

# Obesity and Comorbidity—time to rethink the pay-for-performance metrics?

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- The authors have nothing to disclose

# Introduction

- Premier Hospital Quality Improvement Demonstration:
  - introduced in 2003
  - rewards hospitals for being in the top 20% for performance in outcomes
  - penalizes those in the bottom 10%
- P4P initiatives can threaten how care of challenging patients is reimbursed
- Obesity is associated with increased complication rates in colorectal surgery
- Comorbidity, but not obesity, is factored into determination of complexity

# Hypothesis

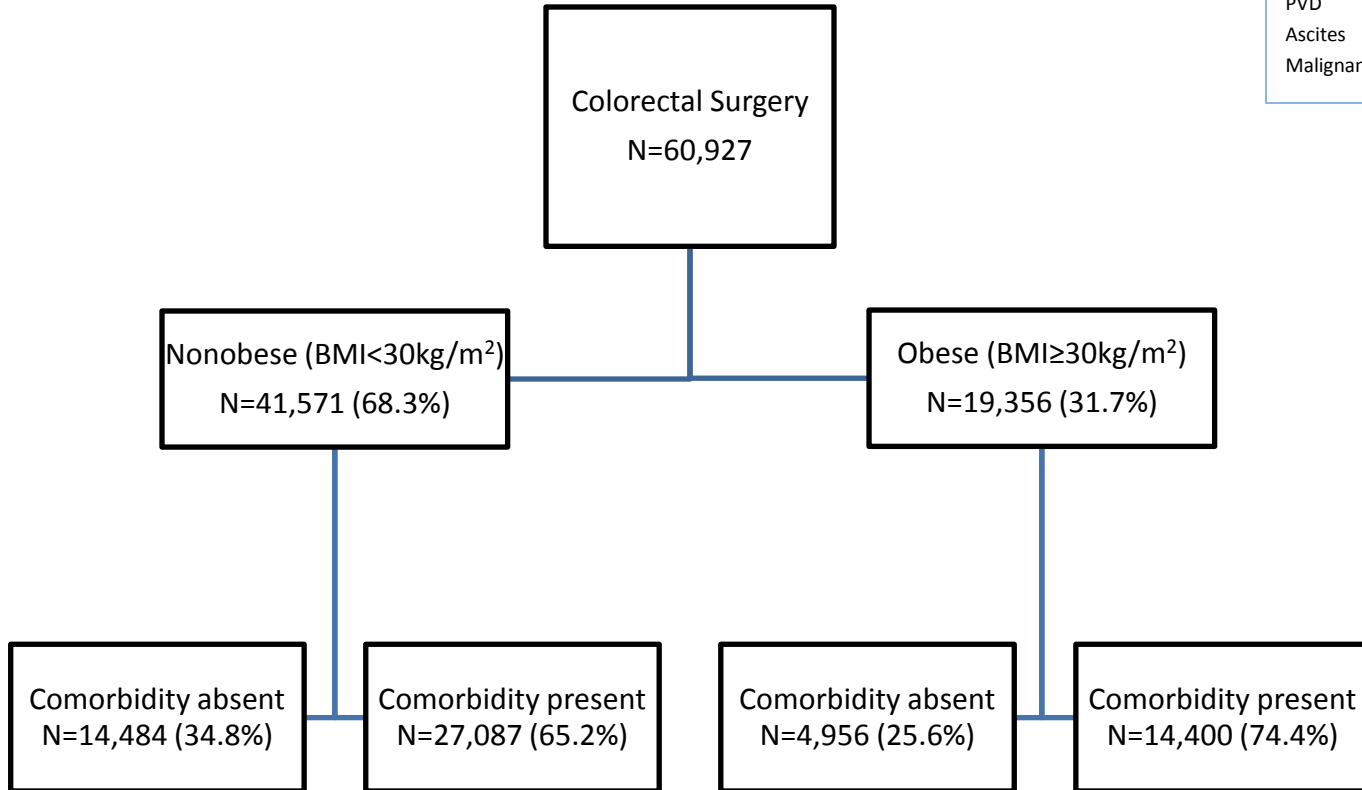
- Obesity even in the absence of comorbidity adversely influences outcomes after colorectal surgery
- Assessment of interaction between BMI and comorbidities
  - will improve risk stratification
  - allow for a more accurate evaluation of additional factors that may influence outcomes
  - more accurate reflection of quality

