Obesity Screening in Hospitalized Pediatric Patients: Rates of Diagnosis, Intervention, and Risk Factors for Overlooked Obesity

Shir Libman MD[1]*, Michal Vinker-Shuster MD[1,2]*, Zvi Perry MD PhD[1,4], and Yonatan Yeshayahu MD MHA[1,2,3]

[1]Faculty of Health Sciences, Ben Gurion University of the Negev, Beer Sheva, Israel
[2] Department of Pediatrics and [3]Pediatric Endocrinology and Diabetes Unit, Samson Assuta Ashdod University Hospital, Ashdod, Israel
[4]Department of Surgery A, Soroka University Medical Center, Faculty of Health Sciences, Ben Gurion University of the Negev, Beer Sheva, Israel

*These authors contributed equally to this study

ABSTRACT **Background:** Recent guidelines have emphasized the importance of the diagnosis and treatment of obesity in all healthcare settings. However, obesity rarely appears as a chronic diagnosis during hospitalization, and there are few reports of targeted interventions.

Objectives: To assess obesity-related diagnoses and interventions during pediatric acute hospitalization.

Methods: A retrospective cohort study was conducted in a pediatric ward. Hospitalization records of all patients aged 2–18 years were retrieved during a 30-month period. Weight percentile for patient age was calculated using the U.S. Centers for Disease Control and Prevention (CDC) age- and sex-adjusted charts. Patients with a weight-percentile-for-age of ≥ 95% were classified as suspected obesity. The characteristics of *obesity-diagnosed* patients were compared to *obesity-overlooked* patients.

Results: Of the hospitalized patients, 245/2827 (8.6%) had weight-percentile-for-age of ≥ 95%. Of these, 91/245 (37.4%) had obesity-related references in their medical record; 65/245 (26.5%) had a mean body mass index of 97.66% ± 2.6. Only 38/245 (15.5%) were diagnosed with obesity; weight-related recommendations only appeared in the discharge letter for 44/245 (17.9%). Multivariate analysis indicated that obesity was significantly more overlooked in preschoolers than in adolescents (adjusted odds ratio [OR] 11.78, 95% confidence interval [95%CI] 4.71–29.42), $P < 0.001$) and in patients, regardless of age, whose chief complaint was not abdominal (OR 7.7, 95%CI 1.92–30.8, $P = 0.004$).

Conclusions: Low rates of obesity-related diagnoses during pediatric acute hospitalization, especially in younger patients, are frequent. Pediatric staff should note obesity in patients and be trained in non-stigmatizing intervention during hospitalization.

IMAJ 2026; 28: 45–49

KEY WORDS: hospitalization, medical education, obesity, pediatrics

Childhood obesity is on the rise in both developed and developing countries [1]. Children with obesity are at increased risk of becoming adults with obesity and experiencing its associated co-morbidities such as metabolic syndrome, type 2 diabetes, cardiovascular complications, and psychosocial challenges [2,3]. These risks underscore the importance of early identification and intervention.

Despite extensive research and the vast number of published screening and treatment guidelines, pediatric obesity remains a major global and national health burden [4,5]. In the United States, an estimated 16.1% of all children and adolescents aged 2 to19 years were diagnosed with overweight and 19.3% with obesity in 2020 [6]. Although official nationwide body mass index (BMI) calculations in Israel are not consistently updated, the most recent data as presented in Knesset Health Committee sessions suggest worrisome trends: roughly 20% to 30% of all Israeli children and adolescents are estimated to be at or above the obesity threshold, and nearly 60% of adults have overweight or obesity. These figures, derived from committee presentations in 2023 and 2025, highlight the urgent need for improved detection and documentation efforts in pediatric settings [7,8].

