Ambulatory Management of Childhood Obesity

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Abstract

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Objective: Childhood obesity is one of the most challenging issues facing healthcare providers today. The aims of this study were to describe the ambulatory management of childhood obesity by pediatricians (PDs) and family physicians (FPs) and to evaluate knowledge of and adherence to published recommendations.

Research Methods and Procedures: A 42-item, self-administered questionnaire was mailed to 1207 randomly selected primary care physicians (PDs = 700, FPs = 507) between September 2001 and January 2002.

Results: Of 339 (28%) responses, 287 were eligible (PDs = 213, FPs = 74). Most respondents were in group or solo practice (87%) in a suburban or urban, non-inner city location (67%). The average age was 48 years (range = 31 to 85 years), and the mean years in practice was 17 (range = 1 to 55 years). Nineteen percent of physicians were aware of national recommendations. Three percent of physicians reported adherence to all recommendations. Knowledge of recommendations was not associated with a greater likelihood of adherence. However, physicians who were aware of recommendations were more likely to have positive attitudes about personal counseling ability (odds ratio = 2.4, confidence interval = 1.3 to 4.4) and the overall efficacy of obesity counseling (odds ratio = 4.3, confidence interval = 1.7 to 10.8). Poor patient motivation, patient noncompliance, and treatment futility were perceived as the most frequently encountered barriers to obesity treatment.

Discussion: Most physicians are not aware of or adherent to national recommendations regarding childhood obesity. Awareness of recommendations was associated with more positive attitudes about personal counseling ability and the effectiveness of obesity counseling in general.

Key words: guideline knowledge, physician behavior, guideline compliance, clinical management, physician attitudes

Introduction

The prevalence of obesity in the U.S. has been increasing steadily over the past few decades. Currently, one of five U.S. children is overweight (1). Obese children are at increased risk for a number of comorbid conditions, including hypertension, dyslipidemia (2,3), impaired glucose tolerance (4), and obstructive sleep apnea (5). In addition, obese children and adolescents often become obese adults (6,7). Adults with obesity are at increased risk of coronary heart disease, diabetes, hypertension, dyslipidemia, gallbladder disease, osteoarthritis, and some cancers (8,9). The cost of the obesity epidemic has been estimated to account for up to 6% of U.S. healthcare spending (10).

Obesity in children is one of the most challenging issues facing healthcare providers today. In an effort to provide guidance for physicians and other personnel who care for obese children, the Maternal and Child Health Bureau convened a committee of experts in the field of pediatric obesity to create recommendations for the evaluation and management of childhood obesity. The expert committee recommendations were published in *Pediatrics* in 1998 (11). Similar recommendations are available to family physicians through the American Academy of Family Physicians (AAFP).[1]

The recommendations on the AAFP website (http://www.aafp.org) differ slightly from the expert committee recommendations. The authors offer five different measures that can be used to identify obesity, and whereas they describe BMI as being a good measure of body fat in children and adolescents, they do not specifically recommend it as the parameter of choice. In addition, these guidelines do not address evaluation of some obesity-related

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[1] Nonstandard abbreviations: AAFP, American Academy of Family Physicians; FP, family practice physician; PD, pediatrician; OR, odds ratio; CI, confidence interval.

disorders such as sleep apnea, gall bladder disease, pseudotumor cerebri, and eating disorders (12). Finally, the AAFP recommendations suggest using a food diary for dietary assessment, whereas the expert committee recommendations suggest using a 24-hour dietary recall.

A series of articles were recently published that evaluated the ambulatory management of childhood obesity (13–18). However, these studies did not evaluate knowledge of guidelines and did not include family practice physicians (FPs). The purpose of this study was to describe current knowledge, attitudes, and practices of both primary care pediatricians (PDs) and FPs and to evaluate differences in practice patterns based on guideline knowledge.

Research Methods and Procedures

Subjects

We performed a cross-sectional study of primary care physicians in the U.S. A survey and a preaddressed stamped return envelope were mailed between September 2001 and January 2002 to a random sample of 700 PDs and 507 FPs whose names were obtained from the American Medical Association database. Respondents self-identified as specialists or physicians who spent <8 hours or <25% of their time in direct patient care were excluded. Nonrespondents received second and third mailings every 2 months.