# Methods

- ACS National Surgical Quality Improvement Program (NSQIP) database from 2006 to 2011 was evaluated
- Colorectal surgery patients identified by CPT code
- Obese ( $\text{BMI} \geq 30 \text{ kg/m}^2$ ) patients compared to non-obese ( $\text{BMI} < 30 \text{ kg/m}^2$ )
  - Subgroups of patients with and without comorbidity were further compared

# Groups

Comorbidities	
HTN	Renal failure
DM	Ventilator
COPD	Transfusion
CAD	Weight loss
CVA	Steroid use
Neuropathy	Bleeding
Paralysis	Pneumonia
PVD	Sepsis
Ascites	Infection
Malignancy	



# Complications and Outcomes

## **Surgical**

- Surgical Site Infection (SSI)
- Wound dehiscence
- Perioperative bleeding
- Reoperation
- Length of Stay (LOS)
- 30 day mortality

## **Medical**

- Pulmonary Embolism (PE)
- Urinary Tract Infection(UTI)
- Pneumonia
- Failure to wean
- Myocardial Infarction (MI)
- Stroke
- Acute Renal Failure (ARF)

# Results

- Mean age 61.8 years
- 48% male
- Most common diagnosis: colorectal malignancy (36.8%)
- 44,434 colectomies (72.9%)
  - most common technique: open (66%)
- 41,487 (68.1%) with comorbidities
  - HTN (51%) and DM (14.8%) most common



# Outline

- No comorbidity:  
Nonobese  
vs  
Obese
- Obese:  
Comorbidity present  
vs  
Comorbidity absent
- Nonobese with comorbidity  
vs  
Obese without comorbidity

Characteristic	Nonobese		Obese	
	Comorbidity absent	Comorbidity present	Comorbidity absent	Comorbidity present
Age (mean±SD)	55.1 ± 14.9	66.2 ± 15.2	52.2 ± 12.9	63.6 ± 12.7
Gender (female)	7732 (53.4%)	13678 (50.5%)	2556 (51.6%)	7721 (53.6%)
ASA 3-5	3030 (20.9%)	17287 (63.8%)	1274 (25.7%)	9765 (67.8%)
Emergency	2527 (17.5%)	5200 (19.2%)	385 (7.8%)	1261 (8.7%)
Surgical Technique (laparoscopic)	6316 (43.6%)	7959 (29.4%)	2132 (43.1%)	4299 (29.9%)
Operative Time (mean±SD)	164.3 ± 85.3	158.2 ± 86.5	180.9 ± 88.6	175.1 ± 91.2

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# Demographics

Characteristic	Nonobese (BMI<30 kg/m <sup>2</sup> )		Obese (BMI≥30 kg/m <sup>2</sup> )		p-value
	Comorbidity absent	Comorbidity present	Comorbidity absent	Comorbidity present	
Age (mean±SD)	55.1 ± 14.9	66.2 ± 15.2	52.2 ± 12.9	63.6 ± 12.7	<0.001
Gender (female)	7732 (53.4%)	13678 (50.5%)	2556 (51.6%)	7721 (53.6%)	0.036
ASA 3-5	<b>3030 (20.9%)</b>	17287 (63.8%)	<b>1274 (25.7%)</b>	9765 (67.8%)	<b>&lt;0.001</b>
Emergency	<b>2527 (17.5%)</b>	5200 (19.2%)	<b>385 (7.8%)</b>	1261 (8.7%)	<b>0.044</b>
Surgical Technique (laparoscopic)	6316 (43.6%)	7959 (29.4%)	2132 (43.1%)	4299 (29.9%)	0.53
Operative Time (mean±SD)	164.3 ± 85.3	158.2 ± 86.5	180.9 ± 88.6	175.1 ± 91.2	<0.001

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Surgical Technique (laparoscopic)	6316 (43.6%)	7959 (29.4%)	2132 (43.1%)	4299 (29.9%)	0.53
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# Surgical Complications

