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Under-diagnosis of Pediatric Obesity during Outpatient Preventive Care Visits

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Abstract

OBJECTIVE—To examine obesity diagnosis, obesity-related counseling, and laboratory testing rates among obese pediatric patients seen in US preventive outpatient visits and to determine patient, provider, and practice-level factors that are associated with obesity diagnosis.

METHODS—By using 2005–2007 National Ambulatory Medical Care Survey and National Hospital Ambulatory Medical Care Survey data, outpatient preventive visits made by obese (body mass index ≥95%) 2- to 18-year-old patients were examined for frequencies of obesity diagnosis, diet, exercise, or weight reduction counseling, and glucose or cholesterol testing. Multivariable logistic regression was used to examine whether patient-level (gender, age, race/ethnicity, insurance type) and provider/practice-level (geographic region, provider specialty, and practice setting) factors were associated with physician obesity diagnosis.

RESULTS—Physicians documented an obesity diagnosis in 18% (95% confidence interval, 13–23) of visits made by 2- to 18-year-old patients with a body mass index ≥95%. Documentation of an obesity diagnosis was more likely for non-white patients (odds ratio 2.87; 95% confidence interval, 1.3–6.3). Physicians were more likely to provide obesity-related counseling (51% of visits) than to conduct laboratory testing (10% of visits) for obese pediatric patients.

CONCLUSIONS—Rates of documented obesity diagnosis, obesity-related counseling, and laboratory testing for comorbid conditions among obese pediatric patients seen in US outpatient preventive visits are suboptimal. Efforts should target enhanced obesity diagnosis as a first step toward improving pediatric obesity management.

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Keywords

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INTRODUCTION

THE PREVALENAE OF childhood obesity has increased over the last several decades.[1] Obesity diagnosis is associated with increased rates of obesity-related counseling and testing for comorbidities.[2–8] The 2003 American Academy of Pediatrics (AAP) recommendations stated that physicians should screen pediatric patients ≥2 years of age for obesity annually by plotting body mass index (BMI)[9] and provide anticipatory guidance to patients regarding diet and exercise. In 2007, an expert committee convened by the American Medical Association, the Centers for Disease Control and Prevention, and the Health Resources and Services Administration recommended that physicians test obese pediatric patients for comorbid conditions, such as hyperlipidemia and diabetes.[10]

Despite such recommendations, to our knowledge, only 1 nationally representative study has examined the frequency with which physicians appropriately diagnose and provide recommended management to patients with a documented BMI ≥95%, and this study was conducted only among 13- to 18-year-old patients.[11] Therefore, our study objectives were to use a nationally representative sample of outpatient preventive visits to examine the frequency with which US physicians diagnose obesity and provide obesity-related counseling (dietary, exercise, weight reduction) and laboratory testing (glucose, cholesterol) for a broader age range of pediatric patients (2–18 years old) with a BMI ≥95%. Because AAP obesity guidelines were published in 2003 and expert recommendations were published in 2007, study results can provide a baseline for examining the effect of such recommendations on physician childhood obesity diagnosis and management nationally. Another study goal was to assess whether obesity recognition among pediatric patients with a BMI ≥95% is associated with patient, provider, and practice characteristics.

MATERIALS AND METHODS

Data Source

This study uses 2005–2007 data from the National Ambulatory Medical Care Survey (NAMCS) and the National Hospital Medical Care Survey (NHAMCS), nationally representative surveys conducted by the National Center for Health Statistics (NCHS) regarding use and provision of care in US outpatient settings. NAMCS and NHAMCS use a multistage probability sampling approach in which US geographic regions are sampled, office-based physician practices (stratified by specialty status) and hospital-based outpatient departments are selected within each region, and patient visits are sampled within physician practices and outpatient departments.

Within practices, for a 1-week reporting period, physicians complete a 1-page record form for a systematic sample of patient visits. Patient record forms include questions regarding patient demographic information, reasons for the patient visit, provider diagnoses, diagnostic and screening examinations, patient education, and medications prescribed.

Since 2005, NAMCS and NHAMCS have included patient height and weight in the record forms. Therefore, our analysis included visits to physicians of all specialties during 2005–2007, a period when height and weight data were available and BMI was calculable. In addition, because the AAP recommends the use of BMI to screen for obesity starting at age 2 years, the sample was restricted to 2- to 18-year-old patient visits. The study sample also only included preventive visits in which obesity screening, diagnosis, and counseling are most appropriate.

