

No Change in the National Utilization of Cemented Stem Fixation for Elective Total Hip Arthroplasty from 2015 to 2021

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INTRODUCTION: Cementless fixation is most commonly used for elective total hip arthroplasty (THA) in the United States (US). However, cemented stems have less risk of fracture and loosening, particularly in older patients with poor bone quality. Given the aging population, the purpose of this study was to examine 1) factors associated with cemented stem fixation and 2) changes in US cemented stem fixation utilization for THA from 2015 to 2021.

METHODS: A retrospective analysis of patients undergoing cemented or cementless THA stem fixation between 2015 and 2021 was conducted using a national administrative database. Patient characteristics were compared for each fixation type. Subsequently, the change in utilization of cemented fixation as the THA fixation type was observed from 2015 to 2021 for all patients as well as for different subgroups. Among the 275,108 THA patients identified, 27,783 (10.1%) underwent cemented stem fixation.

RESULTS: Patients who underwent cemented fixation were significantly older, more likely to be female, have osteoporosis, a prior fragility fracture, rheumatoid arthritis, chronic kidney disease, Medicaid, Medicare, and to be from the South (p<0.001). Between 2015 to 2021, there was no significant change in the utilization of cemented fixation in the general population (p=0.230), patients aged 75+ (p=0.526), those with prior fragility fractures (p=0.098), or those with a diagnosis of osteoporosis (p=0.134).

DISCUSSION AND CONCLUSION: Despite studies favoring cemented femoral stem fixation in patients with poor bone health, our study showed no difference in the national utilization of cemented stem fixation for total hip arthroplasty. Clinical practice guidelines may encourage wider utilization of cemented stem fixation in at-risk patients.

Table 1. Demographic and Comorbidities of Patients Undergoing Cementless and Cemented Total Hip Arthroplasty

Category	Cemented		Cementless		P-value	
	Number	Percent	Number	Percent		
TOTAL	276,434	27.783	10.05%	248,651	89.95%	-
Average Age (Years)	-	70.04	SD (10.499)	65.99	SD (10.55)	<0.001
Sex	-	-	-	-	-	<0.001
Female	159061	18289	65.83%	140772	56.61%	-
Male	117373	9494	34.17%	107879	43.39%	-
Average CCI	N/A	2.58	SD (2.20)	2.01	SD (2.72)	<0.001
Osteoporosis	18081	2704	9.73%	15347	6.17%	<0.001
OP treatment	24,724	3,902	14.04%	20822	8.37%	<0.001
Prior Fragility Fracture	29010	4472	16.10%	24538	9.87%	<0.001
Diabetes Mellitus	13557	1411	5.08%	12146	4.88%	0.142
Tobacco Use	9246	843	3.03%	8403	3.38%	0.004
Underweight (BMI <18.5)	4723	693	2.49%	4030	1.62%	<0.001
Rheumatoid Arthritis	20167	2491	8.97%	17676	7.11%	<0.001
Dementia	13753	2469	8.81%	11304	4.55%	<0.001
Chronic Kidney Disease	3406	626	2.25%	2780	1.12%	<0.001
Insurance Type	-	-	-	-	-	<0.001
Commercial	165307	14284	51.41%	151023	60.74%	-
Government	2937	215	0.77%	2722	1.09%	-
Medicaid	11047	954	3.43%	10093	4.06%	-
Medicare	95897	12548	44.68%	83649	33.64%	-
Unknown	757	58	0.21%	699	0.28%	-
Region	-	-	-	-	-	<0.001
Midwest	76859	6683	24.05%	70176	28.22%	-
Northeast	70179	6431	23.15%	63748	25.64%	-
South	80544	9709	34.95%	70835	28.49%	-
West	47619	4837	17.41%	42782	17.21%	-
Unknown	1233	123	0.44%	1110	0.45%	-

CCI: Charlson Comorbidity Index; BMI: Body Mass Index

Table 2. Factors Associated with Patients Undergoing Cementless Total Hip Arthroplasty: Multivariable Analysis

Category	Odds Ratio	95% CI	P-value
AGE	-	-	-
<55	REF	REF	REF
55-64	0.99	0.93-1.04	0.694
65-74	1.15	1.09-1.20	<0.001
75+	2.16	2.06-2.27	<0.001
Sex	-	-	-
Female	REF	REF	REF
Male	0.78	0.76-0.80	<0.001
CCI	-	-	-
0	REF	REF	REF
1+	1.06	1.06-1.07	<0.001
Osteoporosis	1.11	1.06-1.16	<0.001
OP treatment	1.26	1.21-1.31	<0.001
Prior Fragility Fracture	1.35	1.26-1.45	<0.001
Diabetes Mellitus	0.88	0.84-0.94	<0.001
Tobacco Use	1.04	0.97-1.12	0.240
Underweight (BMI <18.5)	1.18	1.09-1.28	<0.001
Rheumatoid Arthritis	1.15	1.10-1.21	<0.001
Dementia	1.21	1.16-1.27	<0.001
Chronic Kidney Disease	1.59	1.45-1.74	<0.001
Insurance	-	-	-
Commercial	REF	REF	REF
Government	0.94	0.83-1.08	0.392
Medicaid	1.28	1.20-1.36	<0.001
Medicare	1.24	1.21-1.28	<0.001
Region	-	-	-
Midwest	REF	REF	REF
Northeast	1.08	1.05-1.12	<0.001
South	1.41	1.37-1.46	<0.001
West	1.16	1.11-1.20	<0.001

