Medical Evaluation of Overweight Children and Adolescents: Reports From Pediatricians, Pediatric Nurse Practitioners, and Registered Dietitians

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ABSTRACT. *Objective.* **The primary aim of this study was to determine how pediatric health care providers identify overweight in children and adolescents and how they evaluate obesity-related medical complications. This information can guide development of programs to help providers improve their evaluation practices. A secondary objective was to examine the association of certain provider characteristics with recommended evaluation practices.**

Methods. **A random sample of pediatricians, pediatric nurse practitioners (PNPs), and registered dietitians received a questionnaire about their evaluation of overweight children and adolescents. Results were compared with published recommendations. Associations between respondent characteristics and adherence to published recommendations were examined.**

Results. **A total 940 providers responded (response rate: 19%–33%). Among all 3 groups a majority frequently used clinical impression, weight-for-age percentile, weight-for-height percent, and weight-for-height percentile to assess degree of overweight. Nearly all pediatricians and PNPs routinely evaluated blood pressure, but a minority routinely looked for orthopedic problems, insulin resistance, and sleep disorders. Less than 10% followed all recommendations for history and physical examination. Two thirds of pediatricians and PNPs routinely tested for lipid abnormalities. Most providers asked about family history of overweight, hypertension, cardiovascular disease, and diabetes, but only one third asked about gallbladder disease. In general, the provider's specialty, years in practice, gender, and body mass index were not associated with adherence to recommended practices.**

Conclusions. **Medical evaluation of overweight children and adolescents fell short of recommended practices. These results point to the need for educational efforts to increase awareness of medical risks and for tools to facilitate more complete evaluation during office visits.** ***Pediatrics*** **2002;110:222–228;** ***child obesity, adolescent obesity, overweight, medical evaluation.***

ABBREVIATIONS. BMI, body mass index; MCHB, Maternal and Child Health Bureau; HRSA, Health Resources and Services Administration; DHHS, Department of Health and Human Services; PNP, pediatric nurse practitioner; RD, registered dietitian; CDC, Centers for Disease Control and Prevention.

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The rapid rise in obesity prevalence among children portends a future epidemic of obesity-related medical conditions. These conditions include cardiovascular disease, type 2 diabetes mellitus, and degenerative joint disease. Childhood obesity may also be accompanied by immediate problems that require medical attention at the time of diagnosis. Approximately 60% of overweight (body mass index [BMI] >95th percentile) youth, including children aged 5 to 10 years, have at least 1 risk factor for future cardiovascular disease, including blood pressure elevation, abnormal lipids, and insulin elevation, and >25% have 2 or more of these risk factors.[1] Type 2 diabetes mellitus now accounts for between 8% and 45% of newly diagnosed diabetes mellitus youths under age 19.[2] Obstructive sleep apnea and obesity hypoventilation are potentially life-threatening conditions that can occur in markedly obese children,[3,4] and obesity increases risk for Blount's disease and slipped capital femoral epiphysis.[5,6]

Care of obese children by their primary health care providers requires a thorough medical evaluation that begins with appropriate identification of overweight. After a clinician identifies overweight in a child, the next step is to identify current medical problems and risk factors for future disease. This evaluation may lead to additional diagnostic tests, such as bone radiographs or sleep studies. At the end of the evaluation, the clinician will be in a position to outline the need for any immediate therapies (eg, continuous positive airway pressure or antihypertensive medication) and to begin to educate the patient and family about risk factors for cardiovascular disease, diabetes, and other obesity-related problems. A thorough medical evaluation precedes weight control interventions.[7]

As described in detail elsewhere,[8] the Maternal and Child Health Bureau (MCHB), Health Resources and Services Administration (HRSA), Department of Health and Human Services (DHHS), Rockville, Maryland, assessed pediatricians, pediatric nurse practitioners (PNPs) and registered dietitians (RDs) to identify needs in their management of overweight children and adolescents. The questionnaire elicited

information about attitudes toward weight management in children and adolescents, perceived barriers to provision of care, perceived skill levels, evaluation practices, treatment practices, and the respondent's practice and demographics. This article focuses on how these providers evaluate overweight children, including the methods used to identify degree of overweight and the medical conditions they routinely seek. The primary goal of the assessment was to identify aspects of current practice that would benefit from programs to educate clinicians and to assist them in the performance of more complete evaluations in the limited time available in office visits. A secondary aim was to determine if certain respondent characteristics were associated with recommended evaluation practices.

