



Quality Improvement

Hospitalist Recognition and Treatment of Obesity in Inpatients: A Quality Improvement Cohort Study

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Abstract

Background: Obesity is primarily managed in the outpatient setting, however its impact on the frequency and course of hospitalizations is well-established. Considering the rising prevalence of obesity and the broad implications on population health when untreated, hospitalizations may represent an untapped opportunity to address obesity management. **Methods:** We performed a retrospective cohort study comparing the frequency of inpatient obesity documentation to initiation of obesity-targeted therapy, including weight management clinic referral and weight management medication prescription on discharge from hospitalization by hospitalists for patients with class 2 and 3 obesity. We also queried the frequency of weight management clinic referrals and weight management medication prescriptions prior to hospitalization for these cohorts. **Results:** The cohorts included 1531 patients with class 2 (49.2%) or class 3 (50.8%) obesity. During hospitalization, obesity was frequently documented as a medical problem in patients with both class 2 (48.4%) and class 3 (75%) obesity. Patients with class 3 obesity were more likely to be referred on discharge to a weight management clinic and initiated on weight management medications, however the overall absolute number of referrals and prescriptions were low. **Conclusions:** We observed that hospitalists documented the presence of obesity in over 60% of patients, yet rarely implemented targeted treatment on discharge. Our results suggest a gap exists between awareness of obesity and subsequent intervention. This highlights an opportunity to generate an inpatient workflow to bridge a gap in care for patients with obesity.

BACKGROUND

Obesity and excess weight are chronic, treatable metabolic conditions projected to affect 50% of the United States by 2030 and associated with over 4 million deaths in 2015 globally.^{1,2} In addition, obesity is associated with increased hospital admission, longer lengths of stay, and increased morbidity.³⁻⁵ However, in patients with overweight and obesity, clinically meaningful weight loss ($\geq 5\%$ body weight) improves cardiovascular outcomes, health-related quality of life, and mortality.⁵⁻⁷ The past several years have seen a revolution in targeted medical therapy for weight management.^{8,9} Current practice guidelines recommend patients with class 1 (body mass index [BMI] 30 to < 35), class 2 (BMI 35 to < 40), or class 3 (BMI ≥ 40) obesity receive comprehensive lifestyle interventions and be considered for medications and/or bariatric surgery.¹⁰⁻¹² The field of obesity medicine is still in its nascent phase and much of the counselling and initiation of therapy falls to primary care providers. However, limited visit time, high patient loads, and competing

medical problems challenge adequate outpatient evaluation and treatment initiation.^{13,14} Hospitalization may represent an untapped opportunity when multimodal obesity intervention can be initiated, opening the door for further management by outpatient providers.

Hospitalists infrequently address obesity in the inpatient setting, citing lack of time, non-acute nature of the disease, and a perceived lack of obesity-related education.¹⁵ Despite the challenges of discussing obesity in the inpatient setting, there is precedent to discuss and initiate management of chronic medical concerns while hospitalized to facilitate optimal outpatient care.^{16,17} Advances in the management of congestive heart failure and substance use disorder, both of which require longitudinal and multimodal care, suggest that initiation of chronic outpatient therapies (including counselling and medication) during the inpatient hospitalization may lead to improved long-term compliance and outcomes.^{16,17} Importantly, hospitalized patients with obesity have noted an openness to discussing weight management, but few receive any counselling.^{15,18}

To better understand current practices of hospitalist physicians with regards to obesity and to illuminate opportunities to improve obesity care in the inpatient setting, we evaluated the frequency of hospitalist provider obesity documentation and compared it to initiation of obesity-targeted therapy during hospitalization. We hypothesized that both obesity recognition and treatment initiation would occur infrequently, representing a gap in care for hospitalized patients, and an opportunity for improvement in addressing the obesity epidemic.

METHODS

We conducted a retrospective cohort study at the University of Utah Medical Center, a 548-bed academic medical center. An electronic database query identified all patients discharged from the inpatient adult general medicine service between November 1, 2021, and November 1, 2022. All patients with a body mass index of (BMI) 35 or greater were included. Baseline patient characteristics (including age, BMI, gender, race/ethnicity, insurance status, Charlson comorbidity index, and pre-hospitalization obesity-targeted treatment) were abstracted from the medical record. Study subjects were assigned to one of two study cohorts as defined by World Health Organization (WHO) obesity class 2 (BMI 35 - 40) or class 3 (BMI > 40).