Complication	Nonobese (BMI<30 kg/m <sup>2</sup> )		Obese (BMI≥30 kg/m <sup>2</sup> )		p-value
	Comorbidity absent	Comorbidity present	Comorbidity absent	Comorbidity present	
Superficial SSI	<b>953 (6.6%)</b>	2000 (7.4%)	<b>488 (9.9%)</b>	1655 (11.5%)	<b>&lt;0.001</b>
Deep SSI	<b>166 (1.1%)</b>	428 (1.6%)	<b>94 (1.9%)</b>	352 (2.4%)	<b>&lt;0.001</b>
Organ Space SSI	494 (3.4%)	1209 (4.5%)	167 (3.4%)	704 (4.9%)	0.91
Overall SSI	<b>1546 (10.7%)</b>	3456 (12.8%)	<b>722 (14.6%)</b>	2593 (18.0%)	<b>&lt;0.001</b>
Dehiscence	<b>131 (0.90%)</b>	552 (2.0%)	<b>86 (1.7%)</b>	<b>417 (2.9%)</b>	<b>&lt;0.001</b>
Perioperative Bleeding	43 (0.30%)	341 (1.3%)	9 (0.18%)	174 (1.2%)	0.18
Reoperation	671 (4.6%)	2362 (8.7%)	244 (4.9%)	1379 (9.6%)	0.39
Length of Stay (mean days ± SD)	6.3±5.6	9.4±10.0	6.4±4.9	9.6±11.2	0.005
30 day mortality	55 (0.38%)	1584 (5.8%)	14 (0.28%)	655 (4.5%)	0.32

# Medical Complications

Complication	Nonobese (BMI < 30 kg/m <sup>2</sup> )		Obese (BMI ≥ 30 kg/m <sup>2</sup> )		p-value
	Comorbidity absent	Comorbidity present	Comorbidity absent	Comorbidity present	
Pulmonary Embolism	<b>70 (0.48%)</b>	212 (0.78%)	<b>38 (0.77%)</b>	138 (0.96%)	<b>0.02</b>
Urinary Tract Infection	370 (2.6%)	1193 (4.4%)	133 (2.7%)	685 (4.8%)	0.61
Pneumonia	184 (1.3%)	1472 (5.4%)	62 (1.3%)	643 (4.5%)	0.93
Failure to wean	<b>156 (1.1%)</b>	2098 (7.7%)	<b>76 (1.5%)</b>	<b>1243 (8.6%)</b>	<b>0.011</b>
Myocardial Infarction	19 (0.13%)	234 (0.9%)	3 (0.061%)	94 (0.65%)	0.21
Stroke	14 (0.097%)	161 (0.59%)	5 (0.10%)	83 (0.58%)	0.93
Acute Renal Failure	23 (0.16%)	365 (1.3%)	12 (0.24%)	292 (2.0%)	0.23



## II. Obese: Comorbidity absent vs Comorbidity present

# Demographics

Characteristic	Nonobese (BMI<30 kg/m <sup>2</sup> )		Obese (BMI≥30 kg/m <sup>2</sup> )		p-value
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Age (mean±SD)	55.1 ± 14.9	66.2 ± 15.2	<b>52.2 ± 12.9</b>	<b>63.6 ± 12.7</b>	<b>0.016</b>
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Superficial SSI	953 (6.6%)	2000 (7.4%)	<b>488 (9.9%)</b>	<b>1655 (11.5%)</b>	<b>0.002</b>
Deep SSI	166 (1.1%)	428 (1.6%)	<b>94 (1.9%)</b>	<b>352 (2.4%)</b>	<b>0.028</b>
Organ Space SSI	494 (3.4%)	1209 (4.5%)	<b>167 (3.4%)</b>	<b>704 (4.9%)</b>	<b>&lt;0.001</b>
Overall SSI	1546 (10.7%)	3456 (12.8%)	<b>722 (14.6%)</b>	<b>2593 (18.0%)</b>	<b>&lt;0.001</b>
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Reoperation	671 (4.6%)	2362 (8.7%)	244 (4.9%)	1379 (9.6%)	<0.001
Medical Complications	711 (4.9%)	<b>4207 (15.5%)</b>	<b>273 (5.5%)</b>	2307 (16%)	<b>&lt;0.001</b>

# Summary

- Obese patients were younger
- Also less likely to undergo emergency operations
- Despite this: operative time, SSI, wound dehiscence, and failure to wean increased in obese regardless of comorbidity
- Complications and LOS in general increased in patients with comorbidity, but worsened by obesity

# Conclusion

- Obesity in and of itself determines outcomes after colorectal surgery, even though comorbidity is important
- These findings support the inclusion of obesity itself as a factor in any determination of case-severity, quality, and reimbursement



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