Survey Instrument

The survey was a self-administered questionnaire of 42 items (available on request). The questions focused on physician and practice characteristics, familiarity with recommendations, and current practices, beliefs, and attitudes regarding childhood obesity.

Physician Characteristics

In addition to basic demographic information, such as gender and years in practice, physicians were asked to provide their height in inches and their weight in pounds. We also obtained information about physicians' exercise habits, dietary habits, and perceived level of fitness. Physicians reported how frequently they exercised by choosing from the following choices: ≤1, 2, 3, 5, and 7 times/week. Dietary habits were assessed by asking physicians to rate their dietary intake compared with current national recommendations by choosing from the following responses: excellent, good, average, fair, and poor. Physicians chose from the same response set to rate their level of fitness.

Knowledge of Recommendations

Knowledge of recommendations was assessed by asking physicians to answer yes or no to a single question that asked whether they were aware of either the 1998 Expert Committee or the AAFP recommendations. Physicians who responded yes were asked to rate how often they adhered to recommendations by choosing from a response set that included the following choices: never, rarely, sometimes, often, or always. Physicians who responded often or always were considered to be adherent to recommendations. In this report, this subset of physicians is referred to as reporting "global adherence."

Identification of Obesity

Subjects were given a list of diagnostic criteria and asked to choose the method they routinely used to identify obesity in each of four age groups: toddlers (<3 years of age), school age (from 3 to 7 years of age), pre-adolescents, and adolescents. The multiple-choice list included four responses: general appearance, weight for height, BMI, and other. Because the Center for Disease Control and Prevention growth charts do not include BMI values for children younger than 2 years of age, physicians who used BMI or weight for height for the youngest group and BMI for the older three age groups were considered to be adherent to recommendations. Where appropriate, physicians were asked to pick the value they routinely used to classify children as obese. For BMI, the response set included >95th percentile, >85th percentile, crossing >3 kg/m^2 BMI points per year, and other.

Evaluation of the Obese Child

We used the recommendations of the expert committee to create a list of components that should be included in the history and physical exam when evaluating an obese child (Table 3). Physicians reported how frequently they obtained each component in their routine assessment of obese children by selecting one of five responses (never, rarely, sometimes, often, or always).

Physicians who reported that they always or often obtained information on a specific item were considered to be adherent to the recommendations regarding that item. However, because gall bladder disease is a rare complication of childhood obesity (19), physicians who responded sometimes, often, or always were considered compliant. In addition, because hypothyroidism is a rare cause of childhood obesity, and thyroid function testing of obese children is indicated only if clinical signs and symptoms of thyroid disease are present, all physicians who reported never, rarely, or sometimes were considered adherent to recommendations (20). Physicians who were adherent to all components of the history and physical exam were considered to be adherent to guidelines.

Perceived Efficacy of Obesity Treatment

Respondents were asked to rate the overall effectiveness of recommendations regarding diet and exercise in the treatment of obesity on a Likert scale of 1 to 5 (1 = not at all and 5 = extremely). Respondents were asked to rate diet and exercise individually. We asked about recommendations in

general and did not focus on specific exercise or dietary recommendations. In addition, each subject was asked to rate his or her own ability to effectively counsel obese children and the overall efficacy of obesity counseling by choosing from one of five responses: poor, fair, average, good, and excellent.

Barriers to Obesity Treatment

We reviewed past research (21–24) in this area and created a list of seven commonly cited barriers to obesity treatment (Table 6). We asked physicians to rate these barriers according to their frequency of occurrence. Physicians were asked to rank only those barriers that they had personally experienced.

Data Analysis

All data were analyzed using SAS statistical software, Version 8.2 (25). χ^2 and Student's t tests were used to compare differences between groups for categorical and continuous variables, respectively. Statistical significance was considered to be present for $p < 0.05$ for each analysis, without adjusting for multiple comparisons. Bivariate analyses were performed using simple logistic regression to determine which physician and practice characteristics were associated with a variety of outcomes including knowledge of recommendations, adherence to recommended practices for the diagnosis and assessment of childhood obesity, and beliefs about efficacy of treatment. Significant predictors were used to create a multivariate regression model of outcomes.

