Prevalence and Documentation Rates of Obesity in Hospitalized Patients: Results of a Retrospective Cohort Study.

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Abstract: While obesity is a serious chronic condition, its prevalence and documentation as a diagnosis has not been extensively studied in hospitalized patients. We conducted a retrospective chart review to investigate the prevalence and documentation of obesity as a diagnosis among patients admitted to our medical center. IRB approval was obtained for this retrospective study. Body mass index as per CDC, admission and discharge diagnosis of obesity and common comorbidities including hypertension, diabetes, hyperlipidemia and others, were recorded. Length of hospital stay was calculated. We also investigated whether counselling for weight loss was provided to obese patients. A total of 540 consecutive patients with mean age of 66 ± 6 years, were investigated, of which 182(34%) had normal weight, 188(35%) patients were overweight and 170(31%) patients were obese. Obese group included 55% female and 45% male. 100 (59%) had class I obesity, 43(25%) had class II obesity and 27(16%) class III obesity. Of the obese patients 40/170 (23.5%) patients had obesity documented on the admission problem list and only 21(12%) had obesity documented as a discharge diagnosis. Only 3(2%) patients received appropriate counseling and referral for obesity management during the hospitalization. Comorbidities included hypertension (68%), diabetes (35%), hyperlipidemia (36%), coronary artery disease (18%), chronic kidney disease (17%), congestive heart failure (18%) and COPD (24%). The average length of stay in normal weight, overweight and obese patients was similar (4.5 ± 0.5 days). An overwhelming percentage never had weight status documented despite significant prevalence of obesity. Hospitalization offers health care providers a window of opportunity to identify obesity, communicate risks and initiate weight management interventions.

Keywords: obesity, documentation, comorbidities.
In recent decades, obesity has been increasingly cited as a major health issue in the United States and is associated with multiple comorbidities [1-7]. World Health Organization (WHO) describes obesity as the most visible but most neglected public health problem [3]. Two out of three Americans are considered to be overweight or obese. Moreover, obesity plays a major role in modifying treatment outcomes associated with comorbid chronic diseases [3, 5-10]. This impacts our health system by spending approximately $147 billion in medical expenses per year and this number is expected to increase approximately by $1.24 billion per year [3-4].

Despite the dramatic increase in obesity and its impact on healthcare, the weight status of obese patients admitted to the hospital remains under diagnosed and under documented. The purpose of this study was to determine the prevalence of overweight and obesity among hospitalized patients and to assess the extent of documentation of weight status in their inpatient electronic medical records (EMR). Additionally, the current study investigated the prevalence of chronic conditions associated with obesity.

2. Methods

The study was conducted at Jersey Shore University Medical Center (a tertiary care hospital) part of Hackensack-Meridian Health, Neptune, New Jersey. EMR were reviewed for all (consecutive) patients admitted under inpatient medical floor during a 60-day period (from September through October 2017). Data extracted from the EMR included age, gender, race, height, weight, BMI, admission diagnosis and discharge diagnosis. Comorbidities (such as hypertension, diabetes mellitus, hyperlipidemia, coronary artery disease, chronic kidney disease, congestive heart failure and chronic obstructive pulmonary disease) associated with obesity were also investigated. BMI was calculated by the EMR using admission weight and height. Charts were reviewed to ascertain whether counselling was provided to the obese patients for weight loss. BMI was categorized as per Centers for Disease Control and Prevention (CDC) guidelines. Categories were defined as: normal weight [BMI 18.5-24.9 kg/m²], overweight [BMI 25.0-29.9 kg/m²] and obese [BMI >30 kg/m²]. The obese group was further divided into 3 classes. Class I [BMI 30.0-34.9 kg/m²], Class II [BMI 35.0-39.9 kg/m²] and Class III [BMI >40 kg/m²].

Documentation of overweight or obesity status was extracted from EMR, admission and discharge diagnosis lists, admission history notes, physical examination notes and discharge summaries. Patients under 18 years of age and the patients with terminal illness were excluded from the study.

Institutional review board approval was obtained for this study. All study procedures were carried out in accordance with the Declaration of Helsinki regarding research involving human subjects. The summary statistics of continuous variables were reported as mean ± standard deviation. P value was considered significant if >0.05. All data analysis was conducted with Microsoft excel software, with means and percentage calculated among subgroups of patients.