METHODS

The methods used to develop the entire needs assessment are described in the accompanying article by Trowbridge et al.[8] The assessment contained a series of questions that asked how often clinicians performed each type of evaluation or considered each condition when they addressed excess weight in overweight children. The response options were generally in Likert-scale format: "most of the time," "often," "sometimes," "rarely," and "never." The questionnaire was mailed to randomly selected samples of members of the American Academy of Pediatrics (n = 1088), the National Association of Pediatric Nurse Associates and Practitioners (n = 879), and the American Dietetic Association (n = 1652). Nonrespondents received a reminder postcard and then a second questionniare. Pediatricians who did not respond to the second request were given an opportunity to complete the assessment by telephone.

Question Content

We asked providers in all 3 professional groups about their methods of overweight assessment, their investigation of obesity-related medical conditions in the history and physical examination, their use of laboratory studies, and their family history assessment in overweight children. Methods of overweight evaluation included in the questionnaire were clinical impression, weight-for-age percentile, weight-for-height percent, weight-for-height percentile, change in weight velocity, BMI, BMI percentile, skinfold thickness, and waist-hip ratio. Specific medical conditions screened in the medical history and physical examination included hypertension, endocrine disorders, orthopedic problems, type 2 diabetes, genetic syndromes, sleep disorders, pseudotumor cerebri, and gastrointestinal disorders. For laboratory tests, we listed total cholesterol, lipid profile, insulin, glucose tolerance test, serum glucose, glycohemoglobin, thyroid function tests, cortisol, and liver enzymes. Conditions assessed in the family history included overweight, dyslipidemia, hypertension, cardiovascular risk factors, gallbladder disease, eating disorders, diabetes, and other endocrine disorders. To simplify administration of the questionnaire, all 3 professional groups received the entire questionnaire, but we excluded the responses of the RDs to the questions about history and physical examination and the questions about laboratory evaluation because such evaluations are beyond RDs' range of practice.

Definitions of Recommended Evaluation Practices

We identified recommended evaluation practices based on published recommendations and guidelines.[7] Our purpose was to identify areas in which only a small percentage of respondents followed all the recommended practices. For each component of the medical evaluation (history and physical examination, laboratory testing, family history), we identified practitioners whose responses to *all* questions in the component were consistent with recommended practices (Table 1).

The Expert Committee that provided recommendations on evaluation and treatment of pediatric obesity[7] recommended a thorough assessment of current medical conditions in the history and physical examination. Although, in ideal circumstances, a practitioner would screen each of the listed conditions "most of the time," the degree of excess weight, age, and rareness of condition may affect the approach to individual patients. We therefore included "often" as an acceptable response for all of the

TABLE 1. Responses for Each Item That Are Consistent With Recommended Responses

	Recommended Response
A. Recommended medical history and physical examination	
Hypertension	M or O
Endocrinologic disorders	M or O
Orthopedic problems	M or O
Type 2 diabetes mellitus or insulin resistance	M or O
Genetic syndromes	M or O
Sleep disorders	M or O
Pseudotumor cerebri	M, O, or S
Gastrointestinal disorders	M, O, or S
B. Recommended laboratory evaluation	
Lipid evaluation	
Lipid profile or total cholesterol	M or O
Insulin/glucose dysregulation	
Insulin or glucose tolerance test or serum glucose or glycohemoglobin	M, O, or S
Thyroid function tests	S, R, or N
Cortisol	S, R, or N
Liver enzymes	Any response
C. Recommended family history	
Overweight	M or O
Dyslipidemia	M or O
Hypertension	M or O
Cardiovascular disease	M or O
Gallbladder disease	M or O
Diabetes mellitus	M or O
Other endocrine abnormalities	M or O
Eating disorders in parents	M, O, or S

