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Missing Documentation of Weight and Height at Preventive Visits for Children

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Abstract

Despite the importance of measuring weight and height at well-child visits, there are limited data on frequency of anthropometric documentation. The authors aimed to identify characteristics associated with missing weight and height documentation at preventive visits for children. Among preventive visits for children from birth to 18 years old, recorded in the National Ambulatory Medical Care and National Hospital Ambulatory Medical Care Surveys for 2005–2009, the authors found that 20.8% had missing weight and/or height ($n = 19\,033$) documentation. Compared with infants younger than 2 years, school-age children (odds ratio [OR] = 1.30; 95% confidence interval [CI] = 1.03–1.64), and adolescents (OR = 1.61; 95% CI = 1.26–2.04) were more likely to lack documentation. Missing documentation was also more likely for visits with nonphysicians (OR = 4.53; 95% CI = 3.17–6.48) and nonpediatricians (OR = 2.63; 95% CI = 2.02–3.41) compared with pediatricians. Efforts to improve weight and height surveillance should be directed to clinics in which midlevel providers and nonpediatric physicians are caring for school-age children and adolescents.

Keywords

growth, body weight, body height, child, preventive health services

Introduction

Through highly publicized campaigns and the *Bright Futures* guidelines,¹ the American Academy of Pediatrics (AAP) has promoted the routine measurement of weight and height (length for supine infants) at every preventive visit to screen for obesity and other health conditions.² However, there is a wide range in the frequency in which anthropometrics are documented during pediatric outpatient visits.^{3–6} When examining actual documentation of metrics in pediatric preventive visits, the missing documentation of height and weight ranges from 10% to 89%.^{3,4}

Although a few studies have examined the frequency of weight and height documentation among pediatric visits, none were conducted within a nationally representative sample. Furthermore, no previous studies have examined patient-, provider-, or practice-level characteristics associated with such documentation. In this study, we investigate the patient, provider, and practice characteristics associated with missing weight and/or height documentation among a nationally representative sample of preventive visits for children from birth through 18 years. Such findings may highlight specific

areas for improving weight and height documentation within pediatric preventive visits.

Methods

Data Source

Data in this study were obtained from the 2005–2009 National Ambulatory Medical Care Survey (NAMCS) and the National Hospital Ambulatory Medical Care Survey (NHAMCS) conducted by the National Center for Health Statistics, a division of the Centers for Disease Control and Prevention. These data reflect a multilevel stratified sample of 19 033 ambulatory visits in office-based physician practices and hospital-based outpatient departments sampled from geographic regions across the United States.

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Within practices, for a 1-week reporting period, the physician or clinic staff representative completed a one-page patient record form for a random sample of visits. These forms included questions regarding patient demographics, nature of the visit, provider diagnoses, diagnostic and screening examinations, health education provided, and medications prescribed. In addition, each participating clinic completed a physician induction interview regarding clinical practice and provider characteristics. Record forms are verified for field accuracy.⁷

NAMCS and NHAMCS have included patient weight and height in patient record forms since 2005. As the AAP *Bright Futures* guidelines recommend that weight and height be obtained for all children seen at preventive care visits, this study included all 0- to 18-year-olds seen for preventive care visits from 2005 to 2009.

Variables

Our primary study outcome was the percentage of preventive visits made by children in which either weight and/or height was not documented. Preventive visits were defined as visits in which a provider or provider representative labeled the major reason for the visit as preventive care. Although preventive visits include routine prenatal, well-baby, screening, insurance, and general exams, only 3.7% of visits had an additional primary diagnosis listed for need for immunization or a pregnancy-related condition. Therefore, all visits were included in the analysis.

Characteristics potentially associated with undocumented weight and height were selected based on an identified association with body mass index (BMI) screening in a previous study.⁸ Categorical patient-level characteristics included gender, age (0-23 months, 2-5 years, 6-11 years, or 12-18 years), race/ethnicity (white, non-Hispanic; black, non-Hispanic; Hispanic, or Other [Asian, Native Hawaiian/Other Pacific Islander, American Indian/Alaska Native]), health insurance type (private or nonprivate [Medicare, Medicaid/SCHIP, workers compensation, self-pay, no charge/charity, unknown]), and continuity of care (new or established patient). Provider- and practice-level characteristics consisted of provider specialty (including pediatric or nonpediatric [family/general practice, internal medicine, other]), provider type (physician, physician assistant/nurse practitioner, or other), practice setting (NAMCS or NHAMCS), electronic medical record (EMR) use (presence or absence), and geographic region (Northeast, Midwest, South, or West).

Data Analysis

To represent all preventive visits in freestanding and hospital-based clinics, we combined data from both NAMCS and NHAMCS to create a larger, more representative sample of all preventive care visits. We then used multivariable logistic regression to further examine the association of these characteristics associated with missing weight and/or height. All analyses were 2-sided and $P < .05$ was considered statistically significant.