Obesity is typically assessed using BMI, with obesity defined as an age- and sex-adjusted BMI ≥ 95th percentile [2]. However, the BMI calculation includes height, which is not routinely measured in pediatric settings, and in particular during inpatient care. As a result, alternative measures such as weight-for-age percentiles tend to be used in research as a proxy to identify children at high risk of obesity [9]. A previous study indicated that a weight-for-age percentile cutoff of ≥ 90% achieved a

sensitivity of 94.3% and a negative predictive value of 98.6% for detecting obesity [9].

Clinical directives such as the authoritative 2023 American Academy of Pediatrics (AAP) obesity guideline emphasize the need for early and proactive screening and intervention across all healthcare settings, including acute and inpatient environments [2]. Hospitalization may thus constitute a missed opportunity to identify undiagnosed obesity and initiate management, particularly in children not previously assessed or treated in the community [10].

Several studies have examined obesity diagnoses in outpatient and emergency care, but there is scant data from pediatric inpatient settings. A recent Israeli study in a pediatric emergency department (ED) found that obesity was addressed in fewer than 5% of all visits, with minimal follow-up or referral [11]. However, comparable data for general pediatric inpatient wards are lacking.

The goal of the current study was to assess the rates of obesity diagnoses and interventions in a pediatric inpatient setting by comparing patients whose obesity was documented to patients whose obesity was overlooked, to identify the factors associated with the identification of obesity during hospitalization. By focusing on a routine inpatient setting, the findings can shed light on missed opportunities for diagnosis and care and thus contribute to better inpatient obesity screening practices.

PATIENTS AND METHOD

A retrospective cohort study was conducted in the pediatric ward of Samson Assuta Ashdod University Hospital in Israel. Hospitalization records of all patients aged 2 to 18 years who were admitted to the ward were retrieved over a 30-month period. Weight was measured by trained nursing staff as part of the routine admission procedure. Weight was recorded within the first 24 hours of hospitalization. Since BMI is not normally calculated at intake for all patients, we used the weight-percentile-for-age as a proxy, based on U.S. Centers for Disease Control and Prevention (CDC) age- and sex-adjusted charts. In our hospital, the weight-percentile-for-age is, based on the CDC growth percentiles [12], is calculated automatically and presented in the electronic medical records (EMR) as a growth chart. This information is available to all physicians.

To enhance sensitivity and negative predictive value, only patients with a weight-percentile-for-age ≥ 95% were retrospectively categorized as suspected of obesity, and their medical files were reviewed.

The EMR and discharge summaries were manually reviewed, using a structured data extraction form and included anthropometric, demographic, clinical, and laboratory data as well as obesity-related interventions including metabolic screening, motivational interviewing, consultation with a dietician, and weight-related recommendations in the discharge letter.

DEFINITIONS

We divided the groups as follows: pre-school 2 to 5.9 years, school age from 6 to 11.9 years, and adolescents from 12 to 18 years. Patients suspected of obesity were defined as patients with a weight-percentile-for-age ≥ 95%. Obesity diagnosed patients were defined as patients whose medical record made a reference to excess body weight in the medical history section, on physical examination including BMI calculation, in documented medical history at admission or daily medical/nurse's follow-up, or in the discharge letter. Overlooked obesity patients were defined as patients where there was no reference to excess body weight in the patient EMR but whose weight-percentile-for-age was ≥ 95%.

STATISTICAL ANALYSIS

A chi-square test was used for categorical variables. Student's *t*-test or a Mann–Whitney nonparametric test was applied for continuous variables. Independent associations between risk factors for overlooked obesity were evaluated using multivariate logistic regression. Based on data retrieved from the univariate analysis, a multivariate logistical regression analysis was used to define a model of risk of being a patient with overlooked obesity. Variables that were statistically significant in the univariate analysis as well as other presumed confounding variables were included in the regression, and a selection process was applied to determine the significant explanatory variables for the model.

Statistical analyses were performed using IBM Statistical Package for the Social Sciences statistics software, version 26 (SPSS, IBM Corp, Armonk, NY, USA).

This study was approved by the hospital's local ethics committee.