M indicates most of the time; O, often; S, sometimes; R, rarely; N, never.
Adherence to recommendations for each evaluation section (medical history and physical examination, laboratory evaluation, and family history) is defined by adherence to recommended responses for all questions in the section.

conditions, and "sometimes" for rare and less well-known conditions associated with obesity.

In many children, assessment of symptoms and signs will effectively eliminate need for additional diagnostic testing for many obesity-associated conditions. However, some conditions require laboratory testing for identification because they do not cause symptoms or signs. Because of the high prevalence of abnormal lipids in overweight children,[1] clinicians should request a total cholesterol or lipid panel "most of the time" or "often." Although much rarer than lipid disorders, type 2 diabetes mellitus may not cause symptoms, and clinicians should consider a screening test when they evaluate overweight children. Degree of obesity, family history, ethnic background, physical examination findings, and patient age will influence the need for evaluation for diabetes, and so the recommended evaluation included a response of "sometimes" to at least 1 of several tests of glucose regulation. Lack of linear growth occurs with hypothyroidism and primary Cushing's syndrome,[9,10] but overweight children are frequently tall for their age.[11] Therefore, history and physical examination can usually rule out these endocrinologic conditions without routine laboratory evaluation. The recommended frequency of testing for thyroid function and for Cushing's syndrome was therefore "sometimes," "rarely," or "never." No testing frequency for liver transaminases was defined because of the limited knowledge of obesity-related steatosis and steatohepatitis.

The recommended family history evaluation included assessment "most of the time" or "often" for overweight, dyslipidemia, hypertension, cardiovascular disease, gallbladder disease, diabetes mellitus, and other endocrine abnormalities in family members, and an assessment of eating disorders in parents at least sometimes. A knowledge of genetic risk factors will influence the professional's assessment of both short-term and long-term medical risks and may affect treatment recommendations, especially in children with mild overweight.[7,12]

Respondent Characteristics

Because gender, personal experience with excess weight, and number of years in practice and specialty area may affect a clinician's approach to evaluation of obesity, we examined the relationship of these characteristics with evaluation practices. Within each professional group, we classified respondents into 3 BMI levels: <25 kg/m^2 (normal weight), 25 to 29.9 kg/m^2 (overweight), and ≥ 30.0 kg/m^2 (obese). We defined 3 categories of number of years in practice: ≤ 5 years, 6 to 10 years, and >10 years. We classified respondents into those who spend at least 50% of their clinical work time in general pediatric or adult practice, and those who spend at least 50% of their clinical work time in a subspecialty, including adolescent medicine, cardiology, developmental/behavioral, endocrinology, gastroenterology, and pulmonology. We excluded from analysis those who work in specialty areas unlikely to address weight or weight-related issues, such as emergency medicine and neonatology. We examined the relationship of gender and evaluation practices among pediatricians only because $<5\%$ of PNPs and RDs were male.

Data Analysis

We used SAS statistical computing package (SAS/STAT software version 6.12, SAS Institute, Cary, NC) to look for associations between adherence to recommended evaluation practices and BMI level, years in practice, specialty, and gender. The χ^2 test was used for bivariate analyses. Because gender, BMI, specialty, and years in practice were related,[8] any significant associations were reexamined using logistic regression multivariate analysis, to control for the other respondent characteristics.

