****Of note, we would be happy to either present this work as a poster or a podium.**

Background: Robotic-assisted total hip arthroplasty (RA-THA) has gained attention for improved component positioning, but its clinical and economic value remains debated. This study compared outcomes, costs, and utilization trends between RA-THA and manual THA (M-THA).

Methods: This retrospective cohort study analyzed 243,229 primary THA procedures from the Premier Healthcare Claims Database (2016-2022), including 912 RA-THA and 242,317 M-THA cases. Multivariate regression models assessed 90-day complications, readmissions, and index hospitalization costs, adjusting for patient demographics and comorbidities.

Results: RA-THA patients were younger (mean 62.4 vs 66.3 years, p0.001), healthier (Elixhauser index 1.39 vs 1.72, p0.001), and more likely privately insured (60.0% vs 35.2%, p0.001). RA-THA was associated with shorter hospital stays (0.30 vs 0.80 days, $p < 0.001$). After adjustment, no significant differences were observed in 90-day readmission (OR 0.90, 95% CI 0.49-1.66) or complications (OR 0.43, 95% CI 0.14-1.33). Index costs were modestly higher for RA-THA ($15,316 vs $14,982, p=0.012), but this difference was not significant after controlling for confounders (p=0.19). RA-THA utilization increased from 2017 to 2019 but plateaued thereafter, remaining under 1% of total THA volume through 2022, contrasting with earlier projections of rapid adoption.

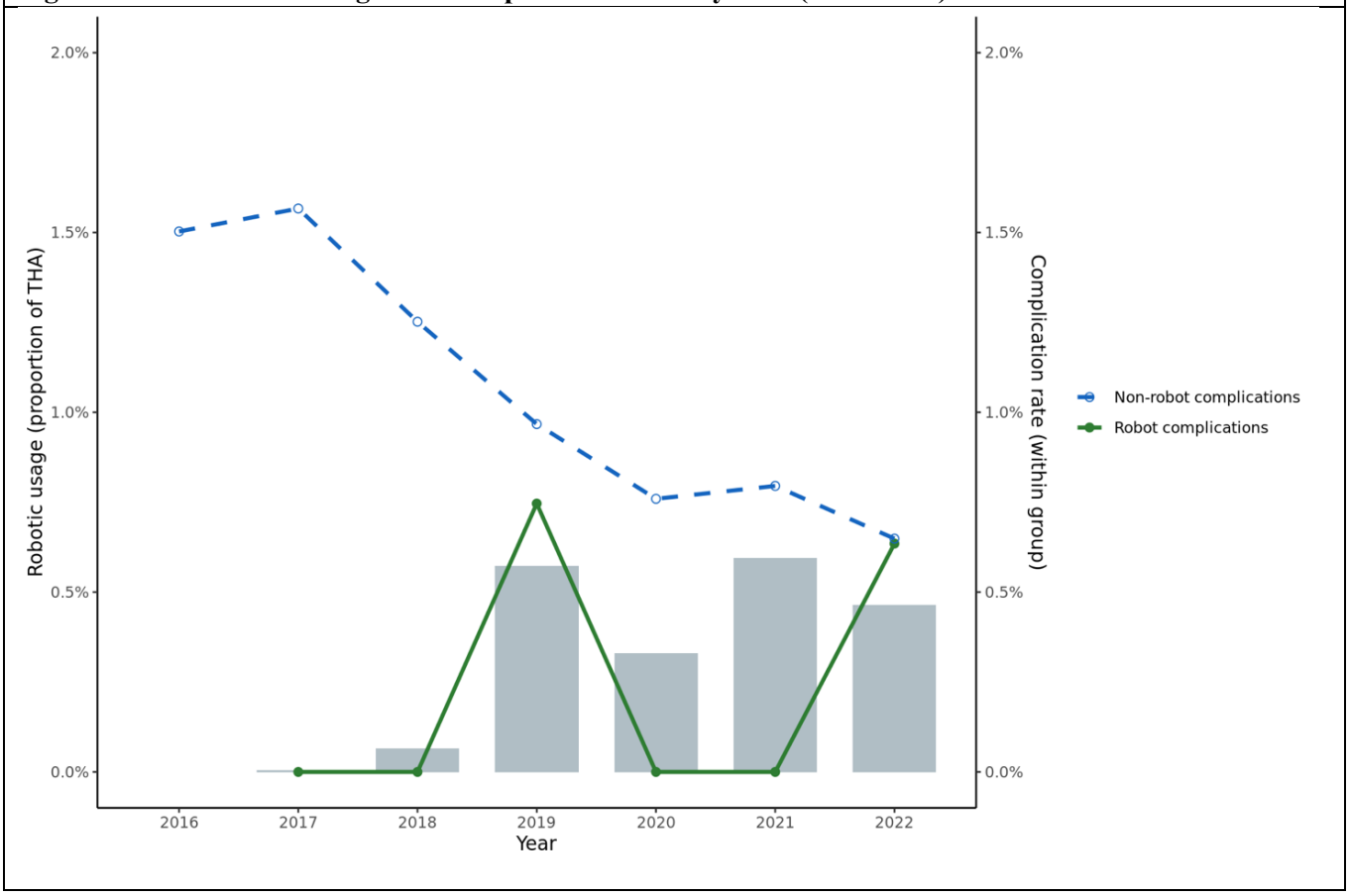
Conclusions: RA-THA is performed in younger, healthier patients and offers shorter hospital stays without increased complications or readmissions. Despite modestly higher index costs, RA-THA does not demonstrate clear clinical or economic advantages over M-THA at short-term follow-up. Adoption rates have plateaued below earlier projections, highlighting the need for long-term comparative effectiveness research.

