Prevalence and Documentation of Overweight and Obesity in Hospitalized Children and Adolescents

abstract

**OBJECTIVE:** Overweight and obesity (OAO) are major problems among children and adolescents. Hospitalization of pediatric patients provides an opportunity for physicians to initiate point-of-care services related to weight status. Our goal was to determine the prevalence of OAO among hospitalized pediatric patients and to assess the extent of documentation of OAO in their medical records.

**METHODS:** We conducted a retrospective chart review of 8- to 18-year-olds admitted to an inpatient pediatric unit during 6 months in 2012. Age, gender, height, weight, BMI, discharge diagnosis, and admitting specialty were extracted from electronic medical records. BMI percentile was calculated from Centers for Disease Control and Prevention growth charts. Prevalence of OAO was determined for medical and surgical subspecialties, and charts were queried for documentation of weight status.

**RESULTS:** The study included 603 patients. Approximately one-third (36.5%) of patients were either overweight or obese, and nearly one-fifth (19.7%) were obese. The prevalence of overweight was similar between medical and surgical specialties. Obesity prevalence differed slightly, at 20.8% and 17.3% \((P > .05)\), respectively. Only 0.9% of overweight and obese patients had documented discharge diagnoses of overweight or obesity, and only 13.2% had documentation of weight status noted anywhere in their medical record.

**CONCLUSIONS:** We identified a significant number of hospitalized OAO patients, an overwhelming percentage of whom never had weight status documented during their admission. Hospitalization offers health providers a window of opportunity to identify obesity, communicate risks, and initiate weight management interventions.

The epidemic of obesity in the United States is on course to overwhelm the nation’s health care system. Currently, –17% of children and adolescents in the United States are obese, a rate that has risen dramatically over the past few decades and nearly tripled since 1980.\(^1\)\(^2\) Furthermore, 4% to 6% of all children in the United States are severely obese.\(^3\) Higher childhood BMI correlates with higher prevalence of obesity in adulthood, and obesity is known to be 1 of the strongest cardiovascular disease risk factors.\(^4\)\(^5\) Seventy percent of obese children have \(\geq 1\) cardiovascular disease risk factor, and 39% of obese children have \(\geq 2\) risk factors.\(^6\) Obese children are at increased risk for type 2 diabetes mellitus, sleep apnea, asthma, gastroesophageal reflux, pseudotumor cerebri, steatohepatitis, cholelithiasis, polycystic ovary syndrome, degenerative joint disease, and musculoskeletal problems.\(^7\)\(^-\)\(^12\) Psychosocial conditions associated with obesity include discrimination by peers, low self-esteem, and diminished...
quality of life. On average, length of hospital stay among obese patients is longer than in normal-weight patients.

Currently, overweight and obesity are underdiagnosed conditions in children and adolescents. In 1 study, only 12% of parents reported that, to their knowledge, their child’s BMI had ever been screened. In the same study, 68% of parents of overweight or obese children reported that they were never notified of their child’s weight status within the preceding year. Parents themselves frequently underestimate the weight of their children. Fifty-three percent of parents of obese children and 86% of parents of overweight children thought that their child was either healthy weight or underweight, and no parent viewed his or her obese child as obese. Parental misperception of a child’s weight is 1 of the barriers to improving lifestyle habits.

Point-of-care interventions have been promoted as a means of providing health care services at the moment of contact with any and all health professionals. Access to care among families of low socioeconomic status is limited; therefore, emergency departments and urgent care clinics have become an increasingly important source of health care services. One major problem with medical care in such acute settings is that non-urgent medical issues may not be addressed. Moreover, the prevalence of overweight is 6 times higher among children covered by Medicaid than those with private insurance, suggesting that it is particularly necessary to address weight status in these acute care and hospital-based settings. Despite the dramatic increase in obese patients being hospitalized, weight status remained underdiagnosed and underdocumented in the in-patient setting.

The purpose of this study was to determine the prevalence of overweight and obesity (OAO) among hospitalized pediatric and adolescent patients, and to assess the extent of documentation of weight status in their inpatient electronic medical records (EMRs).

METHODS
Setting
The study was conducted at a 164-bed tertiary-care children’s hospital in a large health system in the northeastern United States. Approval for the study was obtained from the health system’s institutional review board.

Procedures
EMRs were reviewed for all patients admitted to 1 of the hospital’s inpatient pediatric units during a 6-month period from January through June 2012. The EMR system in use was the Eclipsys Sunrise Clinical Manager. Data extracted from the EMR included age, gender, height, weight, BMI, discharge diagnoses, and admitting specialty. BMI was automatically calculated by the EMR using admission weight and height. BMI percentile was calculated, plotted, and categorized using the Centers for Disease Control and Prevention BMI growth charts and percentile calculator for children and adolescents.

