for individual providers and institutions to expand capacity for obesity care is strong on multiple levels, including financial and quality concerns.

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# Payment for Obesity Services: Examples and Recommendations for Stage 3 Comprehensive Multidisciplinary Intervention Programs for Children and Adolescents

## abstract

**OBJECTIVE:** The Reimbursement and Payment Subcommittee of the National Association of Children's Hospitals and Related Institutions FOCUS on a Fitter Future group sought to guide medical providers, patients, and payers to better serve obese children and adolescents to enable optimum health. Recommendations are provided for the essential components of a stage 3 comprehensive multidisciplinary intervention program as defined by the 2007 Expert Committee recommendations. In addition, suggestions are offered for a stepwise approach to implement these recommendations.

**METHODS:** In 2009, key informant interviews were conducted with 15 children's hospitals participating in FOCUS on a Fitter Future and 1 nonparticipating hospital. Interview transcripts identified 5 financially sustainable stage 3 programs, each funded differently.

**RESULTS:** The stage 3 programs interviewed ranged from being nascent to 21 years old (27%, <2 years; 47%, 2–6 years; 27%, >6 years). All of them had multidisciplinary teams that delivered services through 1 of 3 institutional structures: 60% freestanding; 7% specialty; and 33% hospital within a hospital. One-third of them had 1 to 2 funding sources, and 67% had  $\geq 3$  sources.

**CONCLUSIONS:** The stage 3 programs in this review shared some common strategies for achieving financial stability. All of them followed key strategies of the chronic care model, the details of which led to the following recommendation: stage 3 programs should include a health care team with a medical provider, registered dietitian, physical activity specialist, mental health specialist, and coordinator who, as a team, provide service to overweight and obese children at no less than moderate intensity (26–75 hours). *Pediatrics* 2011;128:S78–S85

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### KEY WORDS

childhood obesity, health insurance, multidisciplinary weight management, payment

### ABBREVIATION

ROI—return on investment

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The 2007 “Expert Committee Recommendations Regarding the Prevention, Assessment, and Treatment of Child and Adolescent Overweight and Obesity: Summary Report”<sup>1</sup> described how the chronic care model encompasses the necessary components for a health care system to be effective in caring for childhood obesity. Linking the medical home, community resources, decision and support, and patient self-management within the chronic care model are key strategies for helping ameliorate the obesity epidemic.

One critical component within the chronic care model is the use of practice guidelines such as those issued by the National Initiative for Children’s Healthcare Quality (NICHQ).<sup>2</sup> Although the 2007 Expert Committee made detailed recommendations for management of stages 1 (prevention) and 2 (prevention plus) care of obese and overweight children, stages 3 (comprehensive multidisciplinary intervention including a dietician, physician, behavioralist, and exercise physiologist or physical therapist) and 4 (tertiary care that includes surgical and/or pharmacological management) were less delineated, partly because of a lack of available evidence. Although this lack of clarity has provided opportunities for innovation, without detailed guidelines for higher-level care, clinicians struggle to establish and sustain tertiary care obesity programs. As a consequence, health insurers and hospitals often have to evaluate coverage of obesity care services on a case-by-case basis, which creates a barrier between patients and providers. The goal of this report is to improve access to high-quality stage 3 (comprehensive multidisciplinary intervention) programs for morbidly obese children by addressing a critical barrier to receiving care: payment for services.

Since the writing of the 2007 Expert Committee recommendations, there

has been additional scientific evidence to support practice recommendations for stage 3 level of care<sup>3-5</sup> and, therefore, a need to address payment for delivery of health care service for morbidly obese children who require multidisciplinary services. The reimbursement and payment subcommittee of FOCUS on a Fitter Future was established with the goal of providing support for advocacy efforts related to payment for multidisciplinary teams engaged in stage 3 programs. The objectives of the committee were to (1) develop recommendations for the components necessary to provide effective management of the obese child who needs stage 3 services and (2) develop materials for providers to advocate with health insurance plans, major employers, and legislatures for payment of stage 3 services. These materials include a previous authorization template, a PowerPoint template, and a 1-page information fact sheet (all available at [www.childrenshospitals.net/obesity](http://www.childrenshospitals.net/obesity)).

The committee aims to guide medical providers, patients, and health care payers to better serve obese children and adolescents so that they can achieve personal health. Resource outcomes include examples of financially sustainable stage 3 programs; examples of promising pediatric chronic care programs that address health issues other than obesity; and summaries of current literature describing successful comprehensive multidisciplinary intervention programs. On the basis of this review of existent programs and resources, recommendations are provided for the essential components of a stage 3 comprehensive multidisciplinary intervention program, and suggestions are offered for a stepwise approach to facilitating physicians, patients, and payers to implement these recommendations.

## METHODS

Key informant interviews were conducted in summer 2009 with 1 representative from each of the National Association of Children’s Hospitals and Related Institutions (NACHRI) member hospitals participating in FOCUS on a Fitter Future and 1 nonparticipating hospital. NACHRI staff and participants from the sustainability and return on investment subcommittee conducted the interviews. Four of the authors (Dr Slusser, Ms Staten, Ms Stephens, and Dr Yeh) reviewed the transcripts of the interviews and identified examples of 5 financially viable stage 3 programs, each of which was funded differently. Further questions were directed to the program representative if additional information was needed. Two programs are described below, and the others are reviewed on the NACHRI Web site ([www.childrenshospitals.net/obesity](http://www.childrenshospitals.net/obesity)).