Physician characteristics included in our analysis were specialty (FP vs. PD), gender, years in practice (dichotomized as <10 and ≥10 years), physician BMI (dichotomized as <25 and ≥25 kg/m^2), exercise frequency (dichotomized as <5 and ≥5 times per week), rating of dietary habits and level of fitness (dichotomized as good/excellent and average/fair/poor), and knowledge of recommendations and self-reported adherence to recommendations (dichotomized to always/often and sometimes/rarely/never).

Practice characteristics included type and location of practice, as well as average number of patient visits per week. For the regression analyses, we categorized practice location into three groups: urban, suburban, and rural/other. Practice type was also divided into three groups: individual or two person, group/health maintenance organization, and health center/hospital practice/other. Suburban and group/health maintenance organization practices were used as the reference category for practice location and practice type, respectively.

Results

Response Rate

Of the 1207 physicians who were initially contacted, we received 339 (28%) responses after three mailings. We excluded 51 responses because they were from specialists or physicians who had limited contact with pediatric patients. The remaining 287 (24%) surveys were from eligible PDs (213) and FPs (74). In general, each individual questionnaire item was answered by ≥98% of respondents.

Demographics

The majority of physicians were men (52%), most (59%) were in group practice, and 46% practiced in a suburban location. Mean physician age was 48 years (range = 31 to 85 years), and mean years in practice was 17 (range = 1 to 55 years). On average, physicians saw 4 patients (range, 2 to 15 patients) per hour and 108 patients (range, 20 to 275 patients) each week. The mean physician BMI was 25.5 kg/m^2, and 46% were overweight (BMI ≥25 kg/m^2; Table 1).

FPs were more likely to be men (66% vs. 47%, $p < 0.01$), in individual or two-provider practices (39% vs. 26%, $p = 0.007$), in suburban (42%) or rural (34%) locations ($p = 0.01$), and to have been in practice for ≤10 years (77% vs. 64%, $p = 0.03$) than PDs. FPs were also more likely to have a slightly higher mean BMI (26.6 vs. 25.1 kg/m^2, $p = 0.02$; Table 1).

One-half of the physicians rated their personal level of fitness (52%) and their dietary habits (56%) as good or excellent. The majority exercised fewer than five times each week (77%). The two specialty groups were similar with respect to reported dietary habits, level of fitness, and exercise frequency.

Knowledge of Recommendations

Only 19% of physicians were aware of either the 1998 Expert Committee or AAFP recommendations. A similar proportion of FPs and PDs were knowledgeable about recommendations (18% vs. 20%, $p = 0.66$). There were no significant differences between physicians who were aware of guidelines and those who were not. Physicians who were aware of recommendations ($n = 55$) were asked about their frequency of adherence to recommendations. Less than one-half (46%) reported global adherence (i.e., that they often or always adhered to recommended practices). Female physicians were more likely to report global adherence to recommendations than men [odds ratio (OR) = 3.33, confidence interval (CI) = 1.09 to 10.24].

Identification of Obesity

Very few physicians reported using BMI routinely to identify young children as overweight or obese (4% for children <3 years of age and 13% for 3- to 7-year olds; Table 2). FPs were more likely to use BMI to identify obesity in adolescents than PDs (49% vs. 30%, $p = 0.002$). Of those physicians who used BMI in any age group, less than one-half (41%) used a BMI value >95th percentile for age and sex to classify patients as obese (Table 2). The

Table 1. Practitioner characteristics by specialty*

Characteristic	Family physicians ($n = 75$)	Pediatricians ($n = 213$)
Age in years	47.7 ± 10.4	48.4 ± 10.2
Years in practice	17.1 ± 11.7	17.2 ± 10.6
Patient visits per hour	4.2 ± 1.0	4.4 ± 1.2
Patient visits per week	105.6 ± 39.2	109.2 ± 42.9
BMI†	26.6 ± 5.1	25.1 ± 4.6
Female†	25 (34%)	111 (53%)
BMI ≥ 25 kg/m^2	39 (53%)	89 (43%)
In practice ≥10 years†	47 (64%)	163 (77%)
Location of practice†		
Urban, inner-city	4 (5%)	27 (13%)
Urban, not inner-city	13 (18%)	46 (22%)
Suburban	31 (42%)	101 (48%)
Rural	25 (34%)	32 (15%)
Other	1 (1%)	4 (2%)
Type of practice†		
Solo or two person	29 (39%)	55 (26%)
Group	36 (48%)	131 (61%)
Staff model HMO	0 (0%)	8 (4%)
Community Health Center	5 (8%)	10 (5%)
Hospital clinic	0 (0%)	7 (3%)
Other	4 (5%)	2 (1%)

