Factors Impacting Physician Referral To and Patient Attendance at Weight Management Programs Within a Large Integrated Health System

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BACKGROUND: Identifying which patients receive referrals to and which ones attend weight management programs can provide insights into how physicians manage obesity.

OBJECTIVE: To describe patient factors associated with referrals, which primarily reflect physician priorities, and attendance, which reflects patient priorities. We also examine the influence of the individual physician by comparing adjusted rates of referral and attendance across physicians.

DESIGN: Retrospective cohort study.

PARTICIPANTS: Adults with a body mass index (BMI) ≥ 30 kg/m² who had a primary care visit between 2015 and 2018 at a large integrated health system

MAIN MEASURES: Referrals and visits to programs were collected from the EHR in 2019 and analyzed in 2019–2020. Multilevel logistic regression models were used to identify the association between patient characteristics and (1) receiving a referral, and (2) attending a visit after a referral. We compared physicians' adjusted probabilities of referring patients and of their patients attending a visit.

KEY RESULTS: Our study included 160,163 adults, with a median BMI of 35 kg/m². Seventeen percent of patients received ≥ 1 referral and 29% of those attended a visit. The adjusted odds of referral increased 57% for patients with a BMI 35–39 (versus 30–34) and 32% for each comorbidity ($p < 0.01$). Attending a visit was less strongly associated with BMI (aOR 1.18 for 35–39 versus 30–34, 95% CI 1.09–1.27) and not at all with comorbidity. For the physician-level analysis, the adjusted probability of referral had a much wider range (0 to 83%; mean = 19%) than did the adjusted probability of attendance (range 27 to 34%).

CONCLUSIONS: Few patients attended a weight management program. Physicians vary greatly in their probability of referring patients to programs but not in their patients' probability of attending.

BACKGROUND

Obesity is a leading cause of preventable death¹ and a contributor to the rising cost of care.² Patients with obesity have greater health care expenditures, including for inpatient admissions, than patients who are of normal weight.³ Furthermore, longer duration of obesity increases the risk of poor health outcomes. Individuals who were obese at 25 years of age have significantly more preventable hospitalizations during their middle age years (age 45–64) than patients without long-term obesity even when accounting for current body mass index (BMI).⁴ Thus, supporting patients with obesity in their effort to attain and maintain a healthier weight is important for long-term population health.

Unfortunately, the percentage of patients who receive exercise or diet counseling has remained low for the past two decades.^{5,6} Based on a 2005 national survey, 18% of patients with a BMI ≥ 30 kg/m² received counseling on weight reduction.⁷ Physician beliefs^{8,9} and lack of training in nutrition¹⁰ may influence these discussions. For example, some physicians do not believe that obesity is a disease.⁹ One study found that 9% of physicians provided 52% of all weight counseling.⁸ Even physicians who want to address obesity may be limited by time constraints.^{11,12} To address obesity, health care systems should structure care in ways that support patients in their effort to attain and maintain a healthier weight.

One way to support patients is to facilitate weight management referrals, which are rare¹³ even when supported by best practice alerts.¹⁴ A pilot study found that electronic health record (EHR)-based alerts that included a list of clinic and community-based weight management programs had a minimal impact on referrals,¹⁵ suggesting that the problem is not physician awareness of treatment programs. Examining which patients receive referrals and, among those referred, which ones attend a weight management program, can provide insight into physician and patient behaviors so that health systems can develop structures to support the referral process. The primary objective of this study is to describe patient factors associated with referrals, which primarily reflect physician priorities, and attendance, which reflects patient

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priorities. We also examine physicians' influence by comparing adjusted rates of referral and attendance across physicians.

METHODS

Study Population

This retrospective cohort study included adults who had a primary care visit between 2015 and 2018 and a BMI ≥ 30 kg/m². We excluded women who were pregnant or had been pregnant in the past year, and patients with cancer, because both conditions produce weight changes. Cleveland Clinic's Institutional Review Board approved this study.