## RESULTS

The examples below (with the exception of 1 program) were identified from a group of 15 stage 3 comprehensive multidisciplinary intervention programs. Program age ranged from not-yet-launched to 21 years (27%, <2 years; 47%, 2–6 years; 27%, >6 years). The programs all had multidisciplinary teams that provided services for the stage 3 programs. The programs were delivered in 3 distinct sites: 60% freestanding; 7% specialty; and 33% hospital-based. The number of patient visits ranged from 17 to 3285 (median: 800 for the year before applying to the collaborative). The number of new patients for this period ranged from 10 to 950 (median: 114). One-third of the clinics had 1 to 2 funding sources, and 67% had  $\geq 3$  funding sources. Funding sources for the clinics were 87% clinical revenue, 80% institutional support, 60% grant support, 47% foundation support, and 7% endowments. The common themes expressed

**TABLE 1** Facilitators and Barriers to Stage 3 Weight Management Programs

Facilitators	Challenges
Bundling services or a flat clinic fee helps cover specialists not well covered	Current insurance coverage frequently fails to adequately reimburse the multiple providers and multiple visits required for comprehensive care <sup>3</sup>
Hospital support from the financial departments is often required to negotiate contracts that cover an adequate number of visits and comprehensive services	Dietary and psychology services in particular are critical and often uncovered <sup>3</sup>
Separate billing for psychological and physical therapy services is possible and helps sustain these services	
An investment from the children's hospital or other funding agency is required to offset costs especially at start up	Programs are destined for financial failure unless other sources of revenue are made available
Development of a bariatric surgery program and potential for downstream procedural revenue can provide incentive for hospitals to support clinic costs but do not guarantee financial viability of the program	
Tracking and reported other services utilized by the program helps show how costs can be offset by increased utilization of other services such as laboratory assessments and studies	
Obtain research grants to help demonstrate program results and cost-effectiveness and provide salary support for personnel	Grant-funding requires significant labor for applying and providing outcomes to grant providers <sup>3</sup>
Community partnerships add value to programs	Community programs seldom provide funding for day-to-day operation
Demonstrate ROI; short-term initial investments can result in long-term savings when chronic disease can be prevented or development of comorbidities can be delayed. This has been demonstrated with renal disease if dialysis and renal transplantation can be prevented or delayed. There are also new studies that have demonstrated that bariatric surgery in the adult population can result in downstream savings within 2–4 y by avoiding the need for medications needed to treat comorbidities	As patient loads increase, deficit in payments received increases, which decreases sustainability

by the program representatives and related to payment are listed in Table 1.

### STAGE 3 CASE STUDIES

#### Duke Children's Healthy Lifestyles Program

##### Funding

This program is funded from a hybrid of clinic visit payments and grants.

##### Start Date

In 2005, leadership at Duke Children's Hospital and Health Center recognized the need for a comprehensive childhood obesity-treatment program.

##### Initial Funding

The fundraising efforts of the hospital's national board provided an initial investment of approximately \$500 000 by June 2006. Sponsorship was mostly corporate and philanthropic.

##### Program Leadership

The Duke Children's Healthy Lifestyles Program recruited a program director and identified a dietitian and program coordinator.

#### Development and Current Services Offered

This team began to see patients in October 2006 to promote evidence-based lifestyle behaviors. As the patient referral base grew, the Healthy Lifestyles Program added staff, a satellite location, group programs, a training component, and an office of community outreach. The Healthy Lifestyles Program currently employs 7 part-time pediatric medical providers (1 physician's assistant, 1 nurse practitioner, 5 physicians), 2 dietitians, 1 physical therapist, a clinical psychologist, a social worker, and a program coordinator. All providers are certified in motivational interviewing. The current Healthy Lifestyles Program protocol includes a 1-hour screening visit with a medical provider to review required laboratory work, BMI, and family history; this is followed by an intensive phase of 5 monthly visits with the medical provider, dietitian, physical therapist, and psychologist as needed. Minimum requirements include 6 medical, 4 dietitian, and 2 physical therapy vis-

its within a 1-year period. Patients are then seen biannually in the maintenance phase until they age out of the program at 22 years.

##### Payment

Reimbursement by third-party payers for the medical and physical therapy visit only provide the clinical revenue; comorbidities are primarily billed. Billing for registered dietitian and behavioral services was attempted; however, reimbursement was inconsistent, and patients refuse services because of noncovered services or high copayments. Payer mix is ~40% Medicaid, 10% Duke employee health, 20% managed care, and 30% BlueCross BlueShield/Aetna/Cigna/other. Despite aggressive billing practices and negotiations with local payers, revenue falls short of operating expenses by ~10% per year.

#### Healthy Hearts Program

##### Funding

This program is funded entirely from clinic visit payments.