* Data are reported as mean ± SD for continuous variables and number (%) for categorical variables. Group comparisons use χ^2 for categorical variables and Student's *t* tests for continuous variables.
† $p < 0.05$.

proportion of FPs (50%) and PDs (38%) who used the 95th percentile for age and sex to identify obesity was not significantly different ($p = 0.37$).

Only 11% of physicians reported using BMI or weight for height in the youngest age group and BMI in the older three age groups to identify obesity. Physicians in practice for a longer duration (OR = 0.3, CI = 0. 13 to 0.88) and who saw fewer patients each week (OR = 0.99, CI = 0.97 to 0.99) were less likely to adhere to recommendations.

Family History

A large proportion (≥60%) of PDs and FPs reported routinely asking about a family history of overweight, hypertension, diabetes, coronary heart disease, and dyslipidemia. PDs were significantly more likely than FPs to ask about a history of dyslipidemia (76% vs.62%, $p = 0.02$). Fewer physicians routinely inquired about a family history of gall bladder disease (Table 3).

Only 13% of physicians adhered to all components of the family history. Longer practice duration (OR = 3.13, CI = 1.05 to 9.35) and knowledge of recommendations (OR = 2.90, CI = 1.33 to 6.29) were associated with a greater likelihood of adherence.

History and Physical Examination

Nearly all physicians (>95%) routinely checked blood pressure in obese children. However, fewer physicians routinely assessed for signs and symptoms of gall bladder disease, sleep apnea, orthopedic conditions, or pseudotumor cerebri in the medical history or physical examination (Table 3). PDs were more likely than FPs to check blood pressure (99% vs. 93%, $p = 0.01$), perform funduscopy (62% vs. 35%, $p < 0.01$), and assess for dysmorphisms (66% vs. 33%, $p < 0.01$) and hirsutism (72% vs. 57%, $p < 0.01$) in obese children (Table 3).

Only 3% of the entire sample was adherent to all aspects of the medical history and physical exam. Physicians who saw more patients each week were slightly

Table 2. Identification of obesity by specialty*

	General appearance		Weight/height		BMI	
Age of child	FP	PD	FP	PD	FP	PD
Less than 3 years	10 (19%)	13 (8%)	40 (75%)	136 (88%)	3 (6%)	6 (4%)
3 to 7 years	4 (7%)	7 (4%)	49 (89%)	126 (80%)	3 (5%)	24 (15%)
Pre-adolescents	9 (16%)	10 (6%)	36 (62%)	110 (70%)	13 (22%)	38 (24%)
Adolescents†	9 (15%)	11 (7%)	21 (36%)	97 (63%)	29 (49%)	47 (30%)

* Data are reported as number (%). Group comparisons by specialty use χ^2.
† $p < 0.05$.