Patients <8 years or >18 years and those without a documented height or weight were excluded. Patients admitted with diagnoses of failure to thrive or eating disorders were also excluded.

Measures
Overweight was defined as BMI of ≥85th percentile for age and gender, and obesity was defined as BMI of ≥95th percentile for age and gender. Using the EMR, documentation of overweight or obesity status was abstracted from admission and discharge diagnosis lists, admission history notes, physical examination notes, and discharge summaries.

Statistical Analysis
All data analysis was conducted with Microsoft Excel software, with means and percentages calculated among various subgroups of patients. Prevalence of OAO were calculated separately for pediatric medical and surgical subspecialties, as well as for each individual subspecialty to later present prevalence and documentation rates to each subspecialty department about their own patient population. Prevalence was also calculated for male and female genders. Medical subspecialties included hospitalist (patients admitted under the hospitalist service), private pediatrics (patients admitted under private community pediatricians’ services), adolescent medicine, cardiology, dermatology, endocrinology, gastroenterology, hematology-oncology, infectious disease, nephrology, neurology, pulmonology, and rheumatology. A number of patients were transferred to the inpatient unit from the PICU and remained admitted in the EMR under their previous ICU attending as the attending of record; these patients were also included in the medical subspecialty group. Surgical subspecialties included general surgery, cardiothoracic surgery, orthopedic surgery, neurosurgery, dentistry, oral and maxillofacial surgery, otolaryngology, obstetrics-gynecology, and urology. Additional analysis was performed by using chi-squared (χ²) to determine significance (P < .05) between genders and between the medical and surgical subspecialty groups.
RESULTS

During the study period, 843 patients were admitted to the adolescent unit, of which 603 admissions were eligible for the study; 240 patients were excluded for age outside the range of 8 to 18 years, absence of recorded height in the EMR, or admission diagnoses of failure to thrive or eating disorder.

Of all included patients, 36.5% were overweight or obese (BMI $\geq 85th$ percentile), and 19.7% were obese (BMI $\geq 95th$ percentile). The total prevalence of patients who were either overweight or obese was not statistically different between the medical subspecialties and the surgical subspecialties (both listed in Table 1) at 36.7% and 35.7%, respectively. The prevalence of obesity was slightly greater among medical subspecialties than surgical subspecialties, at 20.8% and 17.3% ($P > .05$), respectively, although the difference was not significant (Fig 1). Among medical specialties, the highest percentages of overweight or obese patients were admitted from the PICU or admitted to the pulmonary or neurology services. Among the surgical specialties, the highest percentage of overweight or obese patients were admitted to the orthopedics service.

When separated by gender, the prevalence of overweight was similar between male and female patients, at 36.2% and 36.8%, respectively. The prevalence of obesity was higher for male than female patients, at 21.5% and 17.9%, respectively, although not significantly ($P > .05$).

Of all 220 patients who were found to be overweight or obese, only 2 patients, or 0.9%, had a documented discharge diagnosis of overweight or obesity entered into the EMR by resident or attending physicians during the admission. One was under the hospitalist service and 1 under neurology. EMRs of those 220 patients were further queried, revealing that only 27 (13.2%) had the terms “overweight” or “obesity” noted elsewhere in their medical record during the admission: in the admission history notes, physical examination notes, or discharge summaries. Notably, of all 29 cases with documentation, 27 were admitted to medical subspecialties compared with 2 admitted to surgical subspecialties.

DISCUSSION

On the basis of outpatient studies between 2009 and 2010, 18.2% of children between the ages of 6 to 19 years had a BMI at the $\geq 95th$ percentile, and 33.3% of children had a BMI at the $\geq 85th$ percentile. The prevalence of OAO among the inpatient population in this study reflects such previously reported outpatient obesity rates. Given the high rates of OAO among pediatric inpatients, hospital-based health care providers have a unique opportunity to recognize and address the role of weight status in the holistic care of their patients.

Weight-associated comorbidities and risk factors can be discussed during both inpatient admissions and outpatient subspecialty follow-up visits, particularly given that many patients with complex or chronic diseases rely on their subspecialty visits as their main source of both preventative and primary medical care. The high prevalence of OAO found in this study, across nearly all medical and surgical subspecialties, highlights the importance of addressing weight status in the care of these patients.