### Start Date

Healthy Hearts started in late 2008 having evolved out of the former Healthy Eating Active Living program, a multidisciplinary weight-loss program that operated for 5 years at Children's Hospital & Research Center Oakland in California.

### Initial Funding

Because it was routinely receiving referrals for overweight/obese children who were experiencing chest pain, the cardiology group based at Children's Oakland decided to add a preventive cardiology component to its practice.

### Program Leadership

The group hired the former leadership of Healthy Eating Active Living.

### Development and Current Services Offered

The program leadership reconfigured a few core program elements of the Healthy Eating Active Living program. Patients are currently seen 3 days/week in 4 different locations in the Bay Area serving a diverse population of urban and suburban families. The Healthy Hearts team includes 2 general pediatricians (0.8 full-time employee), an adolescent medicine physician (0.15 full-time employee), a preventive cardiologist (0.20 full-time employee), a pediatric nurse practitioner (0.4 full-time employee), a registered dietitian (0.5 full-time employee), an exercise physiologist (0.4 full-time employee), and a psychologist (0.4 full-time employee). Patients who participate in the Healthy Hearts program receive care and counseling 1 hour at a time over the course of 6 visits, ~2 to 4 weeks apart, with follow-up visits 3 and 6 months after completion of the program. During the initial visit, the patient goes through an extensive intake evaluation and establishes goals for the next visit and the course of the program that is led by a pediatrician.

The patient receives care from the registered dietitian, exercise physiologist, or psychologist in the subsequent visits, and the physician or nurse practitioner also provides care at each of these visits. To reduce the no-show rate at 1 of the sites, the program runs a free orientation session twice per month at which patients and families are given information about the program and its expectations. Interested families are given their initial clinic appointment at the end of the orientation session, and referring providers are notified if families do not want to schedule an appointment.

### Payment

Because a physician or nurse practitioner sees and examines every patient, all services are billed as medical visits with as many as 6 comorbidities. In the first year, payments from third-party payers covered ~50% of the cost of the program, and grants covered another 6%. Slower-than-expected volume growth was a critical factor in the first year's experience, but introducing the program to diverse communities has changed the program's payer mix from 70%/30% MediCal/commercial to 50%/50% MediCal/commercial. It is estimated that a 50/50 payer mix will reduce the operating deficit, but grant support and research funding will still be necessary. As co-director Lydia Tinajero-Deck, MD, wrote: "I know with my experience... survival depends on some grant money unless you have a bariatric component."<sup>4</sup>

## DISCUSSION

The programs and summary we have given provide insight into stage 3 programs that have sustained themselves through grants, fee-for-service, linkages with associated revenue and generated hospital services, and endowments. The programs described all follow key strategies of the chronic care model with linkages of the

medical home, community resources, decision and support, and patient self-management

Recent reviews on obesity-related interventions have revealed the effectiveness of obesity-treatment interventions, especially those with intensive treatment regimens. The reviews also add support to how the chronic care model encompasses the necessary components for a health care system to be effective in caring for childhood obesity, as proposed by the 2007 Expert Committee. A Cochrane review on obesity-treatment interventions in 2009 included 64 randomized controlled trials with lifestyle (dietary, physical activity, and behavioral) and drug interventions.<sup>3</sup> Bariatric surgery interventions were excluded. The investigators found that for children younger than 12 years, family-targeted lifestyle interventions were effective in the short-term, but the effects did not last for longer periods of follow-up. In contrast, for adolescents aged 12 years and older, combined dietary, physical activity, and behavioral interventions had a longer-term effect. These outcomes were enhanced with pharmacologic (metformin and orlistat) interventions.

On the basis of the Cochrane review, the US Preventive Services Task Force reviewed its recommendations regarding childhood and adolescent obesity interventions and found that medium- to high-intensity comprehensive behavioral interventions were effective in the treatment of obesity in the short-term. The studies reviewed enrolled children and adolescents aged 4 to 18 years in comprehensive behavioral interventions comprising 3 components: weight loss or healthy diet counseling; physical activity counseling or an activity program; and behavioral management techniques. Levels of intensity were based on hours of contact (low, 10 hours; moderate,

26–75 hours; and high, >75 hours). The evidence suggests the medium- to high-intensity programs can be effective over the short-term (up to 12 months after intervention), although additional research is needed to demonstrate the long-term outcomes. The task force also concluded that combined comprehensive behavioral and pharmacologic interventions might be beneficial to adolescents.<sup>4</sup>

Consistent with the chronic care model, these interventions rely on supportive specialists delivering the program in coordination with the physicians and nurse practitioners. The principles of the medical home as part of the chronic care model that apply to the stage 3 services for obese patients are (1) physician-directed medical practice, (2) whole-person orientation, (3) care coordination and/or integration, (4) quality and safety, and (5) enhanced access. The goal is improved health outcomes and patient satisfaction and a more efficient use of health resources through avoiding duplication of services. Currently, there are models of this approach in the health care systems for children with chronic health conditions. The California Children's Services, the Pennsylvania Medical Assistance, and the Healthier Generation programs described in the next section illustrate successful or emerging payment models that provide promising examples for payment strategies for stage 3 comprehensive multidisciplinary intervention programs.