Table 3. Medical evaluation of obesity by specialty*

Component	FP	PD
Family history		
Obesity	50 (68%)	152 (73%)
Diabetes	52 (71%)	154 (73%)
Elevated cholesterol†	46 (62%)	161 (76%)
Hypertension	49 (67%)	142 (68%)
Coronary heart disease/stroke	41 (55%)	128 (61%)
Gall bladder disease	14 (19%)	28 (13%)
Including all	11 (15%)	25 (12%)
History and physical		
Gall bladder disease	20 (28%)	50 (24%)
Snoring/daytime somnolence	16 (22%)	65 (31%)
Headaches	17 (24%)	55 (26%)
Hip pain	6 (8%)	21 (10%)
Blood pressure†	67 (93%)	209 (99%)
Fundoscopy‡	25 (35%)	131 (62%)
Dysmorphisms‡	23 (33%)	136 (66%)
Hirsutism (females)†	41 (57%)	151 (72%)
Hip-range of motion	16 (22%)	68 (32%)
Including all	2 (3%)	6 (3%)
Behavioral		
Dietary recall†	40 (56%)	150 (71%)
Television/video games‡	39 (54%)	167 (79%)
Exercise/sports‡	63 (88%)	208 (98%)
Smoking	53 (74%)	153 (73%)
Eating disorders	31 (43%)	95 (45%)
Depression	33 (46%)	81 (38%)
Including all	12 (17%)	43 (21%)
Laboratory		
Fasting blood sugar	29 (40%)	62 (30%)
Fasting cholesterol profile	28 (39%)	109 (51%)
Thyroid function	34 (47%)	124 (58%)
Including all	3 (5%)	11 (7%)

* Data are reported as number (%). Group comparisons by specialty use χ^2.
† $p < 0.05$.
‡ $p < 0.01$.

more likely to adhere to recommendations (OR = 1.02, CI = 1.01 to 1.03). Knowledge of recommendations was not associated with a significantly higher likelihood of adherence. However, the subset of physicians who reported global adherence were more likely to be adherent (OR = 5.13, CI = 1.03 to 25.26) than the rest of the sample.

Behavioral History

Physicians frequently asked about exercise (95%), television viewing and video games (73%), and tobacco use (73%). A smaller percentage obtained a dietary recall (60%) or asked about depression (40%) or eating disorders (44%). PDs were significantly more likely to report obtaining a dietary recall (71% vs. 56%, $p = 0.02$), a history of television viewing and video games (79% vs. 54%, $p < 0.0001$), and a history of exercise and sports activity (98% vs. 88%, $p < 0.0001$; Table 3).

One of every five physicians (20%) in our sample asked about all components of the behavioral assessment. Knowledge of recommendations was not associated with a significantly higher likelihood of adherence. The subset of physicians who reported global adherence was more likely to be adherent (OR = 3.05, CI = 1.28 to 7.23) than the rest of the sample.

Laboratory Evaluation

Nearly one-half of all physicians (48%) obtained a fasting cholesterol profile. Fewer (32%) checked for insulin resistance with fasting blood sugars. Despite the low prevalence of hypothyroidism in children, we found that many physicians (44%) still routinely ordered thyroid function tests in obese children. Only 6% of the entire sample followed the recommendations for laboratory evaluation (Table 3). There were no differences between physicians who were adherent and those who were not adherent to recommendations regarding laboratory assessment.

Perceived Efficacy of Obesity Treatment

Physicians ranked the effectiveness of dietary and exercise recommendations as 2.7/5 and 2.9/5 on a Likert scale of 1 to 5 (1 = not at all, 5 = extremely; Table 4). Physicians who reported adhering to recommendations were more likely to rate the effectiveness of dietary (OR = 2.30, CI = 0.96 to 5.57) and exercise (OR = 2.31, CI = 1.00 to 5.35) recommendations as 4 or higher. Physicians who had been in practice for a longer duration were also less likely to rate the effectiveness of dietary (OR = 0.48, CI = 0.27 to 0.85) and exercise recommendations (OR = 0.26, CI = 0.13 to 0.50) as 4 or higher.

Physicians were asked to rate their own ability to effectively counsel obese children (Table 5). PDs (OR = 2.59, CI = 1.19 to 5.63), physicians in individual or two-person practice (OR = 2.29, CI = 1.20 to 4.37), physicians who rated their dietary habits as good or excellent compared with current dietary guidelines (OR = 2.47, CI = 1.30 to 4.68), and physicians who reported global adherence (OR = 5.80, CI = 2.30 to 14.60) were significantly more likely to rate their counseling ability as good or excellent. Awareness of recommendations was also independently associated with a positive rating of personal counseling proficiency (OR = 2.35, CI = 1.25 to 4.40).

