

The Burden of Obesity on Perioperative Resource Utilization

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Introduction:

- The prevalence of obesity is 20.5% to 34.7% across the United States
- Medical spending is 42% higher per capita for an obese person compared to someone of normal weight

Objective:

- Examine characteristics associated with obesity in a perioperative setting in a tertiary academic center
- Hypothesized patients with higher BMI would present with higher comorbidity burden, higher rates of abnormal hemodynamic parameters, and would be more time intensive in their anesthetic care

Methods:

- Utilized a database of approximately 180,000 patients receiving anesthesia at New York-Presbyterian/Weill Cornell Medical Center
- Analysis included adult patients with a BMI >18.5 treated from December 2007 – February 2013
- Sample divided into four BMI classes: normal (BMI 18.5-24.9), overweight (BMI 25-29.9), obese (BMI 30-39.9), and morbidly obese (BMI ≥40)
- Descriptive analyses conducted and compared by BMI class for differences in demographics, ASA class, pre-operative vitals, procedure and anesthesia times
- All analyses conducted using SAS 9.2

Table 1: General Demographics, Pre-Operative Blood Pressure, and Treatment Times

Category	Normal (18.5-24.9)		Overweight (25.0-29.9)		Obese (30.0-39.9)		Morbidly Obese (>40.0)		P-Value
	n	%	n	%	n	%	n	%	
Total n = 109,089	48789	44.7	35347	32.4	20467	18.8	4486	4.1	
Average Age									
Mean (95% CI)	52.9 (52.7, 53.06)		56.4 (56.3, 56.6)		55.7 (55.5, 55.9)		50.0 (49.5, 50.4)		<.0001
Gender									
Female	31679	64.9	15269	43.2	10590	51.7	3037	67.7	<.0001
Male	17110	35.1	20078	56.8	9877	48.3	1449	32.3	
Average ASA Class									
Mean (95% CI)	2.05 (2.05, 2.6)		2.21 (2.21, 2.22)		2.37 (2.36, 2.37)		2.54 (2.52, 2.56)		<.0001
ASA Class									
1	11481	23.5	4921	13.9	1550	7.6	244	5.4	<.0001
2	24984	51.2	19471	55.1	10910	53.3	1821	40.6	
3	10700	21.9	9466	26.8	7026	34.3	2178	48.5	
4	1566	3.2	1442	4.1	951	4.6	236	5.3	
5	56	0.1	42	0.1	29	0.1	7	0.2	
6	2	0.0	5	0.0	1	0.0	1	0.0	
Average Height									
Mean (95% CI)	167.5 (167.4, 167.6)		170.0 (169.9, 170.1)		168.7 (168.6, 168.8)		166.6 (166.3, 166.3)		<.0001
Average Weight									
Mean (95% CI)	62.5 (62.4, 62.6)		78.9 (78.8, 79.0)		95.4 (95.2, 95.5)		131.9 (131.1, 132.7)		<.0001
Average BMI									
Mean (95% CI)	22.21 (22.19, 22.22)		27.19 (27.17, 27.21)		33.44 (33.41, 33.48)		47.41 (47.16, 47.67)		<.0001
Admission Status (%)									
Inpatient	13423	27.5	11268	31.9	6995	34.2	1431	31.9	<.0001
Same Day Admission	2932	6.0	2799	7.9	1731	8.5	472	10.5	
Outpatient	32349	66.3	21190	59.9	11699	57.2	2571	57.3	
Missing/Other	85	0.2	90	0.3	42	0.2	12	0.3	
Average Systolic Pre-Op BP									
Mean (95% CI)	125.9 (125.7, 126.0)		132.5 (132.3, 132.7)		135.1 (134.8, 135.4)		135.1 (134.6, 135.7)		<.0001
<120	20608	42.2	9068	25.7	3968	19.4	919	20.5	
120-139	16958	34.8	14759	41.8	8789	42.9	1788	39.9	
140-159	8033	16.5	8324	23.5	5720	27.9	1353	30.2	
>or=160	3190	6.5	3196	9.0	1990	9.7	426	9.5	
Average Times (Minutes)									
Length of Anesthesia									
Mean (95% CI)	129.2 (128.2, 130.2)		151.8 (150.6, 152.9)		163.9 (162.3, 165.6)		154.1 (150.8, 157.4)		<0.0001
Length of Procedure									
Mean (95% CI)	78.6 (77.8, 79.3)		95.3 (94.4, 96.2)		103.4 (102.0, 104.7)		94.7 (92.1, 97.3)		<0.0001
Anesthesia Start to Procedure Start									
Mean (95% CI)	30.5 (30.3, 30.7)		34.5 (34.3, 34.8)		36.8 (36.5, 37.2)		34.6 (33.9, 35.2)		<0.0001
Procedure Finish to Anesthesia Finish									
Mean (95% CI)	20.1 (19.9, 20.3)		21.9 (21.7, 22.2)		23.7 (23.4, 24.0)		24.9 (24.2, 25.5)		<0.0001

*N % unless otherwise specified. Percents may not total to 100 due to rounding.

Results:

- 109,089 cases met inclusion criteria:
 - Normal BMI 44.7% (n=48,789), overweight 31.2% (n=35,347), obese 18.1% (n=20,467), and morbidly obese 4.0% (n=4,486)
 - Average height similar among groups
- Obese patients were sicker compared to normal BMI and overweight patients:
 - Higher percentages ranked ASA Class 3 or 4 (obese 34.3% and 4.6% respectively, normal BMI 21.9% and 3.2%, overweight 26.8% and 4.1%; p<0.0001)
 - More had procedures done as inpatients rather than outpatients (obese 34.2% inpatient vs. 57.2% outpatient, normal BMI 27.5% vs. 66.3%, overweight 31.9% vs. 59.9%; p<0.0001)
 - Higher percentages ranked as being hypertensive preoperatively (obese 37.6%, normal BMI 23%, overweight 32.5%; p<0.0001)
- Time taken to treat obese patients was longer with respect to overall operating time (obese 103.4 min, normal BMI 78.6, overweight 95.3; p<0.0001) and time spent under anesthesia (obese 163.9 min, normal BMI 129.2, overweight 151.8; p<0.0001)

Discussion:

- Obese patients were found to consume additional resources compared with normal BMI or overweight patients
- Resource consumption may be associated with higher baseline level of illness, demonstrated by higher ASA class and preoperative systolic BPs
- Obese patients were more likely to be treated as inpatients rather than outpatients and more time was spent on each aspect of treatment, including the procedure and delivery of anesthesia

Conclusions:

- With the increasing prevalence of obesity in the United States, the potential increase in cost to the health care system may be substantial