### California Children's Services Program

California Children's Services (CCS)<sup>6</sup> is California's Title V program for children with special health care needs. It provides supplemental health insurance for children younger than 21 years who live in California (regardless of documentation status), have

certain diseases or health problems, and meet specified financial guidelines. The services provided by CCS are comprehensive and include diagnostic and therapeutic medical services, medical visits, and electronic communication devices. The providers who are reimbursed and play a key role in care coordination include physicians, nutritionists, social workers, physical therapists, and nurses. Most CCS-eligible conditions are chronic and disabling. CCS covers medical services related to childhood obesity such as type 2 diabetes and hypertension. CCS reimburses at a higher rate than Medicaid and improves access to specialists. On the basis of its goals and services, CCS could be an ideal mechanism through which to pay for health care needed by children with metabolic syndrome or children with a BMI at the  $\geq 95$  percentile and 1 or more comorbidities. This, in turn, would reduce the numbers of children and adolescents who develop type 2 diabetes, which leads CCS to save money in the long run.

### Pennsylvania and Clinton Foundations Prevention Service Payments

There have been a few attempts at statewide reimbursement efforts for childhood obesity. Pennsylvania Medical Assistance established a multidisciplinary (including agencies, consumers, and providers) obesity workgroup in 2004.<sup>7</sup> As part of its work the workgroup designed a service package that recognized the high need for obesity prevention and treatment, the types of services needed, and the projected return on investment (ROI). The service package included an initial assessment (Current Procedural Terminology [CPT] code 96150, 30- to 45-minute visit) per year (maximum of 3), and 4 reassessments (CPT code 96151, 30- to 60-minute visit) per year. They also recommended using

consistent diagnostic International Classification of Diseases (ICD) coding: 278.00 through 278.02 along with V85.52 through V85.54. Nutritional counseling ICD codes (S9470) for registered dietitians were also covered at a maximum of 12 visits per year (for more information about billing codes related to obesity and the comorbidities, visit [www.aap.org/obesity/pdf/ObesityCodingFactSheet0208.pdf](http://www.aap.org/obesity/pdf/ObesityCodingFactSheet0208.pdf)). These visits were expanded to include those in the community. These reimbursement efforts were coupled with provider education and continuing medical education. They estimated that the ROI was 67.1% over a 10-year period, netting \$12.1 million (\$5.5 million state share) savings above the cost of \$18.1 million (\$8.2 million state share). The estimate of ROI is based on a number of parameters and study results by Epstein et al (1981 and 1995).<sup>8,9</sup> During a conference call with key Pennsylvania stakeholders in winter 2009, the authors learned that although this service package is available for Medicaid patients in Pennsylvania, at the time it had not yet been widely used, possibly because patients and providers were still unaware of this benefit package.

In February 2009, the Alliance for a Healthier Generation,<sup>10</sup> a partnership between the Clinton Foundation and the American Heart Association, launched a health care initiative with several insurers and employers to provide a childhood obesity reimbursement benefit in the primary care setting (stage 1). This annual benefit included 4 visits with a primary care provider and 4 visits with a registered dietitian to focus on weight management. They estimated that the benefit would reach >6 million children in 3 years. The initiative includes provider tools and resources to support management and an evaluation component. This initiative is just completing

its first year, and there have been no reported outcomes to date. Although the results of these reimbursement benefit efforts are still pending, there is clearly a need to couple reimbursement efforts with provider and consumer education, and adequate reimbursement needs to be in place for providers to incorporate assessment, prevention, and management recommendations into clinical practice. The efforts target obese children and adolescents who are receiving services in the primary care office and those children with certain comorbidities (type 2 diabetes and hypertension) at the tertiary care centers.

To our knowledge, no statewide or national efforts are testing models of payment packages for children treated by a multidisciplinary team, as recommended at stage 3 by the expert work group. However, these efforts are desperately needed, given the near-doubling of hospital admissions and an associated increase in costs from \$125.9 million in 1999 (adjusted for inflation) to \$237.6 million in 2005 among US children aged 2 to 19 years with a diagnosis of obesity. Medicaid is paying a large portion of the hospitalizations for conditions associated with obesity.<sup>11</sup> These high costs and findings from an integrated health system in which an annual excess of approximately \$740 per obese pediatric patient is spent on primary care sick and mental health visits<sup>12</sup> are compelling arguments from a policy perspective to pay for stage 3 comprehensive multidisciplinary intervention programs. Authors of a report from the Thomson Corporation analyzed medical claims data to examine children treated for obesity with private insurance versus Medicaid in 2004 and determined that the mean covered health care expenses for privately insured chil-

dren was \$3743 compared with \$6730 for children on Medicaid.<sup>13</sup> The diagnoses that drove these costs up for both groups of insured children were mental health disorders, gastrointestinal or abdominal symptoms, and bone and joint disorders.

