



## Original Article

## Impact of diagnosis of overweight and obesity on weight management among hospitalized patients

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## ABSTRACT

**Background:** Obesity is a growing epidemic associated with a 30% increase in general mortality. Despite this, diagnosis and treatment is still deficient. A large number of patients with overweight and obesity enter hospitals daily; therefore, the hospital setting could be used as a scenario for intervention in this population.

**Objectives:** To determine the frequency of diagnosis and treatment of overweight/obesity in hospitalized patients and to identify the factors involved in the probability of offering a diagnosis and treatment.

**Methods:** Cross-sectional data from 316 patients aged 18 years and over admitted in the Department of Internal Medicine during 2016–2017 period. Logistic regression was used to estimate the relationship between the possible predictors and the diagnosis of overweight and/or obesity and the development of a treatment.

**Results:** Only 10.8% of the population was diagnosed (overweight 2.6%, obesity 18.8%). Patients with a BMI >40 kg/m<sup>2</sup> had a greater probability of being diagnosed (OR = 1.87; 95% CI, 2.2–19.4; p = 0.001). Only 4.4% of the population received treatment (overweight 3.2%, obesity 5.6%) and the only factor that increased the probability of receiving treatment was having been diagnosed with overweight/obesity in the medical record (OR = 2.28; 95% CI, 2.31–41.94; p = 0.002).

**Discussion:** Despite the high prevalence of overweight and obesity among hospitalized patients, there is no adequate diagnosis and treatment. Future research should be directed at strategies that increase medical recognition of overweight/obesity as well as identifying the long-term benefits of diagnosing overweight/obesity for the reduction and control of body weight.

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## Introduction

Obesity is a complex and multifactorial disease associated with a 30% increase in general mortality [1]. Currently, one out of every three adults in the world is overweight and one in five is obese [2]. Clinical interventions to achieve and maintain weight reduction include strategies based on lifestyle changes, drug therapy and surgery. Medical counseling has achieved a significant impact on patient behavior for losing weight, for being physically more active, and maintaining weight loss [3]. Despite that the International Classification of Diseases classifies obesity as a disease since 2004 [4], many health care professionals have not conceptualized it as such and therefore they do not diagnose it or offer

treatment [5,6]. Factors that could influence the management of overweight and obesity in an outpatient primary care setting have been described [7–13]; however, the approach that these patients receive in-hospital at a tertiary care level is not well known; therefore, our objective was to determine the frequency of diagnosis and treatment of overweight and obesity in the in-hospital setting and identify the factors that intervene in the probability of offering a diagnosis and treatment.

## Materials and methods

The medical records of patients hospitalized in the Department of Internal Medicine during the period 2016–2017 were reviewed and demographic data and data of comorbidities including hypertension, coronary disease, diabetes mellitus, obstructive apnea, chronic kidney injury and hypothyroidism were collected. Patients over 18 years of age who were overweight and obese according to

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**Table 1**  
Population characteristics and its association with the diagnosis and treatment of overweight and obesity.

Characteristic	No. (%)	Diagnosis			Treatment		
		%	Adjusted OR (95% CI) <sup>a</sup>	p value <sup>*</sup>	%	Adjusted OR (95% CI) <sup>a</sup>	p value <sup>*</sup>
Male	160 (50.6)	11	0.21 (0.53–2.88)	0.623	3.8	−0.23 (0.22–2.86)	0.724
Overweight	156 (49.4)	2.6	0.57 (0.72–4.34)	0.211	3.2	1.87 (1.27–2.04)	0.138
Obesity	160 (50.6)	18.8	1.65 (1.70–16.13)	0.004 <sup>†</sup>	5.6	−0.67 (0.11–2.30)	0.380
Obesity classification							
Obesity class I	112 (70)	10.8	0.57 (0.72–4.34)	0.985	0.0	0.81 (0.70–1.90)	0.143
Obesity class II	24 (15)	25.0	1.80 (1.99–18.38)	0.001 <sup>†</sup>	1.9	1.38 (0.80–19.87)	0.092
Obesity class III	24 (15)	29.4	1.87 (2.20–19.40)	0.001 <sup>†</sup>	3.8	1.24 (0.66–18.27)	0.142
No. of comorbidities							
0–3	229 (72.5)	7.7	1 [reference]		2.8	1 [reference]	
>3	30 (9.5)	40.0	1.54 (1.62–13.57)	0.004 <sup>†</sup>	20.0	1.05 (0.59–13.84)	0.188
Comorbidities							
Type 2 diabetes	170 (53.8)	11.8	−0.11 (0.37–2.16)	0.800	6.5	1.63 (0.89–29.18)	0.066
Hypertension	189 (59.8)	13.8	0.39 (0.57–3.79)	0.417	5.3	−0.80 (0.21–4.00)	0.915
Coronary disease	51 (16.1)	23.5	1.32 (1.45–9.72)	0.006 <sup>†</sup>	3.9	−0.59 (0.82–3.73)	0.543
CKD	97 (30)	14.4	0.25 (0.49–3.35)	0.609	4.1	−0.64 (0.09–2.94)	0.462
Sleep apnea	6 (1.9)	66.7	1.60 (0.45–54.59)	0.188	50.0	1.69 (0.55–53.5)	0.147
Hypothyroidism	12 (3.8)	33.3	0.48 (0.17–6.25)	0.958	25.0	1.12 (0.44–21.21)	0.254
Diagnosis in problem list					26.5	2.28 (2.31–41.94)	0.002 <sup>*</sup>

BMI = body mass index, CKD: chronic kidney disease.