RESULTS

An overview of the study design, including patient inclusion and subgroup classification, is presented in Figure 1. Of the 2827 patients in the cohort, 245 (8.6%) were classified as suspected of obesity based on their weight-for-

Figure 1. Study design

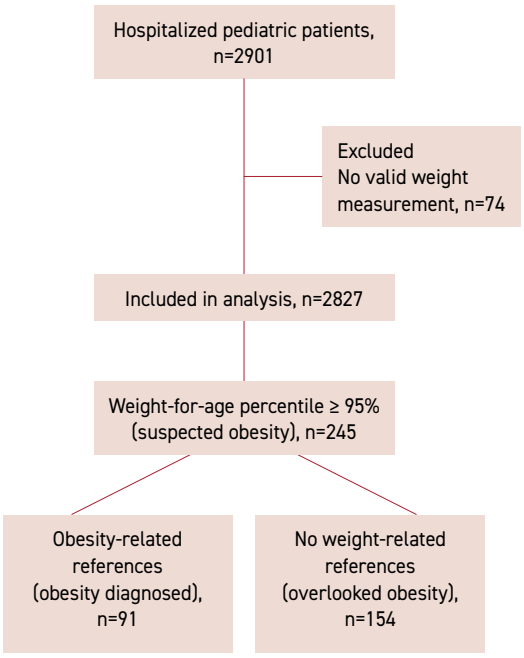


Table 1. Demographic and clinical characteristics of diagnosed versus overlooked patients

	Diagnosed obesity (n=91)	Overlooked obesity (n=154)	*P*-value
Sex (male), n (%)	45 (49.4)	84 (54.5)	0.440
Age, mean years ± standard deviation	12.02 ± 4.06	8.27 ± 4.85	< 0.001
Age group in years, n (%)			
Preschool (ages 2–5.9 years)	7 (7.7)	68 (44.1)	< 0.001
School (ages 6–11.9 years)	33 (36.2)	42 (27.3)	
Adolescent (ages 12–18 years)	51 (56.0)	44 (28.6)	
Weight-percentile-for-age, mean ± SD	98.50 ± 1.52	97.75 ± 1.41	0.012
Weight-percentile-for-age ≥ 99%, n (%)	43 (47.2)	40 (25.9)	< 0.001
BMI percentile, n (%)			
≥ 95 % (Obesity)	39 (60)	19 (29.2)	0.091
85–94.9 (Overweight)	2 (3.1)	5 (7.7)	
Season (winter, %)	54 (59.3)	87 (56.5)	0.663
Address (urban, %)	74 (81.3)	115 (74.6)	0.201
Hospitalization duration > 48 hours, n (%)	45 (49.4)	68 (44.1)	0.422
Abdominal pain at admission, n (%)	17 (18.7)	4 (2.6)	< 0.001

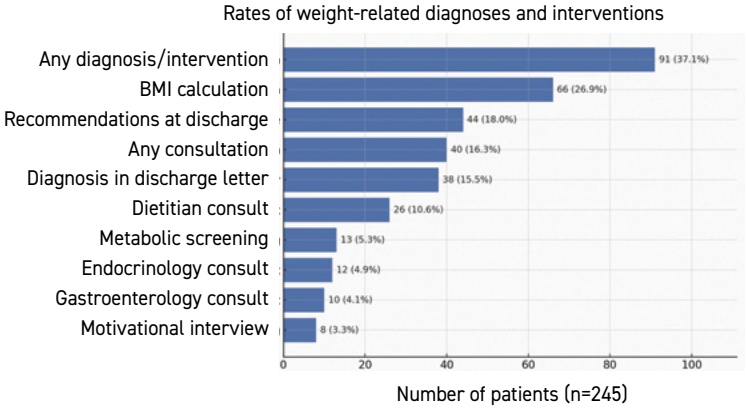
BMI = body mass index, calculated for 65 children

age percentile ≥ 95%. Among these, 91 (37.4%) had an obesity-related reference in their medical record (obesity diagnosed), whereas 154 (62.8%) had no such documentation (overlooked obesity).