3. Results

During the study period, 563 patients were admitted to the medical floor, of those 540 admission were eligible for the study, 23 patients were excluded because of the absence of recorded height and BMI. Consequently, a total of 540 consecutive patients were included in this analysis (Figure 1).
Demographic characteristics are shown in Table 1. Patient age ranged from 21-94 years (mean age 66±6 years). Out of 540 patients only 182 (34%) had normal weight, 188 (35%) of the patients were overweight and 170 (31%) patients were obese (Figure 2). Of the obese group, 100 (59%) had class I obesity, 43 (25%) had class II obesity and 27 (16%) suffered from class III obesity (Figure 2). Average BMI of all the patients was 28 kg/m^2. Only 40 (23.5%) patients had obesity documented on the admission problem list and only 21 (12%) had obesity documented as a discharge diagnosis. Only 3 (2%) patients were given appropriate counseling and referral for obesity management during the hospitalization. Comorbidities and their prevalence included, hypertension (68%), diabetes (35%), hyperlipidemia (36%), coronary artery disease (18%), chronic kidney disease (17%), congestive heart failure (18%) and COPD (24%) (Table 2). The average length of hospital stay in normal weight, overweight and obese patient about 4.5±0.5 days was similar to all three groups. The prevalence of obesity was 55% for females and 45% for male patients.

3.1 Figures, Tables and Schemes

Figure 1: Patients selection

- Total number of patients initially included in the study = 563
- 23 patients were excluded as no BMI were recorded
- Total number of patients finally analyzed = 540
- Number of subjects with BMI <25 kg/m^2 = 182 (34%)
- Number of subjects who were obese = 170 (31%)
- Number of subjects who were overweight = 188 (35%)
- Number of subjects with BMI 30-34.9 kg/m^2 = 100 (59%)
- Number of subjects with BMI 35-39.9 kg/m^2 = 43 (25%)
- Number of subjects with BMI >40 kg/m^2 = 27 (16%)
Table 1: Demographic characteristic and comorbidities of study population:

<table>
<thead>
<tr>
<th></th>
<th>Total</th>
<th>Obese</th>
<th>Overweight</th>
<th>BMI&lt;25</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of patients</td>
<td>540</td>
<td>170(31%)</td>
<td>188(35%)</td>
<td>182(34%)</td>
</tr>
</tbody>
</table>

Gender

<table>
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<tr>
<th></th>
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<th>Obese</th>
<th>Overweight</th>
<th>BMI&lt;25</th>
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</thead>
<tbody>
<tr>
<td>Male</td>
<td>237(44%)</td>
<td>76(45%)</td>
<td>85(45%)</td>
<td>76(42%)</td>
</tr>
<tr>
<td>Female</td>
<td>303(56%)</td>
<td>94(55%)</td>
<td>103(55%)</td>
<td>106(58%)</td>
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</table>

Race

<table>
<thead>
<tr>
<th></th>
<th>Total</th>
<th>Obese</th>
<th>Overweight</th>
<th>BMI&lt;25</th>
</tr>
</thead>
<tbody>
<tr>
<td>Caucasian</td>
<td>420(78%)</td>
<td>123(72%)</td>
<td>148(79%)</td>
<td>149(82%)</td>
</tr>
<tr>
<td>Black</td>
<td>91(17%)</td>
<td>38(22%)</td>
<td>27(14%)</td>
<td>26(14.2%)</td>
</tr>
<tr>
<td>Asian</td>
<td>7(1%)</td>
<td>2(1%)</td>
<td>3(2%)</td>
<td>2(1%)</td>
</tr>
<tr>
<td>Other</td>
<td>19(3.5%)</td>
<td>6(3%)</td>
<td>10(5%)</td>
<td>5(3%)</td>
</tr>
</tbody>
</table>

Figure 2: BMI distribution of the patients (n=540)
4. Discussion

The present study found that a significant number (65%) of patients admitted to the hospital for general medical conditions were overweight (34%) and obese (31%). Out of these patients, only 23% received the diagnosis of obesity during hospitalization. Importantly, at the time of discharge, only 21/170 (12%) patients had obesity as a diagnosis on the discharge list. A miniscule percentage (3 of the 170 obese patients) received obesity counseling at the time of discharge highlighting the missed opportunity that could potentially have a positive impact on weight reduction.