CI: Confidence Interval; CCI: Charlson Comorbidity Index; BMI: Body Mass Index

Table 3. Trends in Utilization of Cementless Total Hip Arthroplasty: Subgroup Analysis

	2015	2016	2017	2018	2019	2020	2021	CAGR	P-value
TOTAL	11.5%	9.8%	8.7%	9.0%	10.1%	11.1%	14.9%	4.43%	0.230
Age	-	-	-	-	-	-	-	-	-
<50	9.0%	7.2%	6.2%	6.0%	7.3%	7.2%	13.5%	6.92%	0.329
50-59	7.5%	6.5%	6.0%	6.1%	6.6%	6.6%	9.5%	3.90%	0.334
60-69	9.2%	7.3%	6.2%	5.9%	7.1%	8.0%	10.1%	1.63%	0.586
70-74	11.6%	9.5%	8.6%	8.9%	9.9%	10.5%	13.1%	2.09%	0.403
75+	20.3%	16.9%	14.7%	15.5%	16.4%	18.3%	22.0%	1.36%	0.526
Sex	-	-	-	-	-	-	-	-	-
Female	13.2%	11.1%	10.1%	10.4%	11.4%	12.8%	16.8%	4.10%	0.234
Male	9.4%	8.1%	6.9%	7.2%	8.3%	8.7%	12.1%	4.27%	0.280
CCI	-	-	-	-	-	-	-	-	-
0	10.1%	7.7%	7.3%	8.2%	8.5%	8.3%	9.1%	-1.75%	0.915
1	11.1%	9.0%	7.6%	8.1%	8.2%	9.8%	13.7%	3.58%	0.343
2	11.6%	10.2%	8.8%	9.1%	10.1%	10.8%	16.4%	5.92%	0.244
3+	13.7%	12.3%	11.2%	11.3%	12.4%	14.9%	22.8%	8.85%	0.121
Osteoporosis	16.1%	14.5%	13.0%	13.4%	15.8%	16.6%	20.9%	4.45%	0.134
OP treatment	17.8%	15.7%	14.4%	14.0%	15.9%	16.6%	21.7%	3.41%	0.787
Prior Fragility Fracture	3.3%	3.4%	3.6%	2.6%	3.9%	2.3%	2.6%	-4.01%	0.098
Diabetes Mellitus	10.9%	10.8%	10.5%	8.5%	10.2%	10.8%	15.5%	5.94%	0.268
Tobacco Use	8.2%	9.6%	9.4%	7.4%	8.7%	10.2%	13.9%	9.16%	0.117
Underweight (BMI <18.5)	13.2%	14.5%	13.1%	12.7%	14.4%	16.2%	21.5%	8.41%	0.054
Rheumatoid Arthritis	14.0%	11.9%	10.8%	11.3%	12.6%	13.8%	17.6%	3.95%	0.201
Dementia	18.3%	17.2%	16.3%	18.0%	17.8%	19.2%	22.6%	3.54%	0.079
Chronic Kidney Disease	19.0%	17.4%	14.8%	18.1%	16.7%	25.1%	26.9%	6.01%	0.080
Insurance	-	-	-	-	-	-	-	-	-
Commercial	10.0%	8.2%	7.6%	7.8%	8.7%	9.5%	12.8%	4.14%	0.233
Government	10.9%	7.7%	7.0%	4.9%	9.6%	9.5%	9.9%	-1.50%	0.590
Medicaid	10.2%	9.1%	7.5%	7.9%	7.3%	9.5%	12.9%	3.91%	0.451
Medicare	14.5%	12.8%	10.9%	11.7%	12.5%	14.4%	18.0%	3.65%	0.253
Region	-	-	-	-	-	-	-	-	-
Midwest	9.6%	8.8%	7.7%	8.0%	8.0%	10.0%	14.3%	6.81%	0.186
Northeast	11.8%	8.3%	8.1%	8.8%	9.0%	9.5%	12.4%	0.84%	0.620
South	13.9%	11.9%	10.5%	10.4%	12.8%	12.6%	17.0%	3.45%	0.319
West	11.2%	10.5%	8.9%	8.8%	10.0%	11.4%	18.5%	8.65%	0.113

CAGR: Compounded Annual Growth Rate; CCI: Charlson Comorbidity Index; BMI: Body Mass Index