Our primary study outcomes included the documentation of obesity, defined as an International Classification of Diseases, 10 revision (ICD-10) code indicative of obesity associated with the hospitalization, referral to a weight management clinic on discharge, and a new prescription for weight management medication (WMM). We compared baseline characteristics and study outcomes via Chi-square test for categorical variables, t-test for normally distributed continuous variables, and Kruskal-Wallis test for non-normally distributed continuous variables. A two-tailed P-value of 0.05 was used to determine statistical significance. Stata/IC version 16.1 (StataCorp, College Station, TX) was used for all analyses.

RESULTS

Baseline characteristics

Of the 1,531 patients included, 754 (49.2%) had class 2 obesity and 777 (50.8%) had class 3 obesity ([Table 1](#)). Patients with class 3 obesity were significantly younger (median age [interquartile range] 54 [42-65] vs. 57 [45-69] years, $p = 0.001$) and more likely to be female (50.1% vs 58.9%, $p = 0.001$). Obesity-related comorbidities were common in both cohorts, with diabetes mellitus observed in greater than 50% of patients and hypertension in over 75% of patients. Obstructive sleep apnea (61.8% vs. 50.0%, $p < 0.001$) was more prevalent in the class 3 obesity cohort.

We observed similar proportions of WMM prescriptions prior to hospitalization between those with class 2 and 3 obesity. In total, 15% of patients with class 2 had a prescription for WMM, compared to 16% of patients with class 3 obesity. Glucagon-like peptide (GLP)-1 receptor agonists (e.g., semaglutide and liraglutide) were the most frequently prescribed WMMs. Prior to hospitalization, patients with class 3 obesity were more frequently referred to (18.2% vs 9.0%, $p < 0.001$), and more frequently seen in (8.9% vs 2.9%, $p < 0.001$) a weight management clinic.

Inpatient obesity documentation and targeted-treatment initiation

Documentation of obesity was noted more frequently among patients with class 3 relative to those with class 2 obesity (75.0% vs. 48.4%, $p < 0.001$, [Table 2](#)). Both cohorts had low absolute numbers for referral to weight management clinic or new WMM prescription on discharge. Patients with class 3 obesity were more likely to receive a referral to weight management clinic (1.2% vs. 0.3%, $p = 0.039$) or a new prescription for WMM (4.6% vs. 1.6%, $p = 0.001$). The most commonly prescribed WMM on discharge was the GLP-1 agonist, semaglutide (75% of prescriptions).

DISCUSSION

In this retrospective cohort study of hospitalized patients with class 2 or class 3 obesity, a diagnosis of obesity was documented in nearly 50% of patients with class 2 obesity and 75% of patients with class 3 obesity. Despite the high recognition and documentation of obesity among hospitalist providers, referral to a weight management clinic or initiation of weight management medications on discharge were rare. These results suggest an important gap between the recognition of obesity and initiation of therapeutics aimed at combating the illness. This is particularly notable considering the United States Preventive Services Task Force (USPSTF) guidelines, as well as joint guidelines by American Heart Association, American College of Cardiology, and The Obesity Society that recommend those with BMI ≥ 30 (and in some cases BMI ≥ 27) receive advanced referral for intensive behavioral and lifestyle intervention as well as consideration for bariatric surgery and weight management medications.¹⁰⁻¹²

A growing body of literature underscores the association between excess body weight and increased medical care use, particularly hospitalization. An estimated \$172 billion dollars in excess medical care costs in 2019 was attributed to obesity, some of which was due to increased hospitalization.¹⁹ The COVID-19 pandemic clearly highlighted the association between obesity and hospitalization, as it was identified as a key risk factor for severe illness.^{20,21} An evaluation by Schafer et al. reviewed hos-

Table 1. Baseline Characteristics of Hospitalized Patients with Obesity.

