Brief Cutting Edge Report
CLINICAL TRIALS AND INVESTIGATIONS

Obesity

Diagnosing Obesity as a First Step to Weight Loss: An Observational Study

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Objective: This study aimed to explore the relationship between an obesity diagnosis and weight loss as a percentage of total body weight loss over 9 to 15 months, using electronic health record data.

Methods: An observational study of 688,878 adult patients at 15 health systems with BMI ≥ 30 kg/m^2 examined the relationship between weight loss and documentation of obesity diagnosis. Multivariable logistic regression models were created using a stepwise backwards elimination procedure to identify potential predictors of weight loss.

Results: Of patients with BMI ≥ 30, 44.9% had an obesity diagnosis on a claim or electronic health record problem list; 16.9% and 5.9% lost ≥ 5% and ≥ 10% of their body weight, respectively. Multivariable logistic regression models revealed a diagnosis of obesity on the same day as the initial weight (odds ratio [OR] = 1.3; CI: 1.2-1.3; $P < 0.001$) as a predictor of ≥ 5% total body weight loss in 9 to 15 months. Other significant predictors included an antiobesity medication prescription, female sex, diagnosis of type 2 diabetes, Medicare/Medicaid insurance, and number of ambulatory visits.

Conclusions: While controlling for potentially confounding factors, documentation of an obesity diagnosis remained independently predictive of at least 5% weight loss. This suggests that documenting a diagnosis of obesity may be an important step toward engaging patients to lose weight.

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Study Importance

What is already known?

- Obesity is a chronic disease that afflicts more than 40% of the US adult population but is often not diagnosed or treated.
- Qualitative studies, based on self-reported data, suggest an association between an obesity diagnosis and weight loss.

What does this study add?

- While controlling for patient demographics, insurance status, health care utilization, and prescribing antiobesity medication, documentation of an obesity diagnosis remained independently predictive of ≥ 5% and ≥ 10% total body weight loss.

How might these results change the focus of clinical practice?

- The findings from this study suggest that making the diagnosis of obesity may be an important step toward engaging patients to lose weight.
- Primary care health professionals may increase focus on diagnosis and subsequently start conversations about weight and treatment of obesity with their patients sooner and more frequently.

Introduction

As the prevalence of adults with obesity continues to climb in the United States (39.6% in 2015-2016 to 42.4% in 2017-2018) (1), there is a serious need to focus on this population. During the coronavirus disease 2019 (COVID-19) pandemic, the need has been accentuated. Obesity, hypertension, and type 2 diabetes mellitus were the most common comorbidities of hospitalized COVID-19 patients reported in two recent studies (2,3).

Before treatment, patients with obesity first need to be diagnosed, requiring the recognition of obesity as a chronic condition by patients, health care professionals (HCPs), payers, and society. However, evidence suggests discrepancies between patients and

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HCPs in perceptions of obesity. While the Awareness, Care, and Treatment In Obesity Management (ACTION) study found that both HCPs and their patients recognized obesity as a disease, neither treated it as such, i.e., people with obesity did not feel that their weight would affect future health, and HCPs did not prioritize weight-related conversations (4). Obesity rates have been increasing since 2011 (1), while diagnosis and treatment are lacking; only 10% of participants in this study reported weight loss in the previous 3 years (4).

One clinical factor showing promise is the formal recognition of obesity as a medical diagnosis. The ACTION study found that people diagnosed with obesity were more likely to report successful weight loss (5), supporting previous findings that talking to patients about weight increases desire to lose weight and enhances perceptions of weight issues (6). Nevertheless, Kaplan reported that only 55% of patients with BMI ≥ 30 kg/m^2 reported receiving a formal obesity diagnosis (4). Another study observed that only 3.6% of patients with BMI ≥ 30 discussed weight with an HCP (7). These findings suggest a need for further, rigorous investigation into the importance of a formal obesity diagnosis.

The objective of this study was to explore the relationship between an obesity diagnosis and weight loss as a percentage of total body weight loss over 9 to 15 months, using electronic health record (EHR) data. The authors hypothesize a positive relationship.