Referrals and Visits to Weight Management Programs

Dates for referrals and visits to weight management programs were collected. We broadly defined weight management programs to include visits to dietitians, diabetic education, wellness programs that include weight loss, chronic disease management shared medical appointments for weight loss, bariatric medicine (including bariatric surgery) or cardiac rehabilitation, because these programs include education about nutrition and/or physical activity focusing on weight management. Patients could be referred more than once. For simplicity, we count each date a patient received a referral as a single referral opportunity (a.k.a. "referral"). Visits were required to occur within 180 days of the referral.

Patient Characteristics

Demographic characteristics (age, sex, race, marital status), smoking status, Charlson comorbidity score (and its component diseases)¹⁶, and insurance status were collected at the patient's initial visit. We created a binary variable combining married and living with a domestic partner versus all other statuses. We grouped insurance status into private, Medicare, Medicaid, and the Cleveland Clinic's employee health plan (EHP). Our EHP incentivizes employees and their spouses to participate in weight management and nutrition programs by waiving copays for certain programs and reducing their health insurance premiums the following year. Patients' weights and heights were collected from all visits within the health system during the study time period.

Physician Identification

We assigned each patient to their primary care provider as identified in our EHR system. Referrals to weight management programs were assigned to the primary care provider regardless of who made the referral (e.g., resident, nurse practitioner, other physician). To identify the impact of this assignment, we conducted a sensitivity analysis restricting the dataset to patients whose primary care provider made their referral.

Statistical Analysis

We used Student's *t* test and chi-square test to compare the demographic and health characteristics of patients given referrals versus those who were not. Among patients who were referred, we compared those who attended a weight management program versus those who did not. Multilevel logistic regression models were used to identify the association between patient characteristics and (1) receiving a referral, and (2) attending a visit. The models included demographic and health characteristics and were adjusted for clustering within physician. We tested for an interaction effect between age and BMI.¹⁷ We plotted the adjusted predicted probability of receiving a referral or attending a visit by BMI category and decade of age. Secondarily, we repeated the regression analysis to identify individual comorbidities that were associated with receiving a referral or attending a visit.

To identify non-random variation in physician behavior, we identified each primary care physician's average probability of (1) offering a referral, and (2) having his or her patient attend a weight management visit. We did this by calculating each patient's individual adjusted probability of receiving a referral and attending a visit (for patients who received a referral). For each physician, we found his or her average probability across all of their patients. All analysis was conducted in Stata 14.0

RESULTS

Our sample included 160,163 adults who had a mean age of 50 years. Fifty-three percent were female and 77% were White. Median BMI was 35 kg/m², and 45% of patients had a score of greater than two on the Charlson comorbidity index.

Patients Who Received a Referral to Weight Management

Seventeen percent of patients received at least one referral to a weight management program during the study period, including 12% of patients with a BMI 30–34 kg/m², 17% with a BMI 35–39 kg/m², and 31% with a BMI ≥ 40 kg/m² ($p < 0.01$). Patients who received a referral had a higher Charlson comorbidity score (3.1 versus 2.4) and higher BMI (40 kg/m² versus 36 kg/m²) than those who did not ($p < 0.01$ for all comparisons). There was a higher percentage of females (58% versus 52%), a lower percentage of White patients (66% versus 78%), and a lower percentage of married patients (46% versus 53%) in the referral group ($p < 0.01$ for all comparisons). The adjusted odds of receiving a referral increased 47% for Black patients and 32% for each point on the Charlson comorbidity score ($p < 0.01$ for all associations) (Table 1). The odds for referral were 15% lower for smokers compared to non-smokers (p

Table 1 Patient Characteristics of Those With and Without a Referral During the Study Period

Patient characteristics	No referral Mean/ percent (N = 132,755)	Referral Mean/ percent (N = 27,312)	AOR*	95% CI
Age**	49.4	50.2	0.80	0.79–0.82
Female (versus male)	52%	58%	1.05	1.01–1.08
White race	78%	66%	-	-
Black race (versus White)	16%	28%	1.47	1.41–1.54
Married (versus non-Married)	53%	46%	0.98	0.95–1.01
Smoker (versus non-smoker)	15%	14%	0.85	0.81–0.88
Age-adjusted Charlson comorbidity score	2.40	3.11	1.32	1.31–1.34
BMI Category				
30–34	56%	35%	-	-
35–39 (versus 30–34)	26%	26%	1.57	1.52–1.63
≥ 40 (versus 30–34)	18%	39%	3.48	3.36–3.60
Insurance				
Private	62%	51%	-	-
Employee health plan (versus private)	5%	7%	1.28	1.21–1.36
Medicare (versus private)	18%	22%	1.08	1.04–1.14
Medicaid (versus private)	15%	20%	1.41	1.35–1.47