Variables

Our primary dependent variable in this study was the percentage of preventive outpatient visits made by children and adolescents with a BMI ≥95% in which physicians documented an obesity diagnosis. Preventive visits were defined as visits in which a provider characterized that the purpose of the visit was preventive, prenatal, well-baby, screening, insurance, or general examinations. Because BMI is not available from patient record forms, height (centimeters), weight (kilograms), gender, and age (months) were used to obtain BMI percentiles using a SAS program (SAS Institute, Inc, Cary, NC) for 2000 Centers for Disease Control and Prevention growth chart.[12] Visits were classified as having an obesity diagnosis if physicians indicated a diagnosis of obesity, among a list of common diagnoses on the patient record form, or if they listed an International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) diagnosis code related to obesity: obesity 278, overweight/obesity 278.0, obesity unspecified 278.00, morbid obesity 278.01, or overweight 278.02.

Factors potentially associated with a physician diagnosis of obesity were selected on the basis of an identified association with obesity diagnosis within the literature and the presence of an adequate sample size. Categoric patient level factors included gender (male, female),[13, 14] age (2–5 years, 6–11 years, 12–18 years),[7, 14] race/ethnicity (white, other [Hispanic, black, Asian, Native Hawaiian/other Pacific Islander, or American Indian/Alaska Native]), and health insurance type (non-private [Medicare, Medicaid/SCHIP, workers compensation, self-pay, no charge/charity, unknown], private).[13, 14] Provider and practice level factors were provider type (limited to NAMCS only including pediatric or non-pediatric [family/general practice, internal medicine, other]),[8] practice setting (NAMCS, NHAMCS), and geographic region (Northeast, Midwest, South, West).[15]

This analysis also examined rates of counseling (diet, exercise, or weight reduction) and laboratory testing for obesity-related comorbid conditions (cholesterol or glucose screening) among 2- to 18-year-old patients with a BMI ≥95%. Visits in which providers offered obesity-related counseling or laboratory testing were identified from NAMCS/NHAMCS survey forms if appropriate checkboxes in the diagnostic/screening services (eg, cholesterol) and health education categories (eg, diet counseling) were marked.

Data Analysis

Because of small sample sizes for some of our variables, data from 2005–2007 NAMCS and NHAMCS were combined to create a larger-sized sample with more stable estimates based on NCHS recommendations. Comparisons of 2005, 2006, and 2007 data showed no statistically significant differences in the primary dependent variable. All analyses were conducted using the sample of preventive outpatient visits made by 2- to 18-year-olds with a BMI ≥95%; 95% confidence intervals (CIs) were calculated and chi-square tests were conducted for all bivariate analyses. All variables had an adequate sample size (≥30 visits) and relative standard error (<30%) to provide stable estimates per NCHS recommendations unless otherwise noted. Variables that were associated with physician obesity diagnosis ($P \leq .20$) in bivariate analyses (patient gender, age, race/ethnicity, and insurance type, and provider type, practice setting, and region) were entered into a multivariable logistic regression model in which physician obesity diagnosis was the dependent variable.

Data analyses were conducted with SAS version 9.2 and SUDAAN version 10.0 (RTI Institute, Research Triangle Park, NC). We derived national estimates, confidence intervals, and *P* values by using sampling weights provided in NAMCS/NHAMCS and accounted for stratification and clustering of visits within geographic region and within physician by using masked design variables provided by NAMCS/NHAMCS.

RESULTS

Between 2005 and 2007, there were 6710 preventive visits in the datasets, representing an estimated 111 million outpatient visits; 4.4% of these preventive visits occurred with subspecialists as opposed to primary care clinicians (family/general practice, internal medicine, or pediatrics).

Among these preventive visits, 4701 actual visits (74%) included both height and weight from which BMI could be calculated. For visits with height and weight measurements, 1155 actual visits (22%) were made by obese pediatric patients (BMI ≥95%).

Obesity Diagnosis among Pediatric Patients with a Body Mass Index ≥ 95% seen in Preventive Outpatient Visits

Table 1 shows the association of patient, provider, and practice characteristics with physician obesity diagnosis for pediatric preventive outpatient visits in which age- and gender-specific BMI percentiles were ≥95%. Providers documented a diagnosis of obesity in 18% (95% CI, 13–23) of visits where patients met obesity criteria. In bivariate analyses, physicians were less likely to document an obesity diagnosis in younger patients: 19% (95% CI, 11–27) of 6- to 11-year-olds and 29% (95% CI, 20–39) of 12- to 18-year-olds.