Methods

An observational study of 688,878 adult patients at 15 geographically dispersed US health systems with BMI ≥ 30 kg/m^2 and a primary care ambulatory visit between 1 January 2019 and 31 March 2019 examined the relationship between weight loss over the previous 9 to 15 months and multiple covariates predictive of weight loss, including documentation of an obesity diagnosis and prescription of antiobesity medications (AOMs) (i.e., any of six approved by the US Food and Drug Administration at the time of this study or the generic components of the combination medications). Other potential predictors included patient demographics, insurance status, obesity complications, and number of ambulatory visits.

Documentation of an obesity diagnosis was defined using *International Classification of Diseases* codes E66.01, E66.09, E66.2, E66.8, or E66.9, active on the patient's EHR problem list or billing claim. (Z68.X codes, which indicate elevated BMI, did not count as obesity diagnoses.) The model required that an obesity diagnosis be present on the same day as the initial weight. This binary variable was defined as the presence or absence of a diagnosis.

The dependent variables, ≥ 5% and ≥ 10% total body weight loss, were also binary, based on weight change over 9 to 15 months. Inclusion required the final weight to be ≥ 274 days after the initial weight. Weight change was calculated as initial weight subtracted from final weight, divided by initial weight and multiplied by 100%.

Denominator requirements included the following (1): ≥ 1 primary care ambulatory visit/encounter with a recorded weight (1 January 2019 to 31 March 2019); (2) age 18 to 79 years; (3) a recorded weight associated with any ambulatory visit 9 to 15 months earlier; and (4) initial BMI ≥ 30. Exclusion criteria included history of bariatric surgery ever or pregnancy during the last 18 months of data. Multivariable logistic regression models were created using a stepwise backwards elimination procedure to identify potential predictors of weight loss.

AMGA is a nonprofit trade association representing multispecialty medical groups, integrated health care systems, and academic medical centers in the United States. This study used longitudinal clinical EHR data extracted, mapped, and normalized by Optum® (Eden Prairie, Minnesota) from 15 geographically dispersed AMGA-member health care organizations.

Results

Overall, 44.9% (health care organization range: 27.9%-64.1%) of patients had an obesity diagnosis on a claim or problem list, 3.3% had an AOM prescription, and 16.9% and 5.9% lost ≥ 5% and ≥ 10% of their body weight, respectively (Table 1). Documented diagnoses and AOM prescribing varied by weight class: 30.0%, 50.9%, and 70.0% with a diagnosis and 2.4%, 3.5%, and 5.3% with a prescription for class 1, class 2, and class 3 obesity, respectively. Univariate analysis showed that 19.7% compared with 16.9% of patients with versus without an obesity diagnosis on the same day as the initial weight lost ≥ 5% body weight ($P < 0.001$) (Figure 1).

Multivariable logistic regression models revealed a documented obesity diagnosis on the same day as the initial weight to be a significant predictor of ≥ 5% (odds ratio [OR] = 1.3; CI: 1.2-1.3) and ≥ 10% (OR = 1.4; CI: 1.3-1.4) total body weight loss in 9 to 12 months. The largest predictor was an AOM prescription on the same day as the initial weight (≥ 5% weight loss: OR = 2.2; CI: 2.0-2.4; ≥ 10% weight loss: OR = 2.3; CI: 2.0-2.7). Other significant predictors included female sex, diagnosis of type 2 diabetes mellitus, Medicare or Medicaid insurance, and number of ambulatory visits between weights (Figure 2).

Discussion

This study provides evidence that a formal diagnosis of obesity may be an important step in treating and managing people with obesity, with a demonstrated association between a documented diagnosis on the same day as an initial weight and weight loss. This observational study supports the existing qualitative evidence that a formal diagnosis may be a first step leading to weight loss. Although we were unable to observe clinical action beyond AOM prescribing, we hypothesize that a formal diagnosis leads to HCP action, e.g., counseling on diet/physical activity and/or referral to supporting resources/obesity specialists. Regrettably, the overall rate for documentation of obesity as a disease remains low.

Obesity diagnoses were found on a claim, patient problem list, or both. Problem list entries are available during each patient interaction, enabling continuity across visits and HCPs and potentially increasing the likelihood of a focus on disease treatment. In this study, 61% of diagnoses were on a claim only. If HCP action is more likely when obesity is on the problem list, the reported association between an obesity diagnosis and weight loss may be an underestimate.