*A multilevel regression model was used to identify the association between receiving a referral or not. The model was adjusted for patient demographic and health characteristics and clustering within physician. The model also included the year a person first appeared in the dataset. All values are statistically significant at $p < 0.01$

**Age is reported in years; AOR is reported for every 10 years increase in age

< 0.01). The adjusted probability of receiving a referral declined with age, but at every age, patients with a higher BMI were more likely to be referred (Fig. 1a).

Weight Management Visits After Referral

Twenty-nine percent of patients who received a referral had a subsequent weight management visit. Patients who attended a visit had more prior referrals than patients who never attended (1.83 versus 1.75, $p < 0.01$). The mean number of days between the last referral and visit was 32. Compared to patients who did not attend, those who attended were slightly younger (49 versus 51 years), more likely to be female (61% versus 56%), and to be married (49% versus 44%) ($p < 0.01$ for all comparisons). The adjusted odds of having a visit increased 19% for females, 27% for Black patients, and 17% for married patients ($p < 0.01$). They were 45% lower for smokers compared to non-smokers ($p < 0.01$). Patients with a BMI ≥ 35 were significantly more likely to attend than

patients with a BMI 30–34 (AOR 1.18, 95% CI 1.09–1.27 for patients with a BMI 35–39; AOR 1.27, 95% CI 1.18–1.35 for patients with a BMI ≥ 40). Charlson comorbidity score was not associated with attendance ($p = 0.33$) (Table 2). As seen in Fig. 1b, the probability of attending a visit declined with age and lower BMI, but the slope of decline was not nearly as pronounced as it was for referrals.

Physician Effect on Referrals and Visits

Almost all physicians (99%) provided ≥ 1 referral. Twenty-percent of the physicians ($n = 131$) made half of the referrals. As seen in Fig. 2a, the adjusted probability of a physician referring their patient to weight management ranged from 0 to 83%, with a mean of 19%. For physicians who made referrals, the average adjusted probability of a patient attending a weight management visit was 31% (range 27 to 34%) (Fig. 2b). In our sensitivity analysis that was restricted to physicians who referred their primary care patients to weight management, the average predicted probability of a patient attending a visit was slightly lower 27% (range 0.23–0.31).

Secondary Analysis

Patients who have diabetes had significantly higher odds of receiving a referral (AOR 4.37, 95% CI 3.94–4.84) and attending a visit (AOR 1.23, 95% CI 1.01–1.50) than did patients without diabetes. (Appendix Table 3)

DISCUSSION

In our study of over 160,000 primary care patients with obesity, only a small percentage received a referral to weight management. Patients with more comorbidities and more severe obesity were more likely to receive a referral, as were younger patients. Of patients who did receive a referral, less than a third attended a visit within 6 months. Degree of obesity, but not number of comorbidities, was significantly related to attending a visit. Physician's propensity to refer patients differed drastically but not their patients' probability of attending a visit. Taken together, these results suggest that if physicians referred more patients to weight management programs, more patients would attend.

Our study is one of the first to examine the rates of referrals to weight management programs and subsequent attendance. Since weight management tools are an integral part of many programs, we took a broad view, focusing on referrals to a variety of therapeutic interventions. Thus, we found a higher percentage of referrals than other studies. A cohort study of primary care patients in the United Kingdom (UK) found that 6% of patients with a BMI 30–34, 10% of patients with a BMI 35–39, and 17% of patients with a BMI ≥ 40 received a referral to dietitians, exercise therapy, or weight management programs.¹⁸ Our referral rate was almost double that 12% for patients with a BMI 30–34, 17% for patients with a BMI

Figure 1 Patient's adjusted probability of being offered a referral (a) and attending a weight management visit (b).