After adjusting for potential confounders (Table 1), we found that physicians were more likely to document an obesity diagnosis among patients of non-white race/ethnicity (OR 2.87; 95% CI, 1.3–6.29). Physicians were less likely to document an obesity diagnosis among younger patients (OR 0.1; 95% CI, 0.04–0.31 for 2- to 5-year-olds vs 12- to 18-year-olds) and for patients seen in the Midwest US region (OR 0.3; 95% CI, 0.10–0.79 for

Midwest region vs West region); however, these estimates were based on fewer than 30 sampled records.

Obesity-related Counseling and Laboratory Testing among Patients with a Body Mass Index ≥ 95% Seen in Preventive Outpatient Visits

Obesity-related counseling, defined as counseling about diet, exercise, or weight reduction, occurred in 51% (95% CI, 44–58) of visits by obese patients aged 2 to 18 years old; this includes counseling in 86% (95% CI, 77–94) of patients with an obesity diagnosis and in 44% (95% CI, 36–52) of patients without an obesity diagnosis. Cholesterol or glucose testing occurred in 10% (95% CI, 5–15) of visits by obese patients.

DISCUSSION

To our knowledge, this is the first national study to explore rates of obesity diagnosis, counseling, and laboratory testing for comorbid conditions among outpatient preventive visits made by 2- to 18-year-old patients with a BMI ≥95%. Although 2003 AAP guidelines stated that physicians should use BMI to screen for obesity,[9] our findings suggest that height and weight measurement and obesity diagnosis were suboptimal in 2005–2007 preventive outpatient visits.

Height and weight measurement is the first step toward diagnosing and treating obesity during outpatient preventive visits; yet in this study, approximately one quarter of preventive pediatric visits lacked documentation of such measurements.

Further, in those cases in which height and weight were obtained, obesity diagnosis was underdocumented, occurring in only 18% of preventive outpatient visits made by 2- to 18-year-old obese patients (BMI ≥95%). Such rates are lower than previous single or multicenter studies in which diagnosis occurred among 20% to 86% of pediatric visits.[4, 5, 7, 8, 13, 14, 16] This may be related to the fact that previously conducted studies used medical chart abstraction, a method that often relies not only on ICD-9-CM coding as in NAMCS/NHAMCS but also on additional physician documentation to generate an obesity diagnosis.

Notably, in this study, documentation of an obesity diagnosis was more likely among visits made by non-white patients. In a smaller, single-site study, obese pediatric patients of black and Hispanic race/ethnicity were more likely to receive an obesity diagnosis than white patients.[13] Perhaps literature and popular media emphasizing the increased prevalence of obesity among non-white populations have led to heightened obesity assessment and management among minority populations.

As in previous studies,[2–4, 13,14] this study also demonstrates that rates of obesity-related counseling and laboratory testing for comorbid conditions among obese pediatric patients are unsatisfactory. In addition, the counseling rate is a quantitative estimate and does not address the depth or quality of obesity-related counseling. Of note, counseling rates are higher than diagnosis rates, suggesting that reliance on ICD-9-CM codes for diagnosis potentially underestimates the proportion of visits where a provider appropriately acknowledges and discusses obesity. Nonetheless, even if rates of diagnosis are as high as 51% (the rate for counseling), this rate remains insufficient.

Quality improvement, a systematic method for performance assessment and improvement, may offer a useful approach to help improve childhood obesity screening and diagnosis. Despite the clinical and public health significance of quality improvement, there are few documented examples of pediatric clinical settings that have successfully used such an approach to improve obesity screening and diagnosis rates. In Delaware, Nemours primary care clinics have successfully integrated an electronic medical record system that automatically calculates BMI and BMI% and provides a weight classification for primary care providers.[17] In Seattle, primary care clinics improved BMI measurement and weight classification for their patients through a combination of learning sessions, conference calls, and coaching.[18] In New Mexico, quality improvement efforts, including obesity-related learning collaboratives and trainings for school-based health center staff, led to a significant increase in provider assessment of students' BMI% and weight category status.[19] Thus, quality improvement approaches may offer promise in improving obesity screening and diagnosis rates, which have remained low despite clinical guidelines and recommendations. Because subspecialists may provide preventive care to some children with chronic diseases (eg, oncologists may administer vaccinations to children with cancer diagnoses),[20] comprehensive quality improvement efforts may want to target subspecialists and generalists.