Table 1. Demographics and Characteristics by Procedure Date in Individuals Undergoing Primary Total Hip Arthroplasty with Robotic and Non-Robotic Approaches (N=243,229)

Variable	Robotic (N=912)	Non-Robotic (N=242,317)	p-value
Age in years (Mean ± SE)	62.4 (0.33)	66.3 (0.02)	<0.001
Length of Stay (Mean ± SE)	0.30 (0.03)	0.80 (0.00)	<0.001
Elixhauser Comorbidity Index (Mean ± SE)	1.39 (0.04)	1.72 (0.00)	<0.001
Index Cost	15316 (130.1)	14982 (24.4)	0.012
90 Day Cost	3208 (506.0)	3850 (38.1)	0.21
Sex			<0.001
Female	447 (0.49)	133427 (0.55)	
Male	465 (0.51)	108890 (0.45)	
Race			0.037
Asian	1 (0)	1988 (0.01)	
Black	85 (0.09)	19296 (0.08)	
Other	34 (0.04)	7894 (0.03)	
White	792 (0.87)	213139 (0.88)	
Ethnicity			0.38
Hispanic	27 (0.03)	8623 (0.04)	
Non-Hispanic	885 (0.97)	233694 (0.96)	

Payer			<0.001
Medicaid	35 (0.04)	10775 (0.04)	
Medicare	295 (0.32)	138633 (0.57)	
Other	33 (0.04)	7097 (0.03)	
Private	548 (0.6)	84508 (0.35)	
Uninsured	1 (0)	1304 (0.01)	
90 Day Readmission	11 (0.03)	4703 (0.05)	0.31
Complications	3 (0)	2242 (0.01)	0.09
Column data reported as number of patients (%) or mean ± standard error (SE)			

Figure 1. Robotic THA Usage and Complication Rates by Year (2016–2022)



[The following tables are for supplemental purposes only]

Supplemental Table 1. Multivariate Analyses for Effect of Robotic Assisted Procedure Designation on Complications in Individuals Undergoing Primary Total Hip Arthroplasty (N=243,229)			
Variable	**OR**	**CI**	**p-value**
Robot Assisted Procedure	0.43	0.14-1.33	0.14
Age in years (Unit of Change 10)	0.95	0.90-1.00	0.06
Sex			
Female	0.88	0.81-0.95	0.002
Male	Ref		
Race			
Asian	1.15	0.72-1.84	0.56
Black	0.93	0.80-1.09	0.36
Other	1.14	0.92-1.43	0.24
White	Ref		
Ethnicity			
Hispanic	1.02	0.81-1.29	0.87
Non Hispanic	Ref		
Payer			
Medicaid	1.58	1.31-1.90	<0.001
Medicare	1.20	1.07-1.36	0.002
Other	1.23	0.96-1.58	0.11
Private	Ref		
Uninsured	1.12	0.60-2.09	0.73
Elixhauser Comorbidity Index (Mean ± standard error)	1.48	1.44-1.51	<0.001

Supplemental Table 2. Multivariate Analyses for Effect of Robotic Assisted Procedure Designation on 90 Day Readmission in Individuals Undergoing Primary Total Hip Arthroplasty (N=243,229)			
Variable	**OR**	**CI**	**p-value**
Robot Assisted Procedure	**0.90**	**0.49-1.66**	**0.74**
Age in years (Unit of Change 10)	1.27	1.22-1.33	<0.001
Sex			
Female	1.01	0.95-1.08	0.68
Male	Ref		
Race			
Asian	0.70	0.49-1.00	0.048
Black	0.99	0.88-1.11	0.83
Other	0.80	0.72-1.04	0.13
White	Ref		
Ethnicity			
Hispanic	0.87	0.72-1.04	0.13
Non Hispanic	Ref		

Payer			
Medicaid	1.23	1.05-1.45	0.013
Medicare	1.30	1.19-1.42	<0.001
Other	0.91	0.73-1.15	0.43
Private	Ref		
Uninsured	1.05	0.64-1.75	0.83
Elixhauser Comorbidity Index (Mean ± standard error)	1.24	1.22-1.26	<0.001

Supplemental Table 3. Multivariate Analyses for Effect of Robotic Assisted Procedure Designation on Index Costs in Individuals Undergoing Primary Total Hip Arthroplasty (N=243,229)

Variable	CI	p-value	Estimate
Robot Assisted Procedure	**-261.3 – 1292.4**	**0.19**	**515.5**
Age in years (Unit of Change 10)	-3.6 – 122.3	0.06	59.3
Sex			
Female	-17.7 – 175.0	0.11	78.6
Male	Ref		
Race			
Asian	1127.5 – 2182.1	<0.001	1654.8
Black	57.5 - 413.3	0.009	235.4
Other	530.4 - 1.078.0	<0.001	2167.4
White	Ref		
Ethnicity			
Hispanic	1905.0 – 2429.7	<0.001	2167.4
Non Hispanic	Ref		
Payer			
Medicaid	1061.1 – 1543.9	<0.001	1302.5
Medicare	-199.9 – 66.1	0.32	-66.9

Other	-146.0 – 432.8	0.33	143.4
Private	Ref		
Uninsured	-753.9 – 552.5	0.76	-100.7
Elixhauser Comorbidity Index (Mean ± standard error)	406.7 – 474.6	<0.001	440.7