

Changing Demographics in Primary and Revision Total Joint Arthroplasty, 2000-2014

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INTRODUCTION:

Total joint arthroplasty (TJA) procedures have increased in volume continuously over recent decades. Previous studies have evaluated expected future volume growth for primary and revision TJA procedures. There has been little discussion of the recent demographic changes among the population of patients undergoing TJA since 2000. This paper evaluates the trends in age, sex, and race among the TJA population over the past 15 years.

METHODS:

A retrospective review of the National Inpatient Sample database was performed from 2000 to 2014. This database is a representative national sample of all discharges among hospitals in the United States in a calendar year and contains over 116 million patient records. Patients undergoing primary total hip arthroplasty (THA), primary total knee arthroplasty (TKA), revision THA, and revision TKA were identified by International Classification of Disease, 9th edition, procedure code. Demographic data such as age, sex, and race were evaluated.

Continuous variables were compared using *t*-test, and proportions were compared by Chi-square test. Linear regression was performed to assess demographic subpopulation trends over time. Demographic changes among the TJA population were compared with demographic changes among the general United States population.

RESULTS:

From 2000 to 2014, TJA population demographics changed significantly. Mean age decreased significantly among all TJA categories ($p < 0.01$), except for revision THA ($p = 0.11$). Regression models demonstrated a significant trend in mean age, decreasing by 0.1 y annually for primary TJA ($p < 0.01$, R-square 0.69 – 0.85) and decreasing by 0.2 y annually for revision TKA ($p < 0.01$, R-square 0.82).

Sex distribution showed a small, but significant decrease (0.1% per year, $p < 0.01$) in female patients undergoing primary TKA and revision THA, but no change among primary THA and revision TKA. Female patients account for 55-62% of the population undergoing TJA procedures. In 2015, the general United States population was 50.8% female.

Race distribution showed a small, but significant decrease (0.1 – 0.3% per year, $p < 0.01$) in non-Hispanic white patients undergoing all TJA procedures, except for revision THA. Non-Hispanic white patients comprise 80-86% of the TJA population, followed by blacks (8-11%), Hispanics (3-6%), and Asians (<1%). There has been significant increase in the proportion of blacks undergoing all TJA procedures by 0.1 to 0.2% per year ($p < 0.01$), except for revision THA ($p = 0.55$). Aside from a small, but significant increase in Asians undergoing primary TKA, there has been no significant change in the proportion of Hispanics or Asians undergoing TJA procedures. Racial distribution among the general population of the United States in 2014 is 61.6% non-Hispanic white, 13.3% black, 17.6% Hispanic, and 5.6% Asian.

DISCUSSION AND CONCLUSION:

The TJA population has changed markedly over the past 15 years. The mean age has continuously declined across all TJA procedures. Females continue to make up the majority of TJA patients, but the proportion of males undergoing primary TKA and revision THA is rising. Non-Hispanic whites continue to be vastly over-represented among TJA patients, while Asians and Hispanics are vastly under-represented. The proportion of Non-Hispanic whites has been decreasing over time as the proportion of blacks has increased, but there has been minimal change among the proportion of Asians and Hispanics undergoing TJA procedures.

This study provides further information regarding the changing population of primary and revision TJA patients. An improved understanding of this population is imperative in order to adequately mitigate modifiable risk factors preoperatively and identify underserved surgical populations moving forward.

	Primary THA	Trend (a)	Primary TKA	Trend (a)	Revision THA	Trend (a)	Revision TKA	Trend (a)
Age								
2000 Mean, y (SE)	66.3 (0.074)		68.0 (0.040)		67.3 (0.17)		68.1 (0.16)	
2014 Mean, y (SE)	64.9 (0.048)	-0.10 (-0.01)	65.9 (0.027)	-0.14 (-0.01)	66.8 (0.13)	-0.04 (0.11)	65.1 (0.09)	-0.20 (-0.01)
Sex								
2000 Female, % (SE)	58 (0.0027)		63 (0.002)		59 (0.0058)		57 (0.0048)	
2014 Female, % (SE)	55 (0.0018)	-0.20 (0.02)	62 (0.0013)	-0.0018 (-0.01)	56 (0.0049)	-0.0015 (-0.01)	59 (0.0044)	+0.0054 (0.30)
Race								
2000 Non-Hispanic White, % (SE)	89 (0.0020)		87 (0.0016)		88 (0.0044)		86 (0.0055)	
2014 Non-Hispanic White, % (SE)	86 (0.0013)	-0.0018 (-0.01)	82 (0.0011)	-0.0023 (-0.01)	85 (0.0036)	-0.0010 (0.07)	80 (0.0037)	-0.0033 (-0.01)
2000 Black, % (SE)	5.8 (0.0015)		6.3 (0.0012)		5.7 (0.0012)		7.3 (0.0042)	
2014 Black, % (SE)	7.5 (0.0010)	+0.0012 (+0.01)	7.8 (0.0006)	+0.0012 (+0.01)	7.9 (0.0029)	+0.0007 (0.55)	11.2 (0.0029)	+0.0022 (+0.01)
2000 Hispanic, % (SE)	2.9 (0.0011)		4.4 (0.0010)		3.9 (0.0016)		3.9 (0.0013)	
2014 Hispanic, % (SE)	3.4 (0.0007)	-0.0003 (0.89)	5.9 (0.0007)	-0.0004 (0.37)	3.6 (0.0013)	+0.0002 (0.66)	5.1 (0.0020)	+0.0003 (0.71)
2000 Asian, % (SE)	0.56 (0.0005)		0.57 (0.0004)		0.47 (0.0009)		0.46 (0.0011)	
2014 Asian, % (SE)	0.91 (0.0004)	+0.0002 (0.27)	1.4 (0.0003)	+0.0005 (+0.01)	0.84 (0.0009)	+0.0001 (0.48)	0.85 (0.0008)	+0.0002 (0.36)