<sup>\*</sup> p value ≤ 0.05. BMI classification was defined as: overweight = 25–29.9 kg/m<sup>2</sup>; obesity class I = 30–34.9 kg/m<sup>2</sup>; obesity class II = 35–39.9 kg/m<sup>2</sup>; obesity grade III = > 40 kg/m<sup>2</sup>.

<sup>†</sup> The ORs and p values are from the multivariate adjusted logistic regression model.

the criteria of the World Health Organization (BMI ≥ 25 kg/m<sup>2</sup> for overweight and BMI ≥ 30 kg/m<sup>2</sup> for obesity) were included. Pregnant women and patients who died during hospitalization were excluded. Documentation on comorbidities was based on the diagnosis recorded in the medical record and not on laboratory data, blood pressure readings and/or drug use. A diagnosis was considered adequate if the word obese and/or overweight was written in the diagnosis and reports area and/or in the problem list of the patient record. To determine if a treatment was formulated, the discharge prescription was considered. Treatment for the purposes of this study was defined as documented advice on weight loss, nutrition and/or exercise or referral to nutrition. To have 80% power to detect minimum clinically significant differences in mean levels of the outcome with a type-1 error probability (alpha) of 5%, an effective sample size of 316 patients was required.

### Statistical analysis

Categorical variables were expressed as frequencies and continuous variables as means and standard deviations. Comparison of two independent groups of categorical variables was performed using the chi-square test. Odds ratios were determined for all the variables evaluated with their corresponding 95% confidence interval. Logistic regression was used to estimate the relationship between the possible predictors and the diagnosis of overweight and/or obesity and the development of a treatment. The variables that obtained a p value < 0.001 in the univariate analysis were included in the logistic regression. A p value < 0.05 was considered statistically significant. The software used for the analysis was SPSS v 25.

## Results

### Population characteristics

A total of 316 patients were studied, of which 160 (50.6%) were men. Mean age was 53 ± 15.9 years and mean BMI 31.3 ± 6.3 kg/m<sup>2</sup>. Other demographic characteristics and comorbidities are shown in Table 1.

### Diagnosis of overweight and obesity

Only 10.8% of the total population was diagnosed with overweight or obesity (overweight 2.6%, obesity 18.8%) (Fig. 1). The factors that increased the probability of reaching a diagnosis were having a BMI ≥ 30 kg/m<sup>2</sup> (OR 1.65, 95% CI 1.7–16.13, p, 0.004), having more than 3 comorbidities (OR 1.54, 95% CI 1.62–13.57, p = 0.004), grade 2 obesity (OR = 1.80, 95% CI 1.99–18.38, p = 0.001), grade 3 obesity (OR = 1.87, 95% CI 2.2–19.4, p = 0.001) and coronary heart disease (OR = 1.32, 95% CI 1.45–9.72, P = 0.006 (Table 1).

### Treatment in the medical discharge prescription

Only 4.4% of the total population had a treatment in the medical discharge prescription (overweight 3.2%, obesity 5.6%) (Fig. 1). The only factor that maintained a significant independent association was having included the diagnosis of overweight and/or obesity in the problem list (OR = 2.28, 95% CI 2.31–41.94, p = 0.002) (Table 1). Ninety-two percent of the patients who did not receive treatment corresponded to the group of patients who were not diagnosed; in contrast, only 8% of the patients who did have this diagnosis did not receive treatment. (Fig. 2).

## Discussion

Our results show that overweight and obesity are still underdiagnosed and undertreated by health care personnel. The frequency of the diagnosis of obesity in this study was lower than in previous literature [6,9,10,14]. This could be due to differences in the population studied since our data were obtained from inpatients and not from primary care centers where higher diagnostic frequencies are reported. This is probably due to the fact that patients consulting in primary care usually come for medical examinations and/or minor illnesses.