Table 1 presents demographic and clinical characteristics of obesity-diagnosed vs. obesity-overlooked patients. The findings show that older age (mean 12.02 ± 4.06 vs. 8.27 ± 4.85, $P < 0.001$) and a higher weight-percentile-for-age (mean 98.50 ± 1.52 vs. 97.75 ± 1.41, $P < 0.012$) were significantly associated with an obesity diagnosis. Abdominal pain at admission was also associated with an obesity diagnosis (17/91 [18.7%] vs. 4/154 [2.6%], $P < 0.001$). There were no differences in terms of sex, urban vs. rural address, time of year of hospitalization, or length of stay.

Figure 2 presents the percentages of weight-related diagnoses and interventions during the hospitalization of all 245 patients suspected of obesity. Height was measured in 65/245 (26.5%) that yielded a BMI calculation (mean BMI-percentile-for-age 97.66 ± 2.6). Only 38/245 (15.5%) of the patients received obesity diagnosis in their hospital record. As shown in the multivariate analysis in Table 2, obesity was overlooked significantly more in preschool patients as compared to adolescent patients (adjusted odds ratio [OR] 11.78, 95% confidence interval [95%CI] 4.71–29.42, $P < 0.001$). Higher rates of overlooked obesity were found in patients with a lower

Figure 2. Percentages of weight-related diagnoses and interventions, of 245 patients suspected of obesity



weight-percentile-for-age (OR 0.65, 95%CI 0.52–0.83, $P < 0.001$) and in patients with a chief complaint that was non-abdominal (OR 7.7, 95%CI 1.92–30.8, $P < 0.004$).

DISCUSSION

Analysis of the EMR of pediatric admissions for acute illness over a 30-month period showed that obesity received little attention on the part of medical staff. Of all patients suspected retrospectively of obesity based

Table 2. Multivariate analysis: risk factors for overlooked obesity

	Odds ratio	95% Confidence interval	*P*-value
Age group*			
Preschool aged vs. Adolescents	11.78	4.71–29.42	< 0.001
School-aged vs. Adolescents	1.54	0.79–2.98	0.201
Weight percentile for age	0.65	0.52–0.83	< 0.001
Non-abdominal chief complaint	7.7	1.92–30.8	0.004

*Preschool (ages 2–5.9), School (ages 6–11.9), Adolescent (ages 12–18)

on their weight-percentile-for-age, only 15.5% had a formal diagnosis of obesity. BMI was only calculated for 26.5%, and only 37% had any references related to obesity in their medical file. These findings are consistent with previous studies indicating documentation of weight status in only 3.3% to 26% of all pediatric patients at risk for obesity [10,13-16]. The rates of overlooked obesity were, however, much lower than reported in another study conducted in a pediatric ED [11]. This result was to be expected, since short visits to the ED for acute illness and minor trauma may not provide optimal conditions for discussing obesity or lifestyle changes. By contrast, we expected that a hospitalization lasting several days, where the child would be treated by multiple healthcare professionals, would offer more opportunities for these discussions with the family and the child, but the numbers we found were still lower than predicted.

Physicians most likely overlook pediatric obesity during hospitalization for acute illness because they do not have sufficient training in pediatric approaches to manage obesity, nor do they have time and resource constraints in the inpatient setting, which and may be affected by personal biases [17,18]. This possibility aligns with other reports describing the hurdles faced by healthcare providers in general when discussing weight [19], including lack of confidence in using appropriate language, and concerns about potentially undermining the doctor-patient relationship or discouraging future care-seeking. This finding underscores the need for improved training and communication strategies. However, avoiding the documentation of weight-related diagnoses can impact future weight management [20].

Our findings revealed higher rates of overlooked obesity in younger pediatric patients and those with lower weight percentiles. Similar associations between age- and weight-percentile categories have been reported before [14,15]. One possible explanation may be rooted in the erroneous belief by physicians that addressing weight-related concerns in this group may be less urgent or necessary. This conclusion runs counter the latest AAP guidelines that emphasize the importance of BMI assessment, information on nutrition, and the encouragement of physical activity in children aged 2 years and older [2].