There are limitations to our analysis. Because height and weight data first became available in NAMCS/NHAMCS in 2005, we are restricted to 2005–2007 data, which limits our sample size and ability to detect significant associations and differences among variables in our analysis. Further, documentation of an obesity diagnosis was a rare event among visits made by 2- to 18-year-old patients with a BMI ≥95%. Therefore, there are several estimates (Table 1) that are unreliable because they are based on fewer than 30 sampled records (ie, age, non-pediatric specialty) or have a relative standard error greater than 30% (ie, Midwest region). Although NAMCS and NHAMCS are the largest, nationally representative data sources for examining health care services in US outpatient settings, the cross-sectional study design limits our ability to make causal inferences. Because this study only provides information regarding a single physician–patient encounter, it is possible that patients received obesity-related screening, diagnosis, or counseling at previous or subsequent visits not captured in this dataset. Further, it is also possible that physicians diagnosed obesity and performed obesity-related screening and counseling but did not document such practices in the patient record form. In addition, because we did not include other less frequently used reimbursable obesity diagnoses (eg, acanthosis nigricans) in our definition of obesity diagnosis, physician obesity diagnosis may be underestimated in this study.

CONCLUSIONS

Although study results suggest that the rates of physician documentation of obesity, obesity-related counseling, and laboratory testing among obese pediatric patients seen in US outpatient preventive visits are inadequate, such rates provide baseline estimates that can be used to track physician improvement in obesity diagnosis and management in future studies.

Because obesity diagnosis is associated with improved obesity management, clinical-based interventions should target enhanced diagnosis as a first step toward improving care for obese pediatric patients.

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ABBREVIATIONS

BMI	body mass index
CDC	Centers for Disease Control and Prevention
CI	confidence interval
EMR	electronic medical record
NAMCS	National Ambulatory Medical Care Survey
NHAMCS	National Hospital Ambulatory Medical Care Survey
NCHS	National Center for Health Statistic
OR	odds ratio

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Table 1

The association of patient, clinical, provider, and practice characteristics with obesity diagnosis among 2–18 years olds with BMI ≥ 95% seen in US Preventive Visits

Characteristics	**Unweighted total visits, #**	**Estimated total visits, # mil. (95% CI)**	**Unweighted visits with obesity dx, #**	**Visits with obesity dx %, (95% CI)**	**Adjusted odds ratio (95% CI)**
All visits with BMI ≥ 95%	1155	18 (15, 21)	259	18 (13, 23)	N/A
Patient characteristics					
Gender					
Male	534	10 (8, 12)	103	15 (10, 20)	0.61 (0.36, 1.02)
Female	621	8 (7, 10)	156	21 (14, 28)	Reference
Age					
2–5	320	6 (5, 8)	28*	4 (1, 8)**	**0.11 (0.04, 0.31)**
6–11	303	5 (4, 6)	79	19 (11, 27)	0.55 (0.29, 1.04)
12–18	532	7 (5, 8)	152	29 (20, 39)	Reference
Race/ethnicity					
White	400	9 (7, 11)	54	10 (4, 15)	Reference
Non-White	755	9 (7, 11)	205	26 (17, 34)	**2.87 (1.31, 6.29)**
Clinical characteristics					
Insurance type					
Private	313	9 (7, 11)	63	15 (9, 21)	-
Non-private/unknown	842	9 (7, 11)	196	21 (13, 28)	
Provider and practice characteristics					
Provider specialty±					
Pediatrics	309	12 (9, 14)	71	17 (10, 23)	N/A
Non-pediatric	142	5 (2, 6)	27*	18 (9, 27)	
Geographic region					
Northeast	404	4 (3, 5)	110	21 (9, 34)	0.76 (0.28, 2.07)
Midwest	260	4 (2, 6)	43	7 (2, 12)**	**0.29 (0.10, 0.79)**
South	290	7 (5, 9)	63	18 (10, 26)	0.70 (0.30, 1.60)
West	201	3 (2, 4)	43	26 (15, 36)	Reference

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Characteristics	Unweighted total visits, #	Estimated total visits, # mil. (95% CI)	Unweighted visits with obesity dx, #	Visits with obesity dx %, (95% CI)	Adjusted odds ratio (95% CI)
Setting					
NAMCS	451	16 (14, 19)	98	17 (12, 23)	Reference
NHAMCS (OPD)	704	2 (1, 2)	161	24 (18, 30)	1.09 (0.58, 2.04)

* ≤ 30 sample visits;

** relative standard error ≥ 30%, ±Estimates are given for NAMCS only