Although primary prevention of obesity is especially important in overweight patients, we found that only a small number of people were identified and diagnosed and that only patients with a BMI ≥ 40 kg/m<sup>2</sup> had the most significant diagnostic frequency, limiting opportunities for primary prevention. This is in agreement with previous findings [6,8,15] where a BMI ≥ 35 kg/m<sup>2</sup> was a more important predictor for diagnosis. It seems that physicians tend

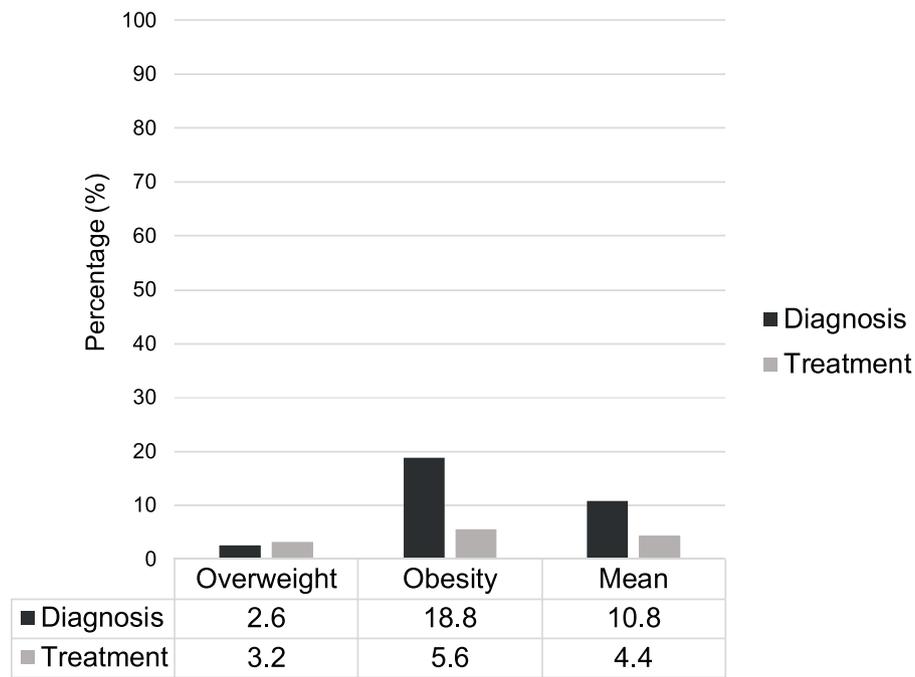


Fig. 1. Frequency of diagnosis and treatment in hospitalized patients in the Department of Internal Medicine.

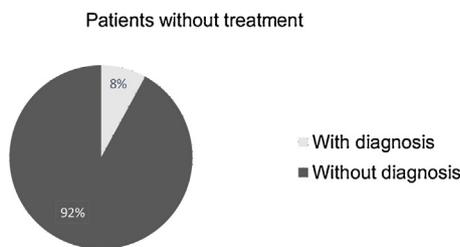


Fig. 2. Frequency of diagnosis among patients without treatment in the Department of Internal Medicine.

to diagnose and manage obesity in patients with greater weight because their external habitus clearly indicates an excess of fat that could be conditioning current and/or future comorbidities; however, by waiting for the patient to reach that BMI level, physicians could be missing an opportunity to provide early intervention that could help stop or even reverse the weight gain process in people at risk of progressing to obesity.

Our findings also show that there is a positive association between the number of comorbidities and the diagnosis of overweight and obesity. When there was no concomitant disease, even if there was a BMI of possible overweight or obesity, the affected patient was not consistently identified. This could be in part because the comorbidities that we included in the study have obesity as a major risk factor and the management of these conditions includes the maintenance of normal weight.

The only predictive factor for the formulation of a treatment was having included the diagnosis in the problem list, which increased the probability of receiving treatment twofold. This documentation process probably requires the doctor to maintain the objective of proposing a solution to each problem identified in the problem list, including overweight and obesity. This finding could be used as a possible health intervention to increase the medical management of excess weight since the strategies that use electronic programs to automate the inclusion of overweight and obesity in the problem list could increase the identification of affected patients. An electronic system could provide an option for health care workers

to include obesity in the problem list or add it automatically. This is a relatively simple task that could change the way physicians approach overweight and obesity.

**Limitations**

Our study has several limitations. First, the data were obtained from clinical records and the lack of documentation does not necessarily imply a lack of recognition, so it is possible that doctors have discussed the problem of overweight and/or obesity with their patients, but they have not documented it. In addition, because clinical practice guidelines suggest lifestyle modifications for weight-related comorbidities, we could not determine whether behavioral recommendations were made to manage these health conditions and/or control weight. However, documentation of obesity increased the likelihood of documentation of a treatment, which at least suggests that documentation leads to a greater action by the physician.

**Conclusions**

There is no adequate in-hospital diagnosis and treatment for overweight and obesity. Future research should be aimed at determining practical strategies for increasing medical recognition and reducing barriers for the treatment of excess weight as well as identifying the long-term benefits of including the diagnosis of overweight and obesity in the problem list for weight reduction and control.

**Submission declaration**

This manuscript describes original work and is not under consideration by any other journal.

**Authorship declaration**

All authors listed meet the authorship criteria and all are in agreement with the manuscript.

## Declarations of interest

None.

## CRediT authorship contribution statement

**Laura Leticia Salazar-Sepúlveda:** Conceptualization, Methodology, Software, Formal analysis, Investigation, Writing - original draft, Visualization. **Jesús Zacarías Villarreal-Pérez:** Methodology, Writing - review & editing, Supervision, Project administration.

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