Children presenting with abdominal pain were more likely to have obesity included in their diagnoses during hospitalization. Speculatively, abdominal complaints may be more readily perceived by physicians as potentially obesity-related (e.g., constipation, gastroesophageal reflux), making it feel more appropriate or clinically justified to raise the issue. In addition, abdominal examinations may draw more attention to body composition and thus increase the likelihood of recognizing excessive adiposity.

Unlike a previous study [11], which found that female patients were more likely to be diagnosed with obesity, our analysis showed that only a slightly higher but non-significant proportion of diagnosed patients were female (50.6% vs. 45.4% overlooked patients).

One limitation of this study relates to its retrospective nature. Another limitation is that weight-percentile-for-age is not the gold standard for defining obesity. It is less accurate than BMI, but simplifies screening for obesity, since height is normally distributed, but not routinely measured. Gamliel and colleagues [9] found that the 90th weight-percentile-for-age cutoff had high sensitivity and negative predictive value in identifying obesity and therefore would have been a good choice of cutoff if the purpose of the study was to determine rates of obesity. We used a cutoff of ≥ 95% weight-percentile-for-age to increase specificity and decrease the possibility of including patients with a normal BMI in the analysis, at the risk of excluding patients with true obesity. The aim of our study was to determine rates of obesity overlooking, which is more surprising when the patients have more pronounced obesity. Using the ≥ 95% weight-for-age percentile resulted in a suspicion of obesity in 8.6% of the patients, which is lower than the expected obesity rate among hospitalized children and adolescents in general [6-8,16]. Thus, our data may have underrepresented the true prevalence of overlooked obesity. Acute illness may lead to weight loss before or during hospitalization, thus potentially causing an underestimation of obesity.

CONCLUSIONS

Diagnoses of obesity and effective interventions are lacking during hospitalization for acute illness. Medical staff tend to overlook obesity in younger patients and patients with non-abdominal complaints. Further research is needed to specify the proper intervention to enhance awareness among medical staff of obesity in the inpatient setting.

Correspondence

Dr. M. Vinker-Shuster
Dept. of Pediatrics, Samson Assuta Ashdod University Hospital, Ashdod 7747629, Israel
Email: michal.vi@gmail.com