On the basis of the Thomson's Corporation claims data, Pennsylvania's model of calculating the ROI for stage 1 and 2 interventions, and the review articles that have reported successful evidence-based stage 3 programs, parameters were chosen and the ROI for stage 3 programs was calculated. The following parameters were used to calculate the ROI: (1) stage 3 programs reported as most successful, at least in the short-term, are those of moderate (26–75 hours) or high (>75 hours) intensity<sup>4</sup>; and (2) assume the average cost to participate in a moderately intense program is \$3000 (taking the average of 26 and 75, which is 50.5 and pricing a conservative \$60/hour for the intervention, which includes physician, dietitian, physical therapist, psychologist, and coordinator's time) per patient and a success rate estimated at 41% initially<sup>8</sup> and 30% of these successful children at 10-year follow-up.<sup>9</sup> Then the initial investment of \$3000 with 41% of the patients successfully reaching the <85th percentile for BMI<sup>8</sup> results in an investment of \$7317 for every successful patient. Cost savings would be realized, on the basis of the Thomson Corporation claims data analysis, after the second year for the privately insured patients and after the first year for Medicaid-insured patients. In 10 years, if 30% of the original 41% of patients maintain a BMI below the 85th percentile,<sup>9</sup> the cost per successful patient based on the initial investment is \$24 390, a cost recovered in 6.5 years for the privately insured patient and 3.5 years for the Medicaid insured patient.

## FUTURE DIRECTIONS

This review of current literature, payment efforts, a proposed ROI, and the chronic care model, which aims to maximize quality and efficiency with the proper utilization of each health care provider in the office, provides the foundation for the following recommendation: stage 3 comprehensive multidisciplinary intervention programs should include a health care team with a medical provider, registered dietitian, physical activity specialist, mental health specialist, and a coordinator providing service to overweight and obese children at no less than moderate intensity (26–75 hours) using evidence-based behavioral and medical interventions and linkages to community resources (see Table 2). Our recommendations further define what providing care at stage 3 means for the obese child; as written in recommendation 2.11 from the White House Task Force on Childhood Obesity states, "Federally funded and private insurance plans should cover services necessary to prevent, assess, and provide care to overweight and obese children."<sup>14</sup>

We recognize that for payers to support such a transformative model, it will need to be implemented in steps. We recognize that dietitians are rarely reimbursed to care for obese children, so we propose the following as the initial care plan for the morbidly obese child: 6 medical visits that might include the mental health specialist and the physical activity specialist team members and 6 dietitian visits. After this initial care plan, the multidisciplinary team and payer should review patient progress and recommend further medical and dietitian visits and further inclusion of mental health specialists and physical activity specialist if needed; the goal is to reach a minimum service of moderate intensity of 26 to 75 hours.<sup>4</sup> To assess quality and

**TABLE 2** Proposed Stage 3: Structured Weight Management Care

Services	BMI	
	85th–94th Percentile	≥95th Percentile
Medical: MD/DO/nurse practitioners with a special interest in childhood obesity who works closely with primary care physicians and follow the chronic care model of care delivery	With comorbidities 1/mo for 6 mo, then as needed or minimum 4/y During visits monitor progress to sustain health improvements or to escalate care as needed and to screen for comorbidities	With or without comorbidities 1/mo for 6 mo, then as needed or minimum 4/y
Registered dietician visits	1/wk for 16 wk with follow-up at 3, 6, 9, and 12 mo	1/wk for 16 wk with follow-up at 3, 6, 9, and 12 mo
Mental health services (mental health: PhD, MFT, LCMSW, MA) if indicated during initial assessment	1/wk for 16 wk with follow-up at 3, 6, 9, and 12 mo If indicated on the basis of initial assessment	1/wk for 16 wk with follow-up at 3, 6, 9, and 12 mo If indicated on the basis of initial assessment
Physical activity: physical therapist, exercise physiologist	Initial assessment	Physical activity with incremental increases with the goal of 1 h/d supervised by a professional in physical activity at least 1/wk for 16 wk with follow-up at 3, 6, 9, and 12 mo; other support services as needed
Laboratory tests: screening for comorbidities, continued follow-up of comorbid conditions	If risk factors present in history or physical exam: AST/ALT, fasting glucose and lipid levels, beginning at 2 y of age (every 2 y for screening)	AST/ALT, BUN/Cr, fasting glucose and lipid levels (with or without risk factors); consider insulin levels
Subspecialists involved as needed (eg, endocrinologist, gastroenterologist, orthopedist, cardiologist, pulmonologist)	As needed	As needed
Care coordination: RN, MSW, or health educator	As needed	As needed

AST indicates aspartate aminotransferase; ALT, alanine aminotransferase; SUN, serum urea nitrogen; Cr, creatinine.

quantify cost savings, the proposed desired outcome measures were chosen because they are easily measured, are associated with improved health outcomes, and reduce health care costs.<sup>1</sup>

1. Maintain or reduce BMI percentile (5 of the 5 programs described in this article collect these data).
2. Slow down weight-gain velocity (2 of the 5 programs described in this article collect these data).
3. Improve comorbidity measures (ie, reduce blood pressure, reduce insulin levels, reduce fasting serum

lipid levels) (4 of the 5 programs described in this article collect these data).