Low diagnosis rates may be due to a lack of recognition of obesity as a disease and concern about offending patients. In addition, *International*

TABLE 1 Study population characteristics among all patients, patients with ≥5% weight loss, and patients with ≥10% weight loss, by BMI class

	Overall, *N* = 688,878 (100%)			Obesity class 1, *n* = 342,766 (49.8%)			Obesity class 2, *n* = 189,126 (27.5%)			Obesity class 3, *n* = 156,986 (22.8%)		
	All, 100%	Lost ≥5%, 16.9%	Lost ≥10%, 5.9%	All, 100%	Lost ≥5%, 15.4%	Lost ≥10%, 5.1%	All, 100%	Lost ≥5%, 17.3%	Lost ≥10%, 6.1%	All, 100%	Lost ≥5%, 19.8%	Lost ≥10%, 7.6%
Demographic variables												
Age, mean (SD)	55.2 (14.7)	54.9* (15.2)	53.5* (15.7)	56.4 (14.7)	55.8* (15.6)	54.1* (16.4)	55.0 (14.6)	55.1* (15.2)	53.7* (15.6)	52.3 (14.5)	53.4* (14.6)	52.6* (14.7)
Female, %	58.7	63.0*	66.6*	53.7	59.7*	65.1*	60.0	63.0*	66.1*	68.2	68.7*	69.3*
White race, %	80.8	81.8*	83.1*	81.7	82.4*	83.7*	80.8	81.8*	83.3*	78.9	80.7*	82.1*
Hispanic ethnicity, %	4.8	4.5*	4.3*	5.1	4.6*	4.4*	4.7	4.7	4.5	4.2	3.9*	3.9
Age 18-49 years, %	33.0	34.2*	38.0*	29.8	32.1*	36.9*	33.2	33.8*	31.1*	39.8	38.2*	40.5*
Age 50-64 years, %	35.8	33.6*	32.0*	35.4	32.4*	29.8*	36.1	33.9*	32.7*	36.2	35.3*	34.5*
Age 65-74 years, %	23.8	23.7*	22.3*	25.8	25.1*	23.4*	23.6	24.1*	22.8*	19.5	21.9*	20.3*
Age ≥75 years, %	7.5	8.5*	7.7*	9.1	10.4*	9.9*	7.1	8.2*	7.2*	4.5	5.5*	4.8*
Married, %	46.2	58.5*	56.4*	49.0	61.1*	58.6*	61.2	59.3*	61.5*	54.2	54.5*	52.1*
Income > median, %	47.8	48.8*	48.9*	50.7	51.8*	52.3*	48.8	48.4	48.9	43.8	44.2	44.8*
Commercial insurance, %	57.5	53.8*	53.5*	57.0	53.3*	52.5*	57.9	54.1*	53.8*	58.1	54.2*	54.8*
Medicaid insurance, %	7.3	8.5*	9.8*	6.1	7.4*	9.0*	7.3	8.2*	9.5*	10.0	10.6*	11.4*
Medicare insurance, %	29.9	32.6*	31.5	31.6	34.0	33.1	29.6	32.7*	31.6*	26.7	30.3*	29.0*
Uninsured, %	0.9	0.9	0.8	0.9	0.9	0.9	0.9	0.8	.8	0.8	0.8	0.8
IDS, %	75.9	81.4*	81.6*	75.6	80.8*	81.1	81.2	81.5	81.2	82.5	82.3	82.5
Clinical variables												
Obesity diagnosis, %	44.9	45.7*	46.0*	30.0	26.9*	25.5*	50.9	51.1	50.4	70.0	71.9*	71.8*
Type 2 DM diagnosis, %	30.6	34.2*	31.8*	25.7	28.2*	26.1	32.6	35.5*	32.5*	38.7	42.9*	39.7*
Dyslipidemia diagnosis, %	46.3	46.8*	44.2*	46.6	45.8*	42.8	47.1	48.2*	45.7*	44.6	46.8*	44.8
Hypertension diagnosis, %	59.4	59.4*	56.5*	55.8	54.6*	50.6	61.1	60.6*	57.5*	65.1	66.4*	64.3
OSA diagnosis, %	23.4	24.8*	25.0*	18.1	18.9*	19.2	24.7	25.1	24.7	33.3	34.4*	33.8
Osteoarthritis diagnosis, %	18.3	20.0*	19.4*	16.3	17.6*	16.8	25.1	20.0*	19.0	22.0	24.1*	23.4*
NAFLD diagnosis, %	4.7	5.2*	5.2*	3.9	4.1	4.06	5.1		5.5	5.9	6.7*	6.6*
Complications, mean (SD)	1.8 (1.4)	1.9* (1.5)	1.8* (1.5)	1.7 (1.3)	1.7* (1.4)	1.6* (1.4)	1.9 (1.4)	1.9* (1.5)	1.9* (1.5)	2.1 (1.5)	2.2* (1.5)	2.2* (1.6)
No. visits (1 y), mean (SD)	4.1 (2.7)	4.6* (2.9)	4.7* (3.0)	4.0 (2.6)	4.4* (2.8)	4.6* (3.0)	4.2 (2.7)	4.6* (2.9)	4.7* (3.0)	4.5 (2.8)	4.9* (3.0)	5.0* (3.1)
AOM prescription, %	3.3	4.8*	5.7*	2.4	3.2*	3.9*	3.5	5.1*	6.1*	5.3	5.3	8.0*

