Appendix

Results of Sensitivity Analysis of Competing Risks

In Table E-1, each of the possible outcomes—censored, revision, death, fracture, myocardial infarction, and stroke—are tabulated along with the cumulative incidence rate and average time until the event occurs. Death had the highest cumulative incidence (31%) among the competing events considered. Myocardial infarction (6%), stroke (4%), and fracture (4%) occurred at comparatively lower rates prior to revision (7%).

Table E-2 displays results from crude and multivariable models of revision, adjusted for the competing risks of death, fracture, stroke, and myocardial infarction. Overall, these analyses did not reveal substantial differences from the results from the Cox proportional hazards models reported in Table II of the article. The hazard ratios (HR) for race, comorbidity, hospital volume, and surgeon volume remain relatively unchanged. There are slight modifications in the estimates for sex, age, and Medicaid eligibility. Men experience a higher rate of mortality and myocardial infarction than women, which reduces their relative risk of revision in the competing risk model (HR, 1.15) compared with the original Cox model (HR, 1.23). Older patients also face a higher risk of competing events, and as a consequence the hazard ratio for revision in younger patients shifts from 1.47 in the Cox model to 1.75 in the competing risk analysis. Medicaid-eligible patients also have higher risk of competing events, and as a result the relative risk of revision among Medicaid-eligible subjects is more protective in the competing risk analysis (HR, 0.84) than in the original Cox regression.

Event	No. (%) of Patients	Time† (yr)
Censored	23,776 (46.30)	8.74 (4.53)
Revision	3798 (7.40)	4.49 (3.45)
Death	16,099 (31.35)	6.42 (3.33)
Fracture	2210 (4.30)	4.31 (3.88)
Myocardial	3218 (6.27)	4.85 (3.27)
infarction		
Stroke	2246 (4.37)	5.47 (3.46)

TABLE E-1 Incidence and Average Time for Each Event Type Among 51,347 Patients*

*Table displays first event for each patient. †The values are given as the mean and the standard deviation.

Variable	Crude Model*	Multivariable Model*†
Sex		
Male	1.18 (1.10, 1.26)‡	1.15 (1.07, 1.22)
Female	Reference	Reference
Age		
65-75	1.79 (1.67, 1.93)‡	1.75 (1.63, 1.88)
>75	Reference	Reference
Race		
White	0.89 (0.77, 1.02)§	0.87 (0.74, 1.02)
Nonwhite	Reference	Reference
Medicaid eligibility		
Yes	0.84 (0.72, 0.98)‡	0.84 (0.72, 0.99)
No	Reference	Reference
Comorbidity		
Charlson score of >1	0.86 (0.78, 0.95)‡	0.90 (0.81, 1.00)
Charlson score of 0-1	Reference	Reference
Hospital volume#		
1-25	1.12 (1.04, 1.20)‡	1.07 (0.98, 1.16)
26-50	1.02 (0.94, 1.11)‡	1.01 (0.92, 1.09)
>50	Reference	Reference
Surgeon volume#		
<6	1.23 (1.13, 1.33)†	1.21 (1.11, 1.32)
6-12	1.07 (0.99, 1.16)†	1.07 (0.98, 1.16)
>12	Reference	Reference

TABLE E-2 Results from Models Adjusting for Competing Risk

*All methods model time to revision as the primary outcome. The values are given as the hazard ratio with the 95% confidence interval in parentheses. \dagger Sample size = 49,136. \ddagger Sample size = 51,347. \$Sample size = 50,894. #Listed volumes indicate Medicare total hip replacement patients only.