4. Reduce medication usage (2 of the 5 programs described in this article collect these data).
5. Increase school attendance (1 of the 5 programs described in this article collect these data).

Furthermore, we support the White House Task Force on Childhood Obesity's 2010 recommendation for future research to help further delineate the optimal care for obese children.<sup>14</sup>

In addition to the provision of stage 3 services, children's hospitals are leaders in their communities and play a key role in the promotion of health and wellness of children and their families and, in turn, the prevention of obesity within their communities. Failure to pay now by fairly supporting these professionals for their life-saving and cost-saving clinical work will only lead children, families, hospitals, insurers, and society to pay later in lower quality of life, higher health care costs, and higher mortality rates.

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# Perspectives on Obesity Programs at Children's Hospitals: Insights From Senior Program Administrators

## abstract

**OBJECTIVE:** The obesity epidemic has resulted in an increasing number of children needing multidisciplinary obesity treatment. To meet this need, pediatric obesity programs have arisen, particularly in children's hospitals. In 2008, the National Association of Children's Hospitals and Related Institutions (NACHRI) convened FOCUS on a Fitter Future, a group drawn from NACHRI member institutions, to investigate the needs, barriers, and capacity-building in these programs.

**METHODS:** Senior administrators of the 47 NACHRI member hospitals that completed an application to participate in the FOCUS group were invited to complete a Web-based survey. The survey targeted 4 key areas: (1) perceived value of the obesity program; (2) funding mechanisms; (3) administrative challenges; and (4) sustainability of the programs.

**RESULTS:** Nearly three-quarters of the respondents reported that their obesity programs were integrated into their hospitals' strategic plans. Obesity programs added value to their institutions because the programs met the needs of patients and families (97%), met the needs of health care providers (91%), prevented future health problems in children (85%), and increased visibility in the community (79%). Lack of reimbursement (82%) and high operating costs (71%) were the most frequently cited challenges. Respondents most frequently identified demonstration of program effectiveness (79%) as a factor that is necessary for ensuring program sustainability.

**CONCLUSIONS:** Hospital administrators view tackling childhood obesity as integral to their mission to care for children. Our results serve to inform hospital clinicians and administrators as they develop and implement sustainable pediatric obesity programs. *Pediatrics* 2011; 128:S86–S90

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### KEY WORDS

administrator, obesity programs, children

### ABBREVIATION

NACHRI—National Association of Children's Hospitals and Related Institutions

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In response to the obesity epidemic, pediatric obesity programs have arisen within health care settings, particularly at children's hospitals. Approximately half of all children's hospitals across the United States provide some type of obesity program.<sup>1</sup> Although obesity care might not have been a core competency of children's hospitals 25 years ago, it is quickly gaining traction as a necessary part of services offered by children's hospitals. Currently, the *U.S. News & World Report* survey that determines the "top 30 children's hospitals" includes questions on whether the hospital has a multidisciplinary weight-management clinic and/or obesity program.<sup>2</sup> The 2007 Expert Committee, convened by the US Department of Health and Human Services and the American Medical Association, proposed that multidisciplinary obesity programs that offer intensive lifestyle intervention, very low-calorie diets, and bariatric surgery are needed.<sup>3</sup> These treatment modalities are reserved for children with a BMI at the >95th percentile and significant comorbidities, children who have not responded to previous diet, physical activity, and behavioral interventions, and children who have a BMI at the >99th percentile.<sup>3</sup>

Although demand for obesity-management programs is high, there are numerous challenges to developing and sustaining a program. These challenges include the cost of a large number of clinic personnel, the intensity of interventions, lack of reimbursement for multidisciplinary care, attrition rates, additional expense for specialized furniture and physical space, and identifying appropriate clinical and administrative outcome measures. To understand and address the challenges and build support and capacity for pediatric obesity management, the National Association of Children's Hospitals and Related Institu-

tions (NACHRI) convened FOCUS on a Fitter Future. Each participating multidisciplinary hospital team in the FOCUS group identified a designated medical champion who had primary responsibility for the program and a senior-level hospital administrator as the executive sponsor for the team.

Within the NACHRI FOCUS group, participants identified the initial step in building a viable and sustainable obesity program as a clear understanding of the expectations from their senior administrators. However, a common challenge for programs is a misalignment of program expectations between program staff and administrators. Most program champions have expertise in patient care and tracking clinical outcomes but might poorly grasp the business implications of their program, such as efficient use of personnel, program capacity, reimbursements, and financial viability. However, administrators tend to expect clinical or program outcomes that cannot be supported by the current state of practice for childhood obesity interventions. Our study objective was to examine the perspectives, challenges, and expectations of senior administrative personnel involved in a hospital-based pediatric obesity program. Although these expectations might vary on the basis of the unique circumstances of each hospital and program, there are common and recurring themes in how senior-level administrators collectively view the sustainability of obesity programs.

## METHODS

Executive sponsors of the 47 NACHRI member hospitals that completed an initial application to participate in the FOCUS group were invited to complete a brief Web-based survey. The survey targeted 4 key areas: (1) perceived value of the obesity program; (2) funding mechanisms; (3) administrative

challenges; and (4) sustainability of the programs.