*Statistically significant differences where $P < 0.01$. Tests of significance compare ≥5% weight loss to all and ≥10% weight loss to all, within each weight category. The percentages in the columns represent the percentage of patients by variables (rows) within each BMI class indicated at the top of the column. For example, overall, 3.3% of patients had an AOM prescription. Of all patients who lost ≥5% and ≥10% weight, 4.8% and 5.7% had an AOM prescription, respectively. Both are significant ($P < 0.01$).

AOM, antiobesity medication; IDS, integrated delivery system; DM, diabetes mellitus; NAFLD, non-alcoholic fatty liver disease; OSA, obstructive sleep apnea.

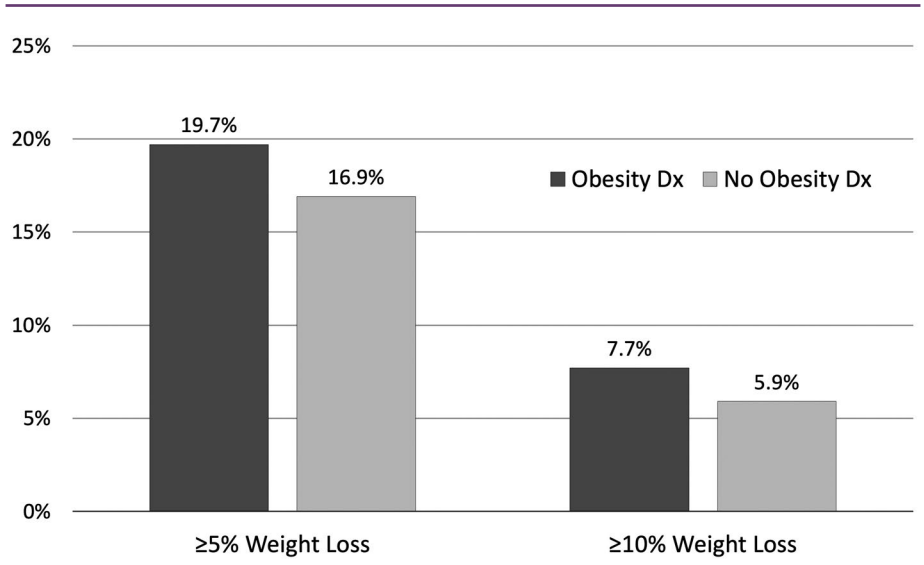

Figure 1 Weight loss by obesity diagnosis on same day as initial weight. Compares weight loss of ≥5% and ≥10% body weight among individuals with and without an obesity diagnosis on a claim or patient problem list on the same day as an initial weight. Individuals who lost ≥10% are included in those who lost ≥5%. Both comparisons are statistically significant at $P < 0.0001$. Dx, diagnosis.

