

# Impact of Body Mass Index Severity on Total Knee Arthroplasty Complications and Length of Stay

Jibreel Hussain MBA<sup>1</sup>, Cecil Babul BS<sup>1</sup>, Amber Lopez BS<sup>1</sup>, Apurva Choubey MD<sup>2</sup>, Brett Drake BS<sup>1</sup>, Mark Gonzalez MD, PhD<sup>2</sup>  
<sup>1</sup>University Illinois College of Medicine, <sup>2</sup>University of Illinois at Chicago, Department of Orthopaedics  
mhussa45@uic.edu

**Disclosures:** Jibreel Hussain (N), Cecil Babul (N), Amber Lopez (N), Apurva Choubey (N), Brett Drake (N), Mark Gonzalez (N).

**INTRODUCTION:** Postoperative complications are more common in obese patients undergoing total knee arthroplasty (TKA). The types of complications and effective mitigation strategies for higher body mass index (BMI) patients are unclear. This study aims to classify complications and length of stay data in different BMI groups after TKA, while adjusting for demographic factors and comorbidities.

**METHODS:** We reviewed the American College of Surgeons National Surgical Quality Improvement Program (ACS-NSQIP) database to identify patients between 2012-2021. Patients were filtered using the Current Procedural Terminology (CPT) codes who underwent primary TKA (CPT code 27447), over the age of 18. Patients were stratified to 6 BMI categories from underweight (<18.5) to obese class III (>50). Multivariate analysis was performed to determine the association between BMI class. The analysis was adjusted for age, race, ethnicity, American Society of Anesthesiologists (ASA) class, and the postoperative complications. Odds ratios with 95% confidence intervals (CIs), and p-values were determined for each of the postoperative complication's association with BMI class.

**RESULTS:** We identified 505,360 patients who underwent primary TKA between 2012-2021. We adjusted for age, race, ethnicity, and ASA classification, and the complications affected by BMI class are shown in **Table 1**. For example, wound disruption (OR: 2.42, p<0.005) is significant in the underweight group, as well as class II (OR: 1.66, p<0.001) and class III obese group (OR: 2.23, p<0.0001). Conversely, prosthetic joint infections are only significantly increased in the Obese Class II and Obese Class III cohorts (**Figure 1**). However, there is no significant increase in complications with increasing BMI groups for death, periprosthetic fractures or DVT. When analyzing length of stay, the largest statistically significant differences were seen in the underweight, Obese Class II, and Obese Class III cohorts for Days from Operation to Discharge and Total Length of Hospital Stay (**Table 2**).

**DISCUSSION:** Our data shows that pulmonary embolism, wound disruption, prosthetic joint infection, readmission and re-operation were significantly increased in the obese class 3. However, there was no difference in DVT and myocardial infarction between the BMI groups. In addition, we found a significant association with an OR < 1 between bleed, readmission, and reoperation between the overweight, obese class 1 and class 2 groups, which provides evidence that there is a less chance of these complications when compared to normal BMI.

**SIGNIFICANCE:** Previous research has suggested that implementing BMI cut-offs can potentially reduce complications, but this approach may also limit patients' access to surgery. Our findings suggest that the utility of a BMI cutoff for patient selection is insufficient as a predictive measure, as both underweight and obese class III cohorts experience numerous complications and extended lengths of stay.