Summary statistics were generated for all variables of interest. Statistical significance for bivariate categorical data (eg, program characteristics, length of program, funding sources, program challenges, perception of value added by program, and job title of respondents) was assessed by using the  $\chi^2$  or Fisher's exact test. All analyses were performed with SAS 9.1 software (Research Triangle Park, NC).

## RESULTS

Seventy-two percent (34 of 47) of the executive sponsors of the 47 NACHRI member hospitals that met the selection criteria completed the survey. Of the 47 hospitals, 42% of the obesity programs were under the auspices of the general pediatrics or ambulatory departments, and 55% were in a subspecialty division. Twenty-six percent of the respondents were chief executive officer/chief operating officer/president, 21% were vice president, and 50% were section chief. The length of time the programs had been in existence varied; 36% had existed for <2 years, 42% for 2 to 6 years, and 21% for >6 years. Programs within freestanding children's hospitals were more likely to have been in existence for >6 years compared with programs within specialty children's hospitals (eg, pediatric rehabilitation hospitals or hospitals within a larger health system or hospital) (100% vs 0%;  $P = .03$ ).

Nearly three-quarters of the respondents reported that their obesity programs were integrated into their hospitals' strategic plans, and 79% ranked the obesity program as "very important" or "important." According to the respondents, obesity programs added value to the institutions, because they met the needs of patients and families (97%); met the needs of health care providers (91%); prevented future

**TABLE 1** Reported Challenges Facing Obesity Programs

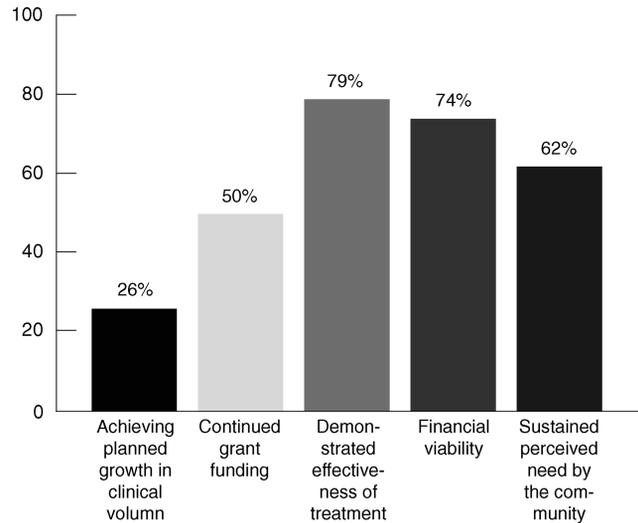
Challenge	n (%)
Lack of reimbursement	29 (85)
High operating costs (overhead)	24 (71)
Inadequate space/facility	19 (56)
Not financially viable	14 (41)
Lack of demonstrable outcomes	12 (35)
Personnel problems	5 (15)
Poor patient recruitment	5 (15)
Inadequate expertise	2 (6)
Lack of leadership	2 (6)
Lack of support from board or top administration.	1 (3)

Respondents were asked to select every applicable answer.

health problems in children (85%); and increased visibility in the community (79%). Lack of reimbursement (82%) and high operating costs (71%) were the most frequently cited challenges (Table 1). Newer programs were more likely to report lack of demonstrable outcomes as a challenge (Fig 1). Institutional support (75%) and clinical revenue (72%) formed the bulk of program financial support (Fig 2). Only 3 (8%) of the programs were funded solely by clinical revenue, whereas 15 (42%) had  $\geq 3$  funding sources. Of the 3 programs that were self-sufficient on clinical revenue, 1 had been in existence for  $<2$  years, whereas the other 2 had been operational for 2 to 6 years. One program only had an inpatient obesity service for children admitted with serious comorbid conditions.

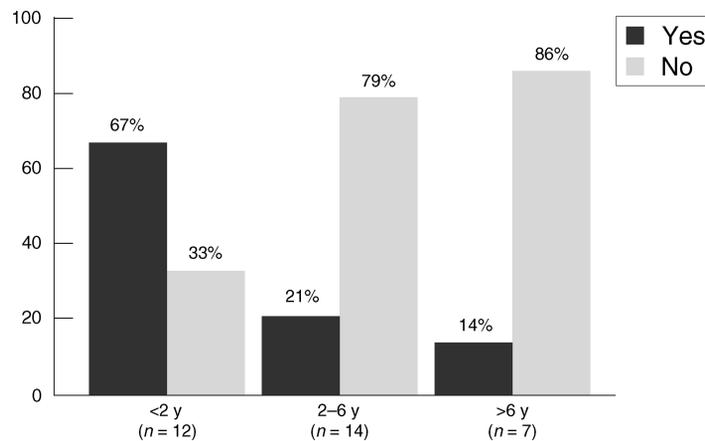
## DISCUSSION

Children's hospital administrators reported benefits of an obesity program related to the universal children's hospital mission of providing service to children and communities. These results suggest that senior hospital administrators view tackling childhood obesity as integral to their mission to care for children, which is an encouraging finding. These programs fulfill a community need, but they tend to be poorly reimbursed and have significant overhead costs. Indeed, inade-



**FIGURE 1**

Program outcomes to ensure sustainability identified by administrators. Source: Perspectives on Obesity Programs at Children's Hospitals Survey.