RESULTS

Of the questionnaire recipients, 203 (19%) pediatricians, 293 (33%) PNPs, and 444 (27%) RDs completed the assessment. Additional information about the respondents is available in the article by Trowbridge et al that appears in this supplement.[8]

Method of Overweight Assessment

Most practitioners used multiple methods to assess overweight (Table 2). Among all 3 professional groups, a majority (62%–82%) frequently used clinical impression, weight-for-age percentile, weight-for-height percent, and weight-for-height percentile. A similar percentage of pediatricians and PNPs used change in weight velocity, compared with 45% of RDs. Fewer practitioners used BMI, BMI percentile, skinfold thickness, and waist circumference. Approximately 40% of RDs and $<20\%$ of pediatricians and PNPs frequently used BMI. Less than 20% of all 3 professional groups used BMI percentile, and $<10\%$ frequently used skinfold thickness or waist circumference or waist-hip ratio.

Medical History and Physical Examination

Routine evaluation of hypertension was nearly universal ($>95\%$) among pediatricians and PNPs (Table 3). About two thirds also used the history and physical examination to screen for endocrinologic disorders. However, a minority of pediatricians and PNPs routinely used the medical history and physical examination to look for orthopedic problems (38% and 46%) and type 2 diabetes or insulin resistance (39% and 42%). A minority (22%–41%) of the practitioners routinely assessed for genetic syndromes, sleep disorders, or gastrointestinal disorders, and only 6% to 11% routinely screened for pseudotumor cerebri.

Only 7% of pediatricians and 8.5% of PNPs followed recommended evaluation practices for all the medical conditions that we included. Adherence to recommendations was not associated with respondents' BMI category, years in practice, or type of specialty among pediatricians and PNPs and was not associated with pediatricians' gender.

TABLE 2. Methods Used to Assess Excess Weight

Assessment Method	% Pediatricians* (n = 178–188)	% PNPs* (n = 268–276)	% RDs* (n = 386–402)
Clinical impression	82.1	77.9	73.0
Weight-for-age percentile	80.8	78.7	62.3
Weight-for-height percent	75.8	69.3	74.7
Weight-for-height percentile	76.2	81.5	77.9
Change in weight velocity	72.3	64.0	44.6
BMI	19.2	16.6	37.8
BMI percentile	12.5	13.3	19.9
Skinfold thickness percentile	3.7	1.8	6.9
Waist-hip ratio/waist circumference	2.7	0.8	6.4

* Percent of pediatricians, PNPs, and RDs responded "most of the time" or "often." Because of missing responses, N varied somewhat for each question.

TABLE 3. Medical History and Physical Examination

Condition	% Pediatricians* (n = 184–188)	% PNPs* (n = 270–278)
Hypertension	96.8	95.3
Endocrinologic disorders	65.5	59.3
Orthopedic problems	38.3	46.4
Type 2 diabetes mellitus or insulin resistance	38.7	41.8
Genetic syndromes	32.1	22.1
Sleep disorders	40.8	26.7
Pseudotumor cerebri	11.4	6.7
Gastrointestinal disorders	22.1	24.0
Recommended evaluation	7.3†	8.5†

* Percentage of pediatricians and PNPs who responded "most of the time" or "often." Because of missing responses, N varied somewhat for each question.
† Percentage of respondents who adhered to all recommended evaluation responses for this part of the patient encounter, as outlined in Table 1.

Laboratory Evaluation

Most pediatricians and PNPs frequently assessed dyslipidemia in overweight children (Table 4). Among pediatricians, 66% frequently assessed total cholesterol, 58% frequently assessed lipid profile, and 67% frequently chose at least 1 of these tests. Among PNPs, 53% frequently assessed lipid profile, 55% frequently assessed total cholesterol, and 59% frequently chose at least 1 of these tests.

Approximately 30% of pediatricians and PNPs frequently requested serum glucose, and about 60% reported sometimes requesting this test (data not shown). Other tests of glucose dysregulation (insulin, glucose tolerance test, and glycohemoglobin) were chosen less frequently. Approximately 20% of pediatricians, compared with 5% of PNPs, requested insulin, and 15% of pediatricians, compared with 5% of PNPs, requested a glucose tolerance test. Less than 10% of either group requested a glycohemoglobin test. When we examined tests of glucose regulation together, 63% of pediatricians and 64% of PNPs reported "sometimes," "often," or, "most of the time" requesting 1 of these 4 tests.