References

1. Di Cesare M, Sorić M, Bovet P, et al. The epidemiological burden of obesity in childhood: a worldwide epidemic requiring urgent action. *BMC Med* 2019; 17: 212.
2. Hampl SE, Hassink SG, Skinner AC, et al. Clinical practice guideline for the evaluation and treatment of children and adolescents with obesity. *Pediatrics* 2023; 151 (2): e2022060640. Erratum in: *Pediatrics* 2024; 153 (1): e2023064612.
3. Simmonds M, Llewellyn A, Owen CG, Woolacott N. Predicting adult obesity from childhood obesity: a systematic review and meta-analysis. *Obes Rev* 2016; 17 (2): 95-107.
4. Thompson D, Wolf AM. The medical-care cost burden of obesity. *Obes Rev* 2001; 2: 189-97.
5. Ling J, Chen S, Zahry NR, Kao T-SA. Economic burden of childhood overweight and obesity: a systematic review and meta-analysis. *Obes Rev* 2023; 24: e13535.
6. Stierman B, Afful J, Carroll MD, et al. National Health and Nutrition Examination Survey 2017-March 2020 Prepandemic Data Files-Development of Files and Prevalence Estimates for Selected Health Outcomes. *Natl Health Stat Report* 2021; (158): 10.15620/cdc: 106273.
7. Knesset Research and Information Center. Obesity among children and adolescents in Israel – prevalence, consequences, and policy tools. Presented to the Knesset Health Committee, Jan 2023. [Available from https://fs.knesset.gov.il/25/Committees/25_cs_bg_6702272.pdf]. [Hebrew].
8. Israeli Ministry of Health. Obesity trends and challenges in Israel. Presentation to the Knesset Health Committee, May 2025. [Available from https://fs.knesset.gov.il/25/Committees/25_cs_bg_6801810.pdf]. [Hebrew].
9. Gamliel A, Ziv-Baran T, Siegel RM, Fogelman Y, Dubnov-Raz G. Using weight-for-age percentiles to screen for overweight and obese children and adolescents. *Prev Med* 2015; 81: 174-9.
10. Azhdam DB, Reyhan I, Grant-Guimaraes J, Feinstein R. Prevalence and documentation of overweight and obesity in hospitalized children and adolescents. *Hosp Pediatr* 2014; 4: 377-81.
11. Friedman N, Erez-Granat O, Inbar A, Dubnov-Raz G. Obesity screening in the pediatric emergency department - A missed opportunity? *Heliyon* 2022; 8 (12): e12473.
12. Kuczmarski RJ, Ogden CL, Grummer-Strawn LM, et al. CDC growth charts: United States. *Adv Data* 2000 (314): 1-27.
13. Woo JG, Zeller MH, Wilson K, Inge T. Obesity identified by discharge ICD-9 codes underestimates the true prevalence of obesity in hospitalized children. *J Pediatr* 2009; 154: 327-31.
14. Borgmeyer A, Ercole PM, Niesen A, Strunk RC. Lack of recognition, diagnosis, and treatment of overweight/obesity in children hospitalized for asthma. *Hosp Pediatr* 2016; 6: 667-76.
15. Katzow M, Homel P, Rhee K. Factors associated with documentation of obesity in the inpatient setting. *Hosp Pediatr* 2017; 7: 731-8.
16. Mary Katherine Hood, Jeffrey C. Winer. Inpatient obesity recognition and diagnosis in pediatric patients. *Hosp Pediatr* 2022; 12: 418-23.
17. Srivastava G, Browne N, Kyle TK, et al. Caring for US children: barriers to effective treatment in children with the disease of obesity. *Obesity (Silver Spring)* 2021; 29: 46-55.
18. Ray D, Sniehotta F, McColl E, Ells L. Barriers and facilitators to implementing practices for prevention of childhood obesity in primary care: a mixed methods systematic review. *Obes Rev* 2022; 23: e13417.
19. Albury C, Strain WD, Brocq SL, et al. The importance of language in engagement between health-care professionals and people living with obesity: a joint consensus statement. *Lancet Diabetes Endocrinol* 2020; 8: 447-55.
20. Dilley KJ, Martin LA, Sullivan C, Seshadri R, Binns HJ, Pediatric Practice Research Group. Identification of overweight status is associated with higher rates of screening for comorbidities of overweight in pediatric primary care practice. *Pediatrics* 2007; 119 (1): e148-155.

Capsule

In situ structural mechanism of epothilone-B-induced CNS axon regeneration

To address the intracellular response to injury, **Bodakuntla** and co-authors developed an in situ cryo-electron tomography and cryo-electron microscopy platform to mimic axonal damage and present the structural mechanism underlying thalamic axon regeneration induced by the drug epothilone B. They observed that stabilized microtubules extend beyond the injury site, generating membrane tension and driving membrane expansion. Cryo-electron microscopy reveals the in situ structure of microtubules at 3.19 Å resolution, which engage epothilone B within the microtubule lattice at the regenerating front. During repair, tubulin clusters are delivered and incorporated into polymerizing microtubules at the regenerating site. These microtubule shoots serve as scaffolds for various types of vesicles and endoplasmic reticulum, facilitating the supply of materials necessary for axon repair until membrane tension normalizes. The authors demonstrated the unexpected ability of neuronal cells to adjust to strain induced by epothilone B, which creates homeostatic imbalances and activates axons to regeneration mode.

Nature 2025; 648: 477
Eitan Israeli