

Supplementary Online Content

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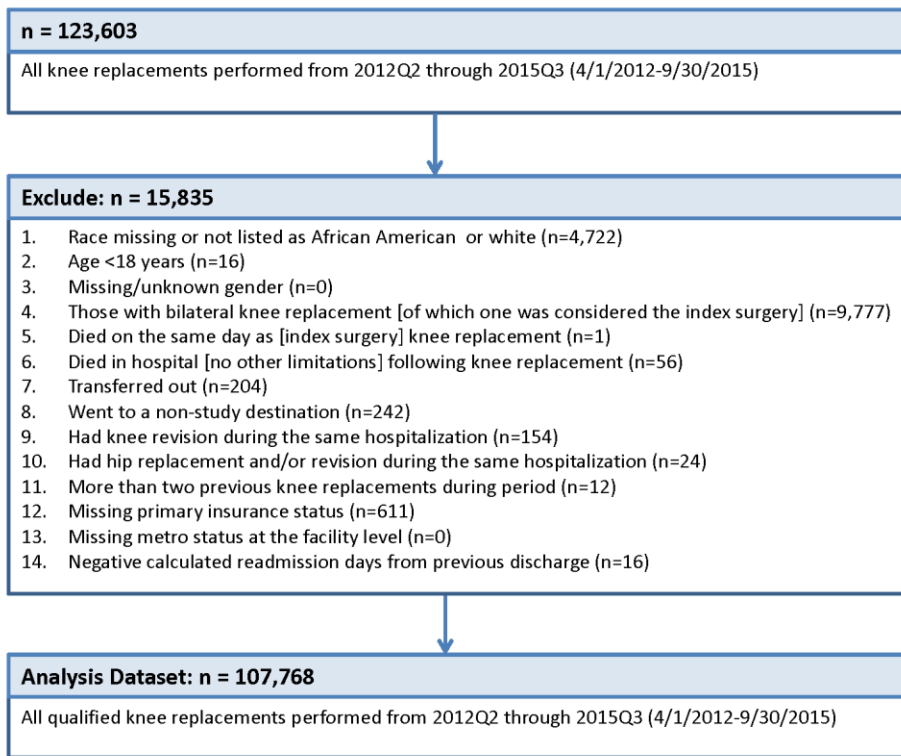
This supplementary material has been provided by the authors to give readers additional information about their work.

eTable 1. Comorbidity Definitions and Corresponding ICD-9-CM Codes

Elixhauser comorbidity	ICD-9-CM (Quan ⁴¹)	ICD-9-CM (Quan ⁴¹ + changes from AHRQ ⁴² V2.1, 3.0-3.7)
Congestive heart failure (CHF)	398.91, 402.01, 402.11, 402.91, 404.01, 404.03, 404.11, 404.13, 404.91, 404.93, 425.4-425.9, 428.x	No change
Cardiac arrhythmias	426.0, 426.13, 426.7, 426.9, 426.10, 426.12, 427.0-427.4, 427.6-427.9, 785.0, 996.01, 996.04, V45.0, V53.3	No change
Valvular disease	093.2, 394.x-397.x, 424.x, 746.3-746.6, V42.2, V43.3	No change
Pulmonary circulation disorders	415.0, 415.1, 416.x, 417.0, 417.8, 417.9	No change
Peripheral vascular disorders	093.0, 437.3, 440.x, 441.x, 443.1-443.9, 447.1, 557.1, 557.9, V43.4	Add: 442.0, 442.1, 442.2, 442.3, 442.81-442.84, 442.89, 442.9, 449.x
Hypertension (combined)	401.x (uncomplicated), 402.x-405.x (complicated)	Add: 642.00, 642.01, 642.02, 642.03, 642.04 (uncomplicated), 401.0, 437.2, 642.10-642.11, 642.13-642.14, 642.20-642.24, 642.70-642.74, 642.90-642.94 (complicated)
Paralysis	334.1, 342.x, 343.x, 344.0-344.6, 344.9	Add: 438.20-438.22, 438.30-438.32, 438.40-438.42, 438.50-438.52, 780.72
Other neurological disorders	331.9, 332.0, 332.1, 333.4, 333.5, 333.92, 334.x-335.x, 336.2, 340.x, 341.x, 345.x, 348.1, 348.3, 780.3, 784.3	Add: 330.0-330.3, 330.8-330.9, 331.0, 331.11, 331.19, 331.2-331.4, 331.7, 331.81-331.82, 331.89, 333.7, 333.85, 333.94, 338.0, 347.00, 347.01, 347.10, 347.11, 649.30-649.34, 768.7, 780.31, 780.32, 780.97 Remove: 348.1, 348.3
Chronic pulmonary disease	416.8, 416.9, 490.x-505.x, 506.4, 508.1, 508.8	No change
Diabetes, uncomplicated	250.0-250.3	Add: 249.00, 249.01, 249.10, 249.11, 249.20, 249.21, 249.30, 249.31
Diabetes, complicated	250.4-250.9	Add: 249.40, 249.41, 249.50, 249.51, 249.60, 249.61, 249.70, 249.71, 249.80, 249.81, 249.90, 249.91
Hypothyroidism	240.9, 243.x, 244.x, 246.1, 246.8	No change
Renal failure	403.01, 403.11, 403.91, 404.02, 404.03, 404.13, 404.92, 404.93, 585.x, 586.x, 588.0, V42.0, V45.1, V56.x	No change
Liver disease	070.22, 070.23, 070.32, 070.33, 070.44, 070.54, 070.6, 070.9, 456.0-456.2, 570.x, 571.x, 572.2-572.8, 573.3, 573.4, 573.8, 573.9, V42.7	Add: 573.9

Peptic ulcer disease excluding bleeding	531.7, 531.9, 532.7, 532.9, 533.7, 533.9, 534.7, 534.9	<u>Add:</u> 531.41, 531.51, 531.61, 532.41, 532.51, 532.61, 533.41, 533.51, 533.61, 534.41, 534.51, 534.61
AIDS/HIV	042.x-044.x	No change
Lymphoma	200.x-202.x, 203.0, 238.6	<u>Add:</u> 203.12, 203.82
Metastatic cancer	196.x-199.x	<u>Add:</u> 209.70-209.75, 209.79, 789.51
Solid tumor without metastasis	140.x-172.x