Forty-five percent of both pediatricians and PNPs routinely requested thyroid function tests, and <10% requested cortisol. A small percentage of pediatricians and PNPs requested liver enzymes.

TABLE 4. Laboratory Evaluations

Laboratory Test	% Pediatricians* (n = 182–186)	% PNPs* (n = 263–269)
Lipid profile	57.8	52.8
Total cholesterol	65.6	55.3
Insulin	17.5	4.9
Glucose tolerance test	15.3	4.5
Glucose	29.0	31.3
Glycohemoglobin	6.0	3.8
Thyroid function tests	45.1	45.3
Cortisol	4.4	6.4
Liver enzymes	10.8	16.3
Recommended evaluation*	16.5†	14.6†

* Percentage of pediatricians and PNPs who responded "most of the time" or "often." Because of missing responses, N varied somewhat for each question.
† Percentage of respondents who adhered to all recommended evaluation responses for this part of the patient encounter, as outlined in Table 1.

Only about 1 in 6 (15%–16%) pediatricians and PNPs followed all the recommendations for laboratory evaluation. Specialty pediatricians appeared more likely than other pediatricians to follow all recommendations (P = .038). However, this association did not persist when multivariate analysis included gender, BMI category, and years in practice category. Among PNPs, adherence with recommendations was not significantly associated with specialty practice, BMI category, or number of years in practice category.

Family History Assessment

More than 85% of pediatricians, PNPs, and RDs frequently asked about overweight family members when assessing an overweight child (Table 5). Approximately 90% of pediatricians and PNPs assessed family history of hypertension and cardiovascular disease, compared with about 75% of RDs. In each group 64% or more of respondents routinely asked about diabetes mellitus and dyslipidemia. Fewer responders frequently asked about gallbladder disease (around 30%), eating disorders in parents (around 45%) and other endocrine abnormalities (39%–57%).

Approximately 25% of pediatricians and PNPs and 18% of RDs followed all recommended family history assessments. Pediatricians who followed recommended family history assessments did not differ consistently in gender, specialty, or years in practice. Among PNPs, responders in the lowest BMI category (BMI <25) were more likely to adhere to recommended evaluation ($P < .05$). When adjusted for years in practice and specialty, the relationship did not reach statistical significance (odds ratio = 3.37; 95% confidence interval [CI] = 0.93, 12.20). RDs who followed recommended family history assessment did not differ in any of these variables.

DISCUSSION

As primary health care providers and RDs care for increasing numbers of overweight children, appropriate identification of medical conditions and risks becomes increasingly important. Few studies have described the medical evaluation of overweight children performed by pediatric caregivers. In a 1989 study, 324 pediatricians reported the percent of ideal body weight they used to define obesity[13]; however, the study did not ask about other clinical methods to assess overweight and did not address medical assessment. A recent analysis of the National Ambulatory Medical Care Surveys examined obesity management by physicians.[14] The study was restricted to physicians caring for adult patients, and the medical evaluation included only blood pressure measurement and cholesterol testing. The data from the present study provides detailed information about evaluation practices of not only pediatricians but also PNPs and RDs.

We found that practitioners in each professional group used multiple methods to assess excess weight. Qualitative assessment ("clinical impression") was used very frequently, but clinicians were

TABLE 5. Family History Evaluation*

Family History	% Pediatricians (n = 183–192)	% PNPs (n = 275–293)	% RDs (n = 383–402)
Overweight	92.2	87.0	93.5
Dyslipidemia	76.3	64.4	68.9
Hypertension	90.6	89.6	73.8
Cardiovascular disease	89.0	90.4	78.2
Gallbladder disease	34.4	35.8	28.9
Eating disorders in parents	44.0	46.2	49.9
Diabetes mellitus	80.0	75.6	82.4
Other endocrine abnormalities	50.2	57.2	38.8
Recommended evaluation	23.6†	24.5†	18.4†