Baseline Characteristics	Class 2 Obesity (BMI 35-40)	Class 3 Obesity (BMI > 40)	p-value
	(n=754)	(n=777)	
Age in yr, median (IQR)	57 (45-69)	54 (42-65)	0.003
BMI, mean (SD)	37.3 (1.4)	47.4 (7.8)	<0.001
Female, n (%)	378 (50.1)	458 (58.9)	0.001
Insurance Status			
<i>Government Insurance</i>	477 (63.6)	498 (64.1)	0.736
<i>Commercial Insurance</i>	258 (34.2)	253 (32.6)	0.492
<i>Uninsured</i>	20 (2.7)	29 (3.7)	0.23
Race/ethnicity			0.388
<i>White</i>	480 (63.6)	457 (58.8)	
<i>Black</i>	19 (2.5)	20 (2.6)	
<i>Hispanic</i>	80 (10.6)	96 (12.4)	
<i>American Indian/Alaskan Native</i>	18 (2.4)	24 (3.1)	
<i>Other</i>	61 (8.1)	60 (7.7)	
<i>Unreported</i>	96 (12.7)	120 (15.4)	
Medical Comorbidities			
<i>Diabetes, n (%)</i>	386 (51.2)	399 (51.4)	0.951
<i>Obstructive Sleep Apnea, n (%)</i>	377 (50.0)	480 (61.8)	<0.001
<i>Hypertension, n (%)</i>	590 (78.3)	608 (78.3)	1
<i>Hyperlipidemia, n (%)</i>	434 (57.6)	403 (51.9)	0.025
<i>Non-alcoholic fatty liver disease, n (%)</i>	46 (6.1)	67 (8.6)	0.059
Charlson Comorbidity Index, mean (SD)	3.8 (3.3)	3.6 (3.3)	0.324
Pre-existing Weight Management Medications			
<i>Phentermine*, n (%)</i>	23 (3.1)	29 (3.7)	0.461
<i>Bupropion-naltrexone, n (%)</i>	3 (0.4)	7 (0.9)	0.222
<i>Semaglutide, n (%)</i>	52 (6.9)	47 (6.1)	0.5
<i>Liraglutide, n (%)</i>	38 (5.0)	44 (5.7)	0.588
Previously Referred to Weight Management Clinic	68 (9.0)	141 (18.2)	<0.001
Previously Seen in Weight Management Clinic	22 (2.9)	69 (8.9)	<0.001
<i>Medical</i>	6 (0.8)	27 (3.5)	
<i>Surgical</i>	16 (2.1)	50 (6.4)	

*phentermine with or without topiramate

Abbreviations: BMI= body mass index; IQR= interquartile range; SD= standard deviation

Table 2. Comparison of Obesity Documentation and Obesity-Targeted Treatment Provided During Hospitalization or upon Hospital Discharge.

Study Outcomes	Class 2 Obesity (BMI 35-40)	Class 3 Obesity (BMI > 40)	p-value
	n=754	n=777	
Obesity Documented in Medical Record, n (%)	365 (48.4)	583 (75.0)	<0.001
Referral to Weight Management Clinic on Discharge, n (%)	2 (0.3)	9 (1.2)	0.039
Seen in Weight Management Clinic after Discharge, n (%)	15 (2.0)	19 (2.4)	0.543
<i>Medical</i>	4 (0.5)	8 (1.0)	
<i>Surgical</i>	13 (1.7)	17 (2.2)	
New Weight Management Medication prescription during hospitalization, n (%)	12 (1.6)	36 (4.6)	0.001
New Weight Management Medication			
<i>Phentermine*, n (%)</i>	2 (0.3)	3 (0.4)	0.679
<i>Bupropion-naltrexone, n (%)</i>	-	-	-
<i>Semaglutide, n (%)</i>	9 (1.2)	27 (3.5)	0.003
<i>Liraglutide, n (%)</i>	1 (0.1)	6 (0.8)	0.064

*phentermine with or without topiramate

Abbreviations: BMI= body mass index

pitalizations associated with obesity and noted that people with a BMI ≥ 30 comprised nearly a quarter of all “avoidable” hospitalizations.²² Despite growing evidence for the link between obesity and hospitalization, there is little evidence around inpatient management of obesity, perhaps because it has long been viewed as the purview of outpatient providers.^{6,13,14} While weight management is a chronic issue, we found only 18% of patients in the outpatient setting experiencing class 3 obesity were referred to weight management clinics for evaluation prior to hospitalization, and only 16% had any weight management medications prescribed. These numbers are even smaller for patients with class 2 obesity, emphasizing the critical missed opportunity in the inpatient setting. Of the limited studies regarding inpatient obesity management, there is evidence that hospitalized general medicine patients are open to discussing weight management options.^{18,23} However, hospitalist providers note several barriers to starting counselling and therapeutics, particularly varying degree of patient-centered obesity management knowledge and concerns about transitioning further care to the outpatient setting.^{15,18}