Table 2 Characteristics of Patients With and Without a Visit After a Referral

Patient characteristics	No visit after referral	Visit after referral	AOR*	95% CI
	Mean/percent (N = 19,327)	Mean/percent (N = 7,985)		
Age**	50.8	48.7	0.93	0.90–0.96
Female (versus male)	56%	61%	1.19	1.13–1.27
White race	68%	62%	-	-
Black race (versus White)	26%	32%	1.27	1.18–1.36
Married (versus non-married)	44%	49%	1.17	1.10–1.24
Smoker (versus non-smoker)	16%	9%	0.55	0.50–0.61
Age-adjusted Charlson comorbidity score**	3.2	2.9	1.01	0.99–1.03
BMI category				
30–34	37%	32%	-	-
35–39	26%	26%	1.18	1.09–1.27
≥ 40	37%	42%	1.27	1.18–1.35
Insurance				
Private	61%	60%	-	-
Employee health plan (versus private)	6%	13%	1.91	1.72–2.11
Medicare (versus private)	10%	10%	0.79	0.72–0.86
Medicaid (versus private)	23%	17%	0.84	0.77–0.91

*A multilevel regression model was used to identify the association between receiving a referral and attending a visit within 180 days versus not. The model was adjusted for patient demographic and health characteristics and clustering within physician. The model also included the year a person appeared in the dataset. The population was limited to patients who received at least one referral

**Age is reported in years; AOR is reported for every 10 years increase in age

category 35–39, and 31% for patients with a BMI ≥ 40. Our higher rate of referrals may be due to our more recent study period (the UK study enrolled patients between 2005 and 2012), which follows the American Medical Association's decision to classify obesity as a disease in 2013. Our referral rate was marginally higher than a study which placed electronic alerts into the charts of family practice patients who had a BMI indicative of obesity, suggesting that EHR alerts alone will not increase referrals to weight management.¹⁴

Several patient characteristics were associated with receiving a referral. Patients who were female, Black, had a higher Charlson comorbidity score or had a BMI greater than 34 had higher adjusted odds of receiving a referral. Prior research has found similar predictors for various referrals: female patients were more likely to be referred to weight management program in a community health center,¹⁹ Black patients were more likely to be referred to diabetes education,²⁰ patients who received a physician-based referral to weight management had more chronic conditions than patients who self-referred,²¹ and patients with obesity were more likely to be referred to weight management.¹⁸ Patients who had Medicaid or Medicare insurance or were part of Cleveland Clinic's employee health plan had higher odds of receiving a referral than patients with commercial insurance. We found that older age and smoking were associated with reduced odds of receiving a referral. Physicians may be reluctant to promote weight loss in older adults due to the obesity paradox,²² or believe that older adults and smokers are unlikely to change their habits. In fact, older patients and smokers were less likely to attend a visit if they were referred. However, obesity and smoking are both associated with adverse events among older adults and require appropriate mitigation.^{22,23} Patients who plan to quit smoking, which may be accompanied by weight gain,²⁴ may particularly benefit from a weight management program. Ultimately, these characteristics are a reflection of both

Figure 2 Physician's adjusted probability of offering a patient a referral (a) and having a patient attend a visit (b). The horizontal line represents the mean for all patients. Dots represent the point estimate and whiskers represent the 95% confidence intervals. Blue dots are not different from the mean, green dots are statistically significantly higher, and red dots significantly lower than the mean.

physicians' views on who needs a referral as well as patients' desire to receive one, since referrals are ideally made after an open and respectful discussion.

Once the referral is placed, the decision to attend rests with the patient. Some, but not all, characteristics associated with a referral were also associated with attending a visit. Being Black, female, and having a BMI of 35 kg/m² or over or EHP insurance (versus private) were all associated with attending a visit. Age and Charlson comorbidity score were not. A study of attendance at a weight management service in the UK likewise found that women and patients with a BMI $\geq$ 35 kg/m² had higher odds of attending, but they also found that patients $\geq$ 65 were more likely to attend a visit than patients 18–24 years of age.²⁵ Patients who had Medicare or Medicaid insurance had reduced odds of attending a visit. Nationally, only 0.2% of Medicare patients used Medicare's intensive behavioral therapy benefit²⁶ which supports behavioral counseling and therapy by a primary care practitioner in a primary care setting.²⁷ Importantly, patients' who have experienced health care-based weight stigmatization may avoid clinical care, including weight management programs,²⁸ highlighting the importance of a respectful discussion during the clinical visit on uptake of future care.