The 23% obesity documentation rates observed in our study are much higher than the obesity documentation rates reported previously in hospitalized patients [11-13]. As an example, Azhdam et al noted that only 13.2% of patients in their study had their weight status documented anywhere in their medical records [12]. The same authors found that at the time of discharge less than 1% of hospitalized obese and overweight patients had any documentation of obesity in their discharge summary. Other researchers reported similarly low rates of documentation with only 1.7% of hospitalized obese patients having the diagnosis listed on the discharge summary [13]. Our study found a much higher percentage (12%) of obesity diagnosis at the time of discharge. However, our study still highlights the opportunity gap in appropriately documenting a major chronic disease. An improvement in obesity documentation would allow a focused attention and intervention to reduce obesity.
In our study predominant medical conditions associated with obesity were hypertension (68%), diabetes (35%), hyperlipidemia (36%), chronic kidney disease (18%), COPD (24%) and coronary artery disease (18%) (Table 2). Multiple previous studies have also documented a high prevalence of chronic diseases in obese patients [3-5]. In one study, investigators found a significantly high prevalence of hypertension (18.1% for normal weight and 52.3% for obesity class 3), diabetes mellitus (2.4% for normal weight and 14.2% for obesity class 3) and dyslipidemia (8.9% for normal weight and 19.0% for obesity class 3). We failed to find a significant difference in our cohort (Table 2). We only found diabetes (normal weight 15%, overweight 27%, obese 24%; P<0.001) and obstructive sleep apnea (normal weight 2%, overweight 5%, obese 5%; P=0.004) to have significantly increased prevalence in the overweight and obese patients compared to the normal weight. However, there are major differences between our study and the report by Nguyen et al [4]. The study by Nguyen et al included general population [4]. Our study, however, included only hospitalized patients. In addition, Nguyen and colleagues reported on class 3 obesity and the co-morbid conditions. We included both overweight and obese patients. These differences might have led to the discrepancies between the results demonstrated by our study and those reported by Nguyen et al [4].

Rising cost of obesity to the payers is a global concern and has always been a priority for researchers. Reducing direct and indirect cost of obesity can decrease healthcare consumption [3]. Stratifying the cost on obesity into direct and indirect group has focused the healthcare interventions to target the group requiring more concentration [15-16]. One study conducted by Finklestein et al in 2010 to estimate costs of obesity on a cross sectional basis found that for all categories of obesity, the three variables: healthcare costs, absenteeism and presentism all increased with increasing BMI [16]. Raising awareness to reduce obesity and related complications is a health care priority worldwide [6]. Previous research concluded that documentation of obesity as a medical problem was associated with greater physician attention to patient weight, specifically an increased prevalence of exercise counseling in both inpatient and outpatient settings [8,10,14,17]. In the present study, only 2% patients received obesity related counseling at the time of discharge although 12% patient had obesity diagnosis at discharge summary. Furthermore, adding obesity diagnosis to the problem list and documentation in the medical records increases work RVUs and revenue stream for the facility and providers. Medicare ICD-10 codes allow counseling that has separate reimbursement codes [5,17]. More strategic and policy based study is needed to identify effective methods for documentation, physician counseling and behavioral therapy approaches in the treatment of obesity in both inpatient and primary care settings.

The US preventive service Task Force and the American Academy of Family Physician set guidelines for primary care clinics and recommended that screening for obesity using BMI should be done for all adults [19]. However, there are no clear guidelines to address obesity on the inpatient settings. The most recent recommendation in 2015 from the American College of Cardiology/American Heart Association and the Obesity Society, introduced five major steps for obesity management including identifying those at risk, physician counselling and guidelines for treatment with diet, life style intervention and surgery [20]. The initial step to increasing guideline compliance may be encouraging physicians to document obesity as a medical problem in the
patient’s EMR. In our study, only 3 patients received obesity counseling. Clearly, there is a major opportunity that exists in identifying and managing weight status of the patients.

Given the high prevalence of obesity among hospitalized patients, we believe that the development of hospital-based weight management program may help to create an action plan in collaboration with department of endocrinology and metabolism that will mandate BMI calculation for every patient within the electronic medical record. The goal for hospital provider and residents should include the documentation of obesity diagnosis to be included in discharge paperwork. The implementation of such a program in a medical center would highlight the importance of weight reduction and make awareness to patients and families. The initial strategies may include nutritional education, cognitive behavioral strategies, emphasis on a supportive family environment, and physical activity prescriptions [22-23].

Our study has several limitations. First, retrospective nature and past medical history gleaned from the EMR limits the ability to infer causal effects and limits our analyses to associations. Secondly, the problem list used as a supplement for addressing the problem as part of the clinical encounter because all of the patients admitted for different reason not related to obesity directly. There could have been counseling related to obesity provided by residents and hospitalists that was verbally provided but not documented within the medical records. This may explain very low counseling rate during discharge even in morbidly obese patients. Finally, this is a single-center study and does not reflect the overall picture of other academic hospitals.

In summary, this study demonstrates that an overwhelming number of obese patients never had their weight status documented during their hospital admission and as a result counseling and appropriate referral service were used infrequently. Additionally, we found obesity to be associated with an increase in the prevalence of diabetes mellitus and obstructive sleep apnea. Inpatient admissions offer health care providers a window of opportunity to effectively act on identifying obesity, communicating risks and initiating weight management intervention such as counseling, behavioral and other interventional therapies.

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Conflict of Interest Statement
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