While there is a growing call for inpatient obesity management in pediatrics, limited evidence exists in adults.²⁴ In one study, Wachsberg et al. randomized hospitalized patients with obesity to nutrition and lifestyle counseling prior to discharge versus no intervention.²³ Both groups were followed with post-hospitalization phone calls. The intervention resulted in moderate weight loss (less than 5% of body weight), but no significant between group difference in weight loss. This highlights a key point: discussing obesity with inpatients once, even without exposure to an overt medical or surgical intervention, may result in some self-driven weight loss, but “one touch” alone will likely not lead to durable change. These findings are in sync with prior work from real-world applications of the US Diabetes Prevention Program (DPP) clinical trial that demonstrated that multiple, intensive behavioral and lifestyle modification sessions over months can result in moderate and sustained weight loss, as well as decrease the subsequent development of obesity associated comorbidities such as diabetes mellitus.²⁵ This underscores that meaningful and durable weight loss likely requires ongoing, longitudinal patient-centered management and intervention. We hypothesize that initiating the conversation during hospitalization and transitioning care to the outpatient setting can promote the long-term management required for durable weight loss.

While there are guidelines that can help identify which patients may qualify for obesity-targeted interventions, our study findings suggest that there are many patients who meet criteria for recommended obesity intervention but are not receiving it. An inpatient obesity consultative service may address this gap in care, as well as the previously noted hospitalist concerns. We believe an

adequately trained provider could initiate an intervention consisting of counselling and therapeutics for inpatients with obesity and facilitate the transition to their outpatient providers. This approach is successful for inpatients with opiate use disorder and the initiation of suboxone, as well as congestive heart failure and the rapid initiation of guideline-directed medical therapy.^{16,17} These are both chronic medical conditions that are associated with more frequent hospitalizations, and whose outpatient therapies are started while a patient is hospitalized to improve clinical outcomes and durability of continuation.

Consideration of inpatient initiation of obesity management is particularly relevant now as the advent of safe and effective novel weight management medications such as GLP-1 receptor agonists and GLP-1/GIP receptor agonists to augment lifestyle changes have revolutionized providers’ ability to facilitate weight loss.^{8,9} Given the increasing prevalence of obesity, its associated co-morbid conditions, and guideline recommended interventions, inpatient initiation of weight management medication, counselling, and transition of care represents an area ripe for quality improvement. By capturing patients during a hospitalization, we may be able to reach a portion of the population that is otherwise missed and initiate preventative care that can help treat an underlying contributor to their hospitalization.

Our study has several limitations. First, the retrospective, observational single center study design may limit the generalizability of our results. Second, we did not capture inpatient nutrition consults, as we had no systematic way to ensure that they addressed a diet aimed at weight reduction rather than a specific diet for associated medical conditions. Third, patients may have received weight loss counseling or medications outside of our healthcare system, not identified in our database query. Lastly, our study population was limited to patients admitted to the internal medicine hospitalist service and may not be representative of other inpatient cohorts.

Further prospective studies are needed to assess the feasibility and effectiveness of inpatient obesity management. Our future studies will be focused on development of an inpatient obesity intervention workflow, working closely with collaborative stakeholders during development including primary care, obesity medicine, and nutritionists.

CONCLUSION

We observed that hospitalists routinely document obesity as a medical problem, especially in patients with class 3 obesity, but rarely initiate obesity-targeted treatment prior to hospital discharge. Further studies are needed to identify effective interventions for obesity management initiation in hospitalized patients.

Author Contributions

All authors have reviewed the final manuscript prior to submission. All the authors have contributed significantly to the manuscript, per the International Committee of Medical Journal Editors criteria of authorship.

- Substantial contributions to the conception or design of the work; or the acquisition, analysis, or interpretation of data for the work; AND
- Drafting the work or revising it critically for important intellectual content; AND
- Final approval of the version to be published; AND
- Agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Disclosures/Conflicts of Interest

The authors declare they have no conflicts of interest

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