Table 4. Perceived efficacy of lifestyle recommendations by specialty

Score*	FPs	PDs	*p*
Exercise recommendations			0.09
1	11 (15%)	23 (11%)	
2	20 (27%)	86 (41%)	
3	28 (38%)	52 (25%)	
4	8 (11%)	33 (16%)	
5	6 (8%)	14 (7%)	
Dietary recommendations			0.90
1	5 (7%)	22 (11%)	
2	23 (31%)	64 (31%)	
3	24 (33%)	68 (33%)	
4	13 (18%)	36 (17%)	
5	8 (11%)	18 (9%)	

Data are reported as number (%). Group comparisons by specialty use χ^2.
* Likert scale of 1 to 5 with 1 = not at all and 5 = extremely.

Table 5. Perceived efficacy of obesity counseling by specialty*

Response	FPs	PDs	*p*
Personal ability to counsel			0.03
Poor	8 (11%)	13 (6%)	
Fair	22 (30%)	36 (17%)	
Average	32 (44%)	97 (47%)	
Good	11 (15%)	55 (27%)	
Excellent	0 (0%)	6 (3%)	
Efficacy of obesity counseling			0.06
Poor	8 (11%)	47 (23%)	
Fair	35 (48%)	67 (33%)	
Average	26 (36%)	72 (35%)	
Good	4 (5%)	19 (9%)	
Excellent	0 (0%)	1 (0.5%)	

* Data are reported as number (%). Group comparisons by specialty use χ^2.

Finally, we asked physicians to rate the overall efficacy of obesity counseling (Table 5). Only 9% of physicians rated the efficacy of counseling as good or excellent. Most (72%) rated it as fair or average. Physicians who were aware of recommendations (OR = 4.39, CI = 1.73 to 11.12) and those in individual or two-person practices (OR = 5.82, CI = 2.23 to 15.20) were more likely to rate counseling favorably. Global adherence to recommendations was also independently associated with a positive rating of counseling efficacy (OR = 5.42, CI = 1.99 to 14.77).

Barriers to Obesity Treatment

Lack of patient motivation, patient noncompliance, and absence of effective obesity treatment were ranked as the most frequently encountered barriers. Nearly all physicians had experiences with unmotivated patients (97%) and patient noncompliance (96%), and a substantial proportion (79%) ranked absence of effective obesity treatment as a commonly encountered barrier (Table 6). Physicians who were aware of recommendations were not significantly less likely to rank lack of effective obesity treatment as one of the top three barriers.

Discussion

Few physicians in this study were aware of or adherent to published recommendations regarding the management of childhood obesity. Many physicians continued to use weight for height instead of BMI to diagnose children as overweight or obese. Physicians ranked patient-related barriers, such as noncompliance and poor motivation, and treatment-related barriers, such as treatment futility, as the most frequently encountered barriers. Awareness of recommendations was not associated with a greater likelihood of adherence. However, physicians who were aware of recommendations were more likely to have positive attitudes regarding their own ability to counsel obese children and the overall efficacy of obesity counseling, and those who reported global adherence to guidelines were more likely to practice according to the expert committee recommendations. We found only minor differences between PDs and FPs in the ambulatory management of childhood obesity.

Recently, a series of articles summarizing the results of a national survey of child health professionals regarding the management of childhood obesity was published (13–18). Our study is similar, but extends the findings in a number of areas. We have included FPs in our sample and have examined the association between knowledge of recommendations and current management of childhood obesity. We found that a slightly smaller percentage of our sample was adherent to the entire medical assessment, even when we examined adherence in PDs only (3% in our study compared with 7% in the previously published study), possibly because of different sampling frames (26,27). The lower adherence rate in our study may also be attributable to the inclusion of FPs. As mentioned in the Introduction, the AAFP guidelines do not address certain obesity-related disorders. Because we used the expert committee recommendations published in *Pediatrics* (11) as the standard, a potential explanation may be that FPs who were aware only of