Perioperative Data	Odds of Complications Stratified by BMI Category											
	< 18.5			25-29.99		30-39.99		40-49.99		> 50		
	OR (95% CI)	p-value	OR (95% CI)	p-value	OR (95% CI)	p-value	OR (95% CI)	p-value	OR (95% CI)	p-value		
Reoperations	0.97 (0.67-1.37)	0.88	0.83 (0.75-0.92)	< 0.001	0.87 (0.79-0.95)	< 0.01	1.07 (0.95-1.20)	0.26	1.60 (1.33-1.91)	< 0.001		
Bleed	1.02 (0.85-1.22)	0.8	0.70 (0.67-0.74)	< 0.001	0.48 (0.46-0.51)	< 0.001	0.39 (0.37-0.42)	< 0.001	0.48 (0.42-0.56)	< 0.001		
DVT	0.74 (0.43-1.18)	0.23	1.02 (0.91-1.16)	0.71	0.96 (0.86-1.08)	0.51	0.77 (0.66-0.89)	< 0.001	0.73 (0.52-0.99)	0.05		
Wound Disruption	2.42 (1.25-4.30)	< 0.01	0.98 (0.75-1.28)	0.87	1.27 (1.00-1.64)	0.05	1.66 (1.27-2.19)	< 0.001	2.23 (1.48-3.32)	< 0.001		
Pulmonary Embolism	0.95 (0.47-1.71)	0.88	1.27 (1.06-1.52)	< 0.01	1.59 (1.35-1.88)	< 0.001	1.67 (1.38-2.03)	< 0.001	1.74 (1.22-2.43)	< 0.01		
Urinary Tract Infection	1.44 (0.96-2.07)	0.06	1.08 (0.95-1.22)	0.25	1.04 (0.92-1.17)	0.56	1.09 (0.94-1.26)	0.24	1.53 (1.18-1.95)	< 0.001		
Myocardial Infarction	0.85 (0.36-1.70)	0.68	0.89 (0.72-1.11)	0.28	0.75 (0.61-0.93)	0.01	0.62 (0.47-0.81)	< 0.001	0.97 (0.57-1.55)	0.9		
Cardiac Arrest Requiring CPR	0.50 (0.03-2.34)	0.5	1.22 (0.83-1.86)	0.33	0.90 (0.61-1.35)	0.59	1.16 (0.74-1.84)	0.53	1.52 (0.70-3.08)	0.26		
Death	1.91 (0.73-4.13)	0.14	0.95 (0.69-1.33)	0.74	0.76 (0.56-1.05)	0.09	0.76 (0.51-1.12)	0.16	1.24 (0.64-2.26)	0.5		
Subcutaneous Tissue Comp (L76)	0.00 (0.00-0.00)	0.99	0.51 (0.24-1.12)	0.08	0.45 (0.23-0.96)	< 0.05	0.80 (0.35-1.87)	0.6	0.49 (0.03-2.63)	0.5		
Comp and Disorders of MSKS (M96)	0.00 (0.00-0.00)	0.97	0.67 (0.41-1.13)	0.12	0.60 (0.38-0.98)	< 0.05	0.64 (0.36-1.16)	0.14	1.61 (0.66-3.59)	0.26		
Periprosthetic Fracture (M97)	NULL	0.99	0.67 (0.30-1.55)	0.33	0.54 (0.26-1.21)	0.11	0.90 (0.36-2.28)	0.83	0.87 (0.05-4.77)	0.9		
Prosthetic Joint Dislocation (T84.02)	4.26 (0.22-28.97)	0.2	1.65 (0.61-5.75)	0.37	1.90 (0.75-6.38)	0.23	2.05 (0.67-7.62)	0.23	3.36 (0.45-17.95)	0.17		
Prosthetic Joint Infections (T84.5)	0.53 (0.09-1.69)	0.37	0.93 (0.70-1.27)	0.65	1.14 (0.87-1.52)	0.36	1.64 (1.20-2.26)	< 0.01	3.60 (2.35-5.47)	< 0.001		
Hip/Thigh Muscle, Tendon, Fascia Injury S76	2.41 (0.13-13.17)	0.41	0.83 (0.37-2.01)	0.65	0.95 (0.47-2.20)	0.9	1.63 (0.73-4.02)	0.25	1.97 (0.42-7.06)	0.33		
Wound Disruption, Unspecified T81.3	3.14 (1.44-6.10)	0	1.04 (0.75-1.45)	0.83	1.43 (1.07-1.96)	< 0.05	1.98 (1.43-2.78)	< 0.001	2.75 (1.70-4.40)	< 0.001		
Readmissions	1.00 (0.81-1.23)	0.98	0.86 (0.81-0.91)	< 0.001	0.82 (0.78-0.87)	< 0.001	0.92 (0.86-0.98)	< 0.05	1.34 (1.19-1.50)	< 0.001		

Table 1. Perioperative data comparing the odds of complications among patients undergoing total knee arthroplasty, stratified by BMI grouping

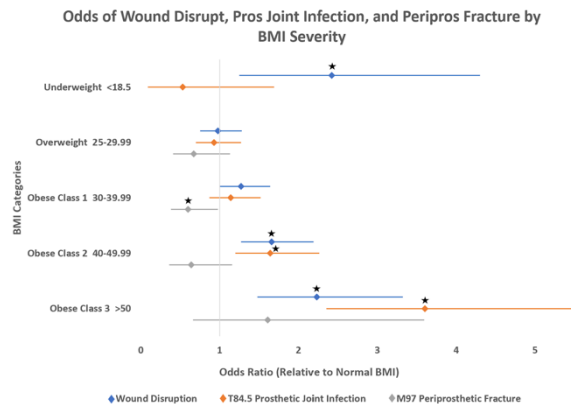


Figure 1: Forest plot shows ORs for wound disruption, prosthetic joint infection, and periprosthetic fractures by BMI class. Star = statistically significant.

Perioperative Data	Difference Normal - Underweight (95% CI)	p-value	Difference Normal - Overweight (95% CI)	p-value	Difference Normal - Obese Class 1 (95% CI)	p-value	Difference Normal - Obese Class 2 (95% CI)	p-value	Difference Normal - Obese Class 3 (95% CI)	p-value
Hospital Admission to Operation (HOOTDAY)	-0.18	0.36	0.004	0.99	-0.002	0.99	-0.002	0.99	0.05 (-0.12-0.22)	0.97
Days from Operation to Discharge (DOPTODIS)	-0.37	<0.001	0.07	<0.001	0.05	<0.001	-0.19	<0.001	-0.59 (-0.66-0.52)	<0.001
Total Length of Hospital Stay (TOTHLLOS)	-0.5	<0.001	0.07	<0.001	0.05	<0.001	-0.19	<0.001	-0.59 (-0.68-0.50)	<0.001

Table 2. Perioperative data comparison between patients undergoing total knee arthroplasty, stratified by BMI grouping