The interaction between insurance, weight management referrals, and attendance has not been explored previously within the general population of adults with obesity. Patients with private insurance were least likely to receive a referral, but more likely to attend a visit than patients with Medicare or Medicaid. Inconsistent coverage for nutritional visits across Medicaid programs,²⁹ and the requirement for comorbidities such as diabetes in Medicare programs,^[25,28,30] may play a role. Patients with private insurance may be less willing to accept a referral unless they know their insurance will cover it. We found that patients with our EHP were both more likely to

be referred and more likely to attend, which may reflect the reduced copays for some programs and financial incentives for weight loss in the form of reduced insurance premiums.

Physicians' adjusted probability of referring patients ranged from 0 to 83%. This substantial variation suggests that it is driven by physicians' preferences. Physicians who report system barriers (e.g., lack of time) or believe that counseling is ineffective are less likely to report discussing physical activity with most of their at-risk patients.³¹ Physicians who themselves have a normal BMI (18–25) discussed weight loss more often than physicians who are overweight or obese.³² Furthermore, we found that the range of attendance rates across physicians was much narrower than the range of referrals. Not surprisingly, physician preferences have much less influence over attendance. Together, these findings suggest that if physicians were simply to refer more often, more of their patients would attend a weight management program.

As people age, they are at increased risk of developing obesity and its resultant comorbidities.^{17,33} Once an individual develops obesity, the likelihood of attaining a normal BMI is low and it is even lower among individuals who have a BMI $\geq$ 40.³⁴ Thus, it is imperative that physicians address obesity at lower BMIs (e.g., 30–34) and before patients acquire other chronic conditions (e.g., diabetes, hypertension). Unfortunately, we found that physicians appeared to wait until patients reached higher levels of obesity and/or developed comorbid conditions. Although patients were also more likely to attend visits if they had BMI $>$ 40, the magnitude of this effect was quite small (AOR = 1.27) compared to the effect on referrals (AOR = 3.48).

Another reason for early referral is that it may take several conversations before a patient agrees to a visit. We found that patients who received a referral averaged at least two, and those who attended a weight management program received

more referrals than those who did not attend. A study based on the National Health and Nutrition Examination survey found that 19% of patients with obesity did not consider themselves to be overweight or have obesity; this number drops to 3% if a physician had informed the patient he/she had been overweight.³⁵ Black and Hispanic patients may have particular difficulty identifying their obesity, especially at lower levels.³⁶ Discussions of weight loss within the visit may be a starting point, but there is a dose-based relationship between receiving more counseling sessions and weight loss.³⁷ Furthermore, at least one study found that meeting with a lifestyle coach helped to promote sustained weight loss.³⁸

Limitations

Our study has limitations. We used a commonly accepted indicator of obesity, BMI ≥ 30 kg/m², as part of our inclusion criteria. Since BMI is an imperfect measure of excess weight, not all patients in our dataset necessarily have excess adiposity. Second, we did not capture discussions of weight loss or physical activity. Patients may have followed diet and lifestyle advice from their clinicians and attended gyms or commercial weight loss programs. However, the extreme variation among physicians is unlikely to be due to unmeasured interventions. There has been prior research on discussions of weight loss; our goal was to understand how patients interacted with weight management programs within the health system. Finally, we could not account for patients' past experiences of weight loss programs on physicians' attitudes towards weight loss interventions. A strength of our study was our large sample comprising multiple years of data.

CONCLUSIONS

In our large integrated health system, we found that rates of referrals to weight management programs were low and most patients who were referred did not attend. Physicians vary greatly in their probability of referring patients to programs but not in their patients' probability of attending. The high rates of referral by some physicians indicate that referrals are acceptable to patients and that physicians are primarily responsible for the low referral rates. Presumably, referring more patients would result in more visits and greater weight loss.

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Compliance with Ethical Standards:

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