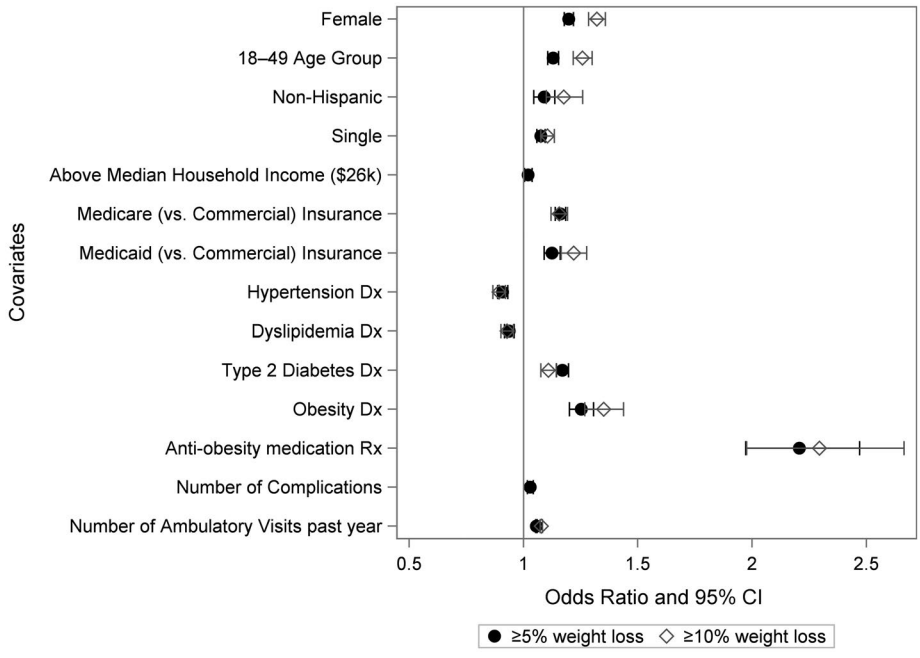

Figure 2 Predictors of ≥5% and ≥10% weight loss among primary care patients at 15 US health care organizations. Results are among adult patients with weights recorded at two ambulatory visits 9-15 months apart. Dx, diagnosis.

Classification of Diseases code E66.0, "obesity due to excess calories," fails to recognize obesity as a complex disease of energy balance with chronic complications and does not convey the need for medical action (8). One mitigation strategy may be to focus on financial incentives. Hierarchical Condition Categories (HCC) are used by Centers for Medicare & Medicaid Services to determine the patients' illness burden in order to appropriately capture savings for health systems participating in Medicare's Shared Savings Program. Patients with severe obesity

(BMI ≥ 40) receive an HCC weighting (HCC 22; weight = 0.262) that is twice that of an acute myocardial infarction (HCC 86; weight = 0.131). HCC scores are also used in Medicare Advantage plans to determine the capitated funding amounts assigned to patients at the start of the enrollment year.

This observational study has several important limitations. Although the data are longitudinal, this study represents a snapshot in time. Starting with the last 3 months of data, the study protocol required looking back from a final weight for an initial weight, then looking for a documented diagnosis on the same day. There may have been documented diagnoses preceding the index diagnosis and other weights recorded during previous visits. In addition, without data on free-text clinical notes (e.g., from natural language processing), it was impossible to know what occurred during the visits (e.g., conversations about obesity between patient and HCP, diet/physical activity recommendations, referrals). Also, low AOM prescribing rates make it difficult to draw conclusions about the predictability of this variable, although as expected, we saw increasing prescribing and weight loss with increasing BMI class. Furthermore, these were prescribed medications only; adjudicated claims data would be required to assess medication fill rates.

Despite these limitations, this study provides strong evidence of an association between a documented obesity diagnosis and weight loss. With the high prevalence of obesity and its complications (9), and its connection to worse outcomes for patients with COVID-19 (2,3), further study of this association is warranted. With the knowledge that it takes more than a diagnosis to successfully treat obesity, primary care HCPs in particular, who are in a position to identify disease and initiate early treatment, should increase efforts to promote understanding of obesity as a chronic disease as well as increase rates of formal diagnosis, as a first step to increased treatment.O

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