

Surgeon, Hospital, and Patient-Related Factors Effect on Mean Operative Time in Total Hip Arthroplasty

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Introduction

- An accurate assessment for THA operative time is essential: helps determine physician reimbursement via RVU formula¹
- Current estimates are limited
 - Surgeon surveys as used by CMS have response rates as low as 2.2%²
 - National databases and registries do not account for surgeon volume^{3,4}
- An estimate is needed that addresses the variety of settings under which THA is performed across the country
 - Surgeon factors: annual THA volume, years of experience, adult reconstruction fellowship
 - Hospital factors: hospital type (academic vs. community), trainee presence
 - Patient factors: ASA status, BMI categories

Materials and Methods

- Retrospective review of all primary THA at a single health system, including 2 urban academic hospitals and 2 suburban community hospitals between 2015-2018
- Total operative time calculated by taking time difference between incision time and case finish time (dressings completed) as documented in medical record
- Mean operative time for each surgeon calculated and assessed for associations with surgeon, hospital, and patient factors
 - Volume categories defined by thresholds determined by Koltsov et al⁵: 0-12, 13-25, 26-72, 73-165, 166-279, 280+
- The calculated mean of surgeon operative times was compared to the mean operative time across all cases

References:

1. Medicare learning network. Medicare Physician Fee Schedule. 2017. <https://www.cms.gov/Outreach-and-Education/Medicare-Learning-Network-MLN/MLNProducts/downloads/MedrecPhysFeeSchedfctsht.pdf>
2. Medicare physician payment rates: better data and greater transparency improve accuracy, G.A. Office, Editor. 2015; Washington, D.C.
3. Wills, B.W., et al., Impact of operative time on early joint infection and deep vein thrombosis in primary total hip arthroplasty. *Orthop Traumatol Surg Res*, 2018. **104**(4): p. 445-448.
4. Bohl, D.D., et al., Impact of Operative Time on Adverse Events Following Primary Total Joint Arthroplasty. *J Arthroplasty*, 2018. **33**(7): p. 2256-2262.e4.
5. Koltsov, J.C.B., et al., Risk-Based Hospital and Surgeon-Volume Categories for Total Hip Arthroplasty. *J Bone Joint Surg Am*, 2018. **100**(14): p. 1203-1208.

Results

- 3,972 THA conducted by 41 surgeons
 - Mean individual surgeon operative time was 106 ± 21 minutes (**Figure 1**)
 - Mean operative time of all cases was 96 ± 28 minutes
- Hospital type demonstrated significance between surgeon operative times ($p < 0.01$)
- Mean surgeon times were significantly different than mean times across all cases

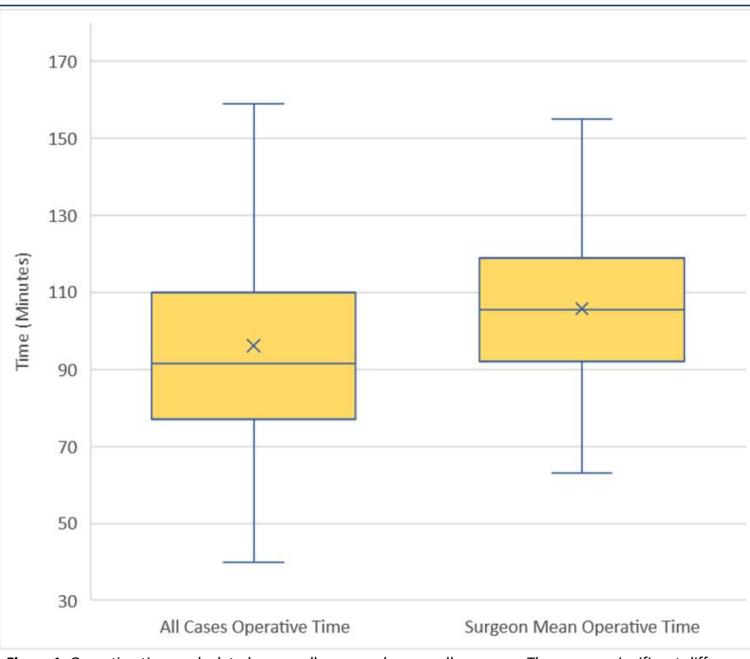


Figure 1: Operative times calculated across all cases and across all surgeons. There was a significant difference in the result calculated by the two methods ($p = 0.03$). Outliers not displayed on above chart but included in mean/median calculation

Characteristic	N (%)		Mean Surgeon Operative Time (min)	P-value
	Cases	Surgeons	Mean \pm SD	
Surgeons	3,972 (100)	41 (100)	106 \pm 21	
BMI category ^a			Patient Factors	
Underweight	36 (0.9)	14 (14) ^b	94 \pm 26	
Normal Weight	930 (24)	29 (29) ^b	98 \pm 19	
Overweight	1,451 (37)	36 (36) ^b	102 \pm 24	
Obese	1,415 (36)	32 (32) ^b	107 \pm 20	
Morbidly Obese	120 (3)	20 (20) ^b	115 \pm 34	
ASA-PS score				
1	231 (6)	24 (22) ^b	106 \pm 26	
2	2,566 (65)	35 (34) ^b	101 \pm 20	
3	1,107 (28)	34 (33) ^b	106 \pm 22	
4	19 (0.5)	11 (11) ^b	105 \pm 40	.84
Fellowship trained			Surgeon Factors	
Yes	3,230 (81)	14 (34)	102 \pm 22	
No	742 (19)	27 (66)	108 \pm 21	
Experience, y ^c				
0-10	305 (7.7)	11 (27)	115 \pm 26	
11-20	2,647 (67)	15 (37)	102 \pm 17	
21-30	719 (18)	10 (24)	102 \pm 24	
>30	301 (7.5)	5 (12)	104 \pm 16	
Surgeon THA Volume ^d				
Very Low	261 (6.6)	23 (56)	109 \pm 23	
Low	607 (15)	9 (22)	112 \pm 15	
Medium	344 (9)	2 (5)	93 \pm 4	
High	1,385 (35)	5 (12)	86 \pm 15	
Very High	1,375 (35)	2 (5)	100 \pm 34	.16
Hospital type			Hospital Factors	
Academic	1,111 (28)	12 (28) ^b	125 \pm 21	<.01
Community	2,861 (72)	31 (72) ^b	101 \pm 20	
Trainee presence				
None	2,320 (58)	36 (72) ^b	103 \pm 24	
Trainee	1,652 (42)	14 (28) ^b	111 \pm 21	.29

Conclusion

- Estimates for THA operative time should account for the variety of surgeon, hospital, and patient-related settings under which THA is conducted across the country
 - Using surgeon mean operative time may be more reflective of the actual time it takes an individual surgeon
- Longer operative times than reported in many other studies, particularly those with nationwide databases (NSQIP: between 91-94 minutes^{3,4})
- Although many of these factors did not demonstrate significance, this may have been limited by the small sample size of our study