* Percentage of pediatricians, PNPs, and RDs who responded "most of the time" or "often." Because of missing responses, n varied somewhat for each question.
† Percentage of respondents who adhered to all recommended evaluation responses for this part of the patient encounter, as outlined in Table 1.

likely to assess each child with several additional quantitative methods. Each quantitative method has limitations. Weight-for-age percentile (eg, 47 kg is the 95th percentile for a 10-year-old girl) is least useful because it does not adjust for height. Weight-for-height percent (relative weight) expresses current weight as percent of ideal body weight. For example, 47 kg is 147% of ideal weight (32 kg) for a 10-year-old girl with a stature of 138 cm (50th percentile). Cutoff points to define obesity using this method have not been established either through validation or by convention. Weight-for-height percentile can be identified from the growth curves, but only for children whose height is between 90 and 137 cm, which correspond to approximately 2–9 years. Absolute values of BMI (kg divided by m^2) cannot be used before adolescent maturity because normal ranges differ with age and sex. Skinfold thickness measures require calipers, which most clinicians do not have, and these measures are unreliable among overweight individuals.[15] Waist measurement norms are not available for children.

In 1998, BMI percentile was recommended for the office-based assessment of excess weight for youth.[16] More RDs than pediatricians and PNPs reported using BMI and BMI percentile, and fewer RDs used weight-for-age percentile, the least useful quantitative method. Still, the percentage of RDs who frequently used BMI percentile remained about 20%. However, the lack of training and widely available standardized norms for the use of this index in children and adolescents until 2000 may explain the low prevalence of its use in this study. The information from this study may be useful as a baseline to assess the pace with which pediatric clinicians switch to BMI percentile, using the recently published revised Centers for Disease Control and Prevention (CDC) growth curves.[17]

The justification for routine screening for obesity-related health conditions lies in their increasing prevalence rates. High blood pressure is present in 20% to 30% of 5- to 11-year-old overweight children,[18] and overweight children and adolescents are more likely to be hypertensive as young adults.[19,20] Polycystic ovary syndrome is frequently associated with obesity,[21,22] although the risk of this syndrome among a population of obese adolescent girls is not known. Ten percent to 30% of obese children have elevated liver aminotransferases, suggesting obesity-related steatosis.[23–25] Prevalence of gallbladder disease has not been carefully studied in obese children, but risk of the diseases is high in obese patients.[26,27] Other obesity-related problems are rare despite the increased risk among obese children, but the severity of the condition and need for intervention make screening important. Type 2 diabetes mellitus is increasingly prevalent among obese adolescents, and in high-risk populations such as the Pima Indians, prevalence may be as high as 50.9 per 1000.[28] Type 2 diabetes mellitus now accounts for as much as 45% of new diagnoses of diabetes mellitus among children.[2] Obstructive sleep apnea and obesity hypoventilation syndrome are potentially life-threatening. Slipped capital femoral epiphysis can occur in the contralateral hip if weight loss does not occur, and Blount's disease can recur. Pseudotumor cerebri is rare (.025%) but can lead to permanent visual impairment if not corrected.[29] Routine history and physical examination can effectively identify or indicate possible presence of these important conditions. However, <10% of the pediatricians and PNPs routinely screened for all these conditions when they evaluated overweight children.

Obesity in adolescence increases the likelihood of elevated total cholesterol, elevated low-density lipoprotein and decreased high-density lipoprotein.[20] In addition, 20% of 5- to 10-year-old children with BMI ≥85th percentile have elevated total cholesterol.[1] We found that reported adherence to recommended evaluation of lipid abnormalities was relatively high, but one third of practitioners did not routinely check either a lipid profile or total cholesterol. Our results showed that two thirds of practitioners screened for glucose abnormalities at least sometimes, as recommended because of the rising prevalence of type 2 diabetes and the low sensitivity of symptoms and signs to identify this disorder.[2] A recent statement by the American Dietetic Association recommended use of the fasting glucose test in overweight children aged 10 years and older with risk factors.[2] The responders who most often tested for diabetes used serum glucose (the option of fasting glucose was not provided). However, a substantial proportion (about 33%) tested rarely or never.