**FIGURE 2**

Lack of demonstrable outcomes compared with age of the program. Source: Perspectives on Obesity Programs at Children's Hospitals Survey.

quate reimbursement for services was the most frequently cited challenge. More than a decade ago, the median reimbursement rate for children enrolled in a children's hospital weight-management program was only 11%.<sup>4</sup> Although there have been improvements in reimbursements, they are not universal.<sup>5</sup> Insurers balk at covering obesity-related services and cite lack of evidence-based treatments, variability in outcome measures, and poor or short-term treatment outcomes that are not sustainable.<sup>6</sup> This might change on the basis of the re-

cent US Preventive Health Services Task Force report, which showed that multidisciplinary obesity treatment is effective.<sup>7</sup> In its systematic review, BMI declined by 1.9 to 3.3 units 6 to 12 months after moderate- to high-intensity programs, which is a clinically significant effect that indicates a longer-term benefit.

With the large number of personnel and intensity of interventions, pediatric obesity programs usually have high operating expenses.<sup>8</sup> These expenses are exacerbated by low recruitment

rates or high rates of attrition typical of obesity programs.<sup>8</sup> High attrition rate is linked to poor quality of care, lack of insurance coverage, inconvenient time or location, and program length.<sup>9,10</sup> Patients and their families often list poor insurance coverage as a reason for program dropout.<sup>10</sup> Given that 71% of administrators identify high operating costs as a challenge, program staff need to understand and create a business plan that maximizes efficiency and reduces cost.

Only 24% of the respondents cited downstream revenue as a value added, which suggests that in the prevailing difficult reimbursement environment, most administrators are aware that financial return on investment is not the short-term goal. This perspective is especially relevant given that obesity programs largely depend on institutional support. Hospitals need to develop a long-term plan to ensure financial sustainability of their programs and to collectively push for a national framework for improving insurance reimbursement for obesity care. The 3 programs that reported that they were financially sufficient on clinical revenue present an opportunity for further case study. Information garnered from future structured interviews of these programs will be exceedingly helpful to hospitals and clinicians who are contemplating starting a stage 3 program. In addition, identifying characteristics common to programs in existence for >6 years will offer valuable insights on how programs can be sustained in different clinical and administrative settings.

Senior administrators most commonly cited demonstration of program effectiveness, an outcome largely under the control of the program team, as the outcome that would ensure a program's sustainability. This belief seems to be in line with the feelings of

patients and their families. Quality of care has repeatedly been cited as the most important factor influencing program retention.<sup>9,11,12</sup> However, program effectiveness might be difficult to demonstrate. Extant literature suggests that, although improvements in lipid profile, blood pressure, and insulin resistance might occur, the decline in BMI associated with weight-management programs tends to be small.<sup>13–17</sup> In addition, inadequate patient and family engagement and high attrition rates in programs decrease the chances for them to have significant positive outcomes. Demonstration of program effectiveness might be of particular concern for programs in existence for <2 years. Young programs might not adequately plan for the personnel and financial resources needed to track and analyze program outcomes. Administrators should be aware of these barriers when evaluating the success of a program, especially during the first 2 years. Future studies will need to examine the relationship between financial viability, institutional support, demonstrated clinical effectiveness, and sustainability.

As conducted, this survey had some potential drawbacks. We were unable to determine the characteristics of obesity programs at the hospitals that did not respond to the survey. Limiting our study population only to member hospitals of the NACHRI that applied to be part of the FOCUS group affects generalizability of the study. Because application to the FOCUS group required the support of a senior administrator, our findings might represent a more favorable impression from administrators than actually exists in other programs. The survey did not obtain feedback from the administrators about individual-level data on outcomes or the financial viability of the programs in their own institutions. We expected that most administrators

would answer the questions from their general experiences with their programs, which was the objective of the study. Finally, our results do not reflect the views by administrators at non-hospital-based pediatric facilities with programs or adult programs that treat adolescents.

Nonetheless, to our knowledge, this study is the first to provide some insight on how administrators perceive pediatric obesity programs within the scope of a complex health care environment. Clearly, administrators are critical to any obesity program, and a program's survival relies on their support. By understanding the perspectives of these administrators, program champions can better communicate the benefits and barriers to program success and improve the likelihood of continued administrative and institutional support. Likewise, administrators can use the feedback shared by their colleagues toward improving their program's effectiveness and sustainability.

## CONCLUSIONS

It is the responsibility of children's hospitals to embrace the care of the obese child as integral to their mission and strategic vision. To achieve this goal, hospital administrators must recognize and support the multidisciplinary team of health care professionals in the continuum of care for the obese child. Hospital administrators acknowledge that obesity programs can satisfy multiple and valuable institutional strategic objectives, which is encouraging as we address the burgeoning number of obese children in the United States. Our results will enhance understanding and communication between program champions and their administrators and strengthen the quality of care in and viability and sustainability of pediatric obesity programs.

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