Data analyses were conducted with SAS, version 9.2 (SAS Institute, Cary, NC) and SUDAAN, version 10.0 (RTI Institute, Research Triangle Park, NC). We derived national weighted estimates, confidence intervals and P values by using sampling weights provided by NCHS.⁹ Stratification and clustering of visits within geographic region and physician were accounted for by using masked design variables provided by NAMCS/NHAMCS.

Results

From 2005 to 2009, there were 19 033 actual preventive visits sampled (weighted estimate of 325 million) for children from birth through 18 years old. Among all preventive visits, 79.2% (258 million) had both weight and height documented, 9.4% (30 million) had neither height nor weight documented, and 20.8% (68 million) had missing weight, height, or both. Of these visits, 93.5% were seen by physician providers as compared with 6.5% by nonphysician or undocumented providers. With respect to physician specialty, 73.3% were seen by pediatricians as compared with other specialists (Table 1).

Of the visits missing weight and/or height, 55.0% were for male patients. The proportion of missing visits according to age was 32.7% for infants (0-23 months), 16.5% for young children (ages 2-5 years), 16.0% for school-age children (6-11 years), and 34.8% for adolescents (12-18 years; Table 2). Of those patient visits missing documentation of weight and/or height, 83.8% were seen by a physician as compared with 96.1% when both measures were documented. Among visits with nonpediatricians, 36.0% had missing documentation. In visits with nonphysicians, 52.4% had missing documentation of weight and/or height.

In multivariable logistic regression analysis, we found that in comparison with preventive visits made for infants, visits for adolescents were the most likely to have missing documentation of weight and/or height (odds ratio [OR] = 1.61; 95% confidence interval [CI] = 1.26-2.04), followed by visits by school-age children (OR = 1.30; 95% CI = 1.03-1.64). In addition,

Table 1. Distribution of Visits by Specialty, Provider Type, and Rates of Missing Weight and/or Height Documentation

	Unweighted Number	Weighted Estimate (Millions)	Total Visits (%)	Missing Weight and/or Height Documentation (%)
Provider type				
Physician	16 629	304	93.5	18.6
Other	2279	20	6.0	52.4
Unknown	125	1	0.5	47.5
Total	19 033	325	100.0	20.8
Specialty				
Pediatrician	12 746	239	73.3	15.2
Other	6287	87	26.7	36.0
Total	19 033	325	100.0	20.7

nonpediatricians were more likely than pediatricians to have undocumented weight and/or height (OR = 2.63; 95% CI = 2.02-3.41). Last, nonphysicians were more likely than physicians to not document weight and height at preventive visits (OR = 4.53; 95% CI = 3.17-6.48; Table 2).

Discussion

This study is the first to highlight and quantify the patient, provider, and practice characteristics associated with missing documentation of weight and height in US preventive visits for infants and children. When weight and height data are not obtained, clinical providers may miss early signs of health conditions associated with underweight and overweight status, as well as those conditions that may be present among children who are of normal weight but are embarking on a concerning growth trend.

In our study, one fifth of US children are missing weight and/or height documentation at preventive visits and almost 10% are without any weight or height documentation despite clear recommendations by the AAP since 1994. Overall, in comparison with other practitioners, pediatricians and physicians do a better job in documenting weight and height but there is still room for improvement.

Older children are more likely to have missing documentation. Adolescents are most often lacking documentation, followed by school-age children. Specifically, adolescents had missing weight and/or height metrics in 31.6% of visits. In an evaluation of government-mandated weight and height screening in England, a similar decrement of weight and height documentation was noted with increasing age of the child. This English study examined 0- to 11-year-old children and showed a decline in the frequency of anthropometric documentation from 74% at 6 weeks of life to 18% at 11 years of

age.⁶ As only 38% of adolescents in the United States attend annual preventive visits,^{10,11} not documenting weight and height at such visits is a missed opportunity to evaluate these patients for obesity and conditions leading to underweight status such as eating disorders^{12,13} and Crohn's disease.^{14,15}

We postulate that provider documentation of weight and height among postpubescent adolescents is lower than that of younger children because their growth rate, especially with respect to females, slows during this developmental period. Our findings are equivocal to findings from a study of weight, height, and BMI documentation in EMRs in which BMI data were actually minimally more available for adults (28% to 88%) than for children (21% to 81%).⁵ Despite the current public health focus on obesity, many providers may rely on clinical appearance rather than BMI to diagnose children as overweight or obese.¹⁶ Studies suggest that relying on clinical appearance leads to inaccurate weight classification,^{17,18} particularly for children who are overweight rather than obese. Furthermore, providers who rely on clinical appearance instead of anthropometrics as an overall health indicator may not notice when children cross growth percentiles from one visit to the next.

Provider type was also associated with missing weight and/or height documentation. Physicians and specifically, pediatricians were much more likely to have documented weight and/or height than nonphysicians and nonpediatricians. As there are no specific data regarding providers' specific practice locations, we could not investigate if the nonphysicians working in clinics with physicians had higher frequencies of documentation than providers who did not work with physicians. This makes it difficult to determine if this finding was provider specific or dependent on the clinical setting. We hypothesize that the decreased rates of anthropometric documentation among nonphysicians and nonpediatricians seen in this study may be related to a

Table 2. Correlates of Missing Weight and/or Height Documentation

Visit Characteristics	Preventive Visits Missing Height and/or Weight (weighted %)	Adjusted Odds Ratio (95% CI) ^a	P
Gender			.431
Female	55.0	1.06 (0.91-1.24)	
Male	45.0	Ref	
Age			.001
0-23 mo	32.7	Ref	
2-5 y	16.5	1.07 (0.84-1.35)	
6-11 y	16.0	1.30 (1.03-1.64)	
12-18 y	34.8	1.61 (1.26-2.04)	
Race/ethnicity			.263
White, non-Hispanic	59.4	Ref	
Black, non-Hispanic	13.8	0.85 (0.66-1.08)	
Hispanic	19.4	1.01 (0.79-1.28)	
Other	7.4	0.75 (0.52-1.09)	
Insurance type			1.000
Private	54.4	Ref	
Other	45.6	1.00 (0.84-1.20)	
Visit type			.052
New	15.1	1.26 (1.00-1.59)	
Established	84.9	Ref	
Specialty			<.001
Pediatrician	53.8	Ref	
Other	46.2	2.63 (2.02-3.41)	
Provider type			<.001
Physician	83.8	Ref	
Other	15.3	4.53 (3.17-6.48)	
Unknown	0.9	3.12 (1.63-5.95)	
Visit setting			.866
NAMCS	87.5	Ref	
NHAMCS	12.5	1.02 (0.80-1.31)	
Electronic medical record			.444
Yes	19.1	Ref	
No	80.9	1.13 (0.83-1.53)	
Geographical region			.056
Northeast	17.5	0.82 (0.59-1.15)	
Midwest	20.1	0.68 (0.48-0.98)	
South	37.7	Ref	
West	24.8	1.06 (0.78-1.45)	

Abbreviations: CI, confidence interval; NAMCS, National Ambulatory Medical Care Survey; NHAMCS, National Hospital Ambulatory Medical Care Survey.

^aAdjusted for patient-level (gender, age, insurance type, or visit type) and provider-/practice-level (provider type, provider specialty, practice setting, or geographic region) characteristics.

lower number of pediatric patients seen as well as a greater emphasis on child growth and development in pediatric training, but this should be further studied.

Surprisingly, we did not identify any association between race/ethnicity and weight/height documentation in our bivariate analysis as has been noted in a prior study.¹⁰ Furthermore, although EMR has been proposed

as a tool to increase frequency of documentation⁴ of weight and height, in our study EMR use was not associated with improved documentation. In the study by Arterburn et al,⁵ a multicenter EMR review was performed on 1.2 million children and 3.7 million adults from 10 clinics. Despite the routine use of EMR in all practice settings, the frequency of documentation of

weight and height was not consistent among these 10 clinics. Such findings suggest that clinic protocols for obtaining such measurements may be a more important focus for improvement than EMR implementation. Although a systematic review of the literature¹⁹ demonstrates that EMR use facilitates providers' adherence to clinical practice guidelines, it does not ensure that all data (eg, weight or vital signs) obtained prior to the provider interaction with the patient may improve with EMR use.

Limitations

A limitation of this study was that NAMCS and NHAMCS rely on provider documentation of weight and height. If the metrics were obtained, but not transferred to the medical record, then our study may overestimate the frequency of missing weight and height data in preventive pediatric visits. Another limitation of this study is our inability to further assess the clinic processes that may have contributed to low rates of weight and height documentation. For instance, in many clinics, measurements are performed by ancillary support staff prior to the provider interaction with the patient. Last, because this is a cross-sectional study, we are unable to assess if a patient lacks weight and height documentation in a sampled visit because they had such measurements taken in a recent visit not included in the sample.

Conclusion

Despite AAP recommendations for routine measurement of weight and height for all pediatric preventive visits,^{9,20} this study suggests that there are opportunities for improvement in this area. Findings from this first nationally representative study serve as a baseline for future quality improvement efforts to facilitate collection of anthropometric data, including BMI, in pediatric primary care settings. Future studies should examine methods of standardizing metric collection and documentation, particularly for adolescent visits and for resource-limited clinical settings that may rely on non-physician providers. With the increasing emphasis on team-based quality improvement, improving anthropometric measurement during pediatric preventive care visits is an area in which health care workers could target.

Authors' Note

The views expressed in this article are those of the author and do not necessarily reflect the official policy or position of the Department of the Navy, Department of Defense, or the US

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Declaration of Conflicting Interests

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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