The low percentage of practitioners who followed the recommended evaluation practices for history

and physical examination reflected the low percentages of practitioners who routinely assessed many of the individual components. However, many of the respondents performed unnecessary laboratory tests. A majority of practitioners adhered to recommended evaluation of lipid and glucose abnormalities, but nearly half routinely requested thyroid function tests. Acquired hypothyroidism may occur in 0.1% of children,[30] and families may look for a metabolic disorder to explain the obesity. However, a review of the child's growth in stature can usually allay these concerns. Children who are overweight generally are taller than average,[11] while children who are hypothyroid have poor linear growth.[9] Only rarely should thyroid function tests be necessary. The rarity of primary Cushing's syndrome[10,31] indicates that low-level screening is appropriate.

Although we know that mild elevation in serum alanine aminotranferase is common among overweight children[23] and likely indicates steatosis, nonalcoholic steatohepatitis can occur in children and can progress to fibrosis or cirrhosis.[32,33] Liver changes are asymptomatic and can be identified only with laboratory testing. Additional work in this area will help delineate risk factors. Such work may lead to broadly accepted screening recommendations.

Clinicians generally screened for family history of overweight, dyslipidemia, hypertension, cardiovascular disease and diabetes. The presence of these genetic risks, coupled with existing obesity, will increase a child's long-term health risk.[20] Although population studies have not been performed, adolescents with gallbladder disease frequently are obese and have a family history of gallbladder disease.[34] These data indicate that more clinicians need to be aware of gallbladder disease risks.

In general, the practitioners' BMI, gender, years in practice, and practice specialty were not associated with adherence to recommended evaluation practices. One exception was the significant relationship among PNPs between BMI and family history evaluation. Those in the normal BMI group more often followed the recommended practices, although they still represented a minority, and so the difference is unlikely to influence further educational efforts. The small sample sizes limited the power to detect differences, however, and additional study in this area is warranted.

The results from this assessment indicate that medical evaluation of overweight children and adolescents frequently fell short of recommended practices. Although the low response rate suggests that the sample was not representative, the respondents who took the time to complete the assessment may have been those most interested in childhood obesity and perhaps most likely to address the problem when they encounter overweight children. Thus, these data may overestimate the extent to which practitioners followed recommended practices.

CONCLUSION

Clinicians may not have followed recommended evaluation practices for a variety of reasons. They may have been unaware of the significance or prevalence of many obesity-associated medical conditions, or they may have been unfamiliar with appropriate methods to screen for these conditions. The epidemic of obesity means that education during and after professional training must address management of childhood obesity. Government agencies, such as the HRSA's MCHB, the CDC, the National Institutes of Health, and the US Department of Agriculture and professional societies can support and guide these efforts.

Improved knowledge of these problems is only the first step. Clinicians also reported many barriers to treatment of these children, including lack of time and inadequate reimbursement.[35] Clinicians need help incorporating these assessments into the constraints of a standard office visit. Recently revised growth curves that include BMI percentile curves for children from 2 to 20 years of age are available on the CDC's Web site.[17] Although these charts are increasingly available in computer and hard copy forms, use of the curves may require training. Such training must be easily accessible to busy practitioners. Tools such as mini-calculators facilitate BMI calculation and may increase the use of the BMI percentile growth curves. Simple checklists could trigger appropriate medical history, physical examination, and family history evaluations. Practitioners in other parts of this assessment indicated a preference for education at local and national continuing medical education courses,[35] but many also indicated they would use videotapes, Web site/computer programs, and televised lectures. Use of >1 medium will increase the number of professionals who will take advantage of the training. Strategies require development and testing to confirm their acceptance by practitioners and their effectiveness in modifying practitioner behavior.

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