| TABLE 1 Prevalence of OAO Among Pediatric Medical and Surgical Subspecialties |
|---------------------------------|-----------------|-----------------|-----------------|
| Service                         | No. of Patients | BMI $\geq 85$  |
|                                 |                | Percentile, n (%) | BMI $\geq 95$  |
|                                 |                | Percentile, n (%) | Cases With Documented OAO Statusa |
| Adolescent                      | 11             | 5 (45.4)         | 3 (27.3)       | 2 |
| Cardiology                      | 10             | 3 (30)           | 2 (20)         | 0 |
| Endocrinology                   | 25             | 8 (32)           | 4 (16)         | 2 |
| Gastroenterology                | 25             | 2 (8)            | 1 (4)          | 0 |
| Hematology                      | 10             | 3 (30)           | 3 (30)         | 1 |
| Hospitalist                     | 108            | 34 (31.5)        | 21 (19.4)      | 10 |
| Neurology                       | 105            | 52 (49.5)        | 29 (27.8)      | 7 |
| PICU                            | 8              | 4 (50)           | 3 (37.5)       | 0 |
| Private pediatric               | 67             | 26 (38.8)        | 13 (19.4)      | 3 |
| Pulmonary                       | 10             | 5 (50)           | 3 (30)         | 1 |
| Rheumatology                    | 15             | 6 (40)           | 2 (13.3)       | 1 |
| Oral and maxillofacial surgery/dental | 13    | 4 (30.8)         | 1 (77)         | 0 |
| Ear, nose, and throat           | 9              | 4 (44.4)         | 2 (22.2)       | 0 |
| Neurosurgery                    | 20             | 6 (30)           | 4 (20)         | 0 |
| Orthopedics                     | 38             | 17 (44.7)        | 8 (21.1)       | 2 |
| Surgery                         | 99             | 31 (31.3)        | 15 (15.2)      | 0 |
| Urology                         | 9              | 4 (44.4)         | 2 (22.2)       | 0 |
| Other medicalb                  | 2              | 0 (0)            | 0 (0)          | 0 |
| Other surgicalc                 | 8              | 4 (50)           | 2 (25)         | 0 |
| All medical subspecialties      | 407            | 150 (36.7)       | 85 (20.8)      | 27 |
| All surgical subspecialties     | 196            | 70 (35.7)        | 34 (17.3)      | 2 |

aThis includes cases with documentation in discharge diagnosis or anywhere else in the inpatient record.

bThe “other medical” category includes Infectious disease and Dermatology services.

cThe “other surgical” category includes cardiothoracic surgery and obstetrics-gynecology services.
surgical subspecialties, supports the implementation of mandatory hospital-based weight status assessment and documentation for all pediatric patients, regardless of admitting diagnosis or specialty.

The hospital-based EMR used at this study’s institution automatically calculates a BMI for all patients; however, this function requires nursing or physician staff to input both a height and weight measurement on admission. The height measurement was omitted in 4% (n = 34) of all patients admitted during our study period. Additionally, the EMR only calculates BMI, a measure generally used to document weight status in adults, but not a BMI percentile for age and gender, which is the standard metric used in pediatrics. Without a calculated BMI percentile, care providers are not automatically notified about weight status, nor are overweight or obesity automatically documented as diagnoses within the EMR. Particularly among subspecialties that may not regularly focus on issues of overweight or obesity, such as neurology or orthopedics (which were shown to have especially high obesity rates in this study), and among surgical specialties (which were shown to have the lowest rates of OAO documentation among their OAO patients), the opportunity for intervention is paramount.

**Future Directions**

The high prevalence of OAO among our hospitalized pediatric patients will be presented to subspecialty department leaders to garner support for the development of a hospital-based weight management program. The researchers plan to create an Obesity Action Plan that will include mandatory height documentation and BMI percentile calculation for every patient within the EMR. The aim is for hospital providers, including subspecialty teams, to be notified of the patient’s weight status before discharge, with the overweight or obesity diagnosis to be included in mandatory discharge paperwork. The implementation of such a program would highlight the importance of weight reduction to patients and families and introduce them to the basic components of successful weight management, including nutritional education, cognitive-behavioral strategies, emphasis on a supportive family environment, and physical activity prescriptions.21

**Limitations**

One limitation of this study was that because of the limited nature of past medical history gleaned from the EMR, patients with a history of chronic disease or other conditions predisposing them to OAO were not separately identified. This includes, but is not limited to, patients on steroid treatment, nonambulatory patients, and those with strong family histories of obesity. Additionally, although the EMR system allows for the assessment of OAO documentation, it does not provide any information on whether providers discussed weight issues with the patients in question. Although the assumption can be made that a lack of documentation of OAO diagnoses means providers were unlikely to have discussed such diagnoses with patients, the retrospective nature of this study precludes our ability to assess the rate of initiation of weight management counseling that may have occurred.

**CONCLUSIONS**

An overwhelming number of OAO patients whose weight status was never documented during their hospital admission were identified in this study. Such documentation can serve as the initial step in the initiation of counseling and referral services for weight management. Inpatient admissions offer health care providers a window of opportunity to identify obesity, communicate risks, and initiate weight management interventions in overweight children.

**REFERENCES**