Table 6. Barriers to treatment by specialty*

Barrier	Report encountering			Rank among top three		
	FPs	PDs	*p*	FPs	PDs	*p*
Lack of patient motivation	71 (99%)	190 (97%)	0.68	58 (81%)	175 (74%)	0.06
Poor patient compliance	69 (96%)	187 (95%)	1.00	59 (82%)	167 (85%)	0.52
Lack of effective therapy	60 (83%)	152 (78%)	0.30	38 (53%)	105 (54%)	0.91
No insurance for referrals	53 (74%)	132 (67%)	0.33	24 (33%)	54 (28%)	0.36
Lack of availability of referral services	47 (65%)	125 (64%)	0.82	14 (19%)	43 (22%)	0.66
No insurance for in-office counseling	43 (60%)	100 (51%)	0.21	12 (17%)	17 (9%)	0.06
No time for frequent follow-up	40 (56%)	97 (49%)	0.38	9 (13%)	30 (15%)	0.56

* Data are reported as number (%). Group comparisons by specialty was χ^2.

the AAFP guidelines would be less likely to adhere to all aspects of the medical assessment. However, this explanation was not supported by the results of our study. We found no difference in the overall rates of adherence between FPs and PDs.

To our knowledge, this is the first study to examine the association between knowledge of recommendations and physician attitudes and practices regarding childhood obesity. As with previous studies on clinical guidelines and physician behavior, we found that guidelines do not necessarily change behavior (28–30). Fewer than one-half of physicians (46%) who were aware of guidelines reported adhering to them often or always. However, guidelines are likely the first step toward changing behaviors, in that they communicate knowledge and provide effective treatment strategies. Our finding that physicians who were aware of guidelines were more likely to have positive attitudes about obesity counseling and their own counseling proficiency supports this proposition. Changing physician attitudes has important implications, because a number of studies have documented that poor proficiency in counseling skills and treatment futility were significant barriers to care (31–33). Alternatively, physicians interested in treating obese children may be more likely to read about the subject and may be more likely to be aware of the guidelines. Regardless, making these guidelines more readily available to PDs and FPs is an important step toward improving obesity management.

We hypothesized that physician BMI may have had an impact on their attitudes and behaviors regarding obesity treatment, but we did not find any association between physician BMI and attitudes or behaviors regarding obesity treatment. Our ability to detect an association between BMI and physician behavior and attitudes may have been limited by the use of self-reported height and weight. Although self-report is more convenient than objective measurement, it may be inaccurate because individuals tend to underreport weight and over-report height (34–36).

We found little difference in overall rates of adherence to recommendations between PDs and FPs. FPs reported using BMI to diagnose obesity more frequently, at least in older children and adolescents, compared with PDs. This may result from their experience with adults, and they may be using adult BMI cut-offs as well. However, our finding that 50% of FPs and 38% of PDs who used BMI reported using the 95th percentile for sex and age to classify children as obese suggests that FPs are as likely to use the appropriate cut-off point as PDs.

PDs were more likely to report performing more thorough physical examinations and behavioral assessments of obese children. PDs were significantly more likely to ask about television viewing. The AAFP guidelines discuss the importance of reducing television viewing in addressing obesity, and, hence, a discrepancy in guidelines does not explain the disparity between FPs and PDs. Reduction of television viewing has been demonstrated to have a positive effect on children's weight (37). Healthcare providers should actively screen for this behavior and encourage families to reduce television viewing.

The results from this study should be interpreted with caution because our response rate was low, although it was similar to other recently conducted obesity surveys (13–18). Nonresponders may have different views about childhood obesity and could be more or less adherent to national recommendations. However, our results likely overestimate adherence because physicians who take a greater interest in childhood obesity were probably more likely to take the time to respond to this survey. As with all surveys, subject responses may be influenced by factors such as social desirability and may not be a true reflection of physicians' day-to-day management of childhood obesity. Further research using different study

designs and data-collection methods (e.g., chart reviews) should be conducted to corroborate and extend the findings of this survey.

In conclusion, knowledge of guidelines was associated with more positive attitudes toward personal counseling proficiency and the overall effectiveness of obesity counseling. Furthermore, physicians who reported adhering to guidelines were more likely to practice according to the recommendations of the expert committee. Unfortunately, few physicians, overall, were adherent to national recommendations regarding the ambulatory management of childhood obesity. Both limited knowledge and limited acceptance of expert recommendations seem to play a role in poor adherence. Efforts should be taken to better understand the reasons for the limited awareness and acceptance of existing guidelines. Substantial improvements in obesity care could be expected by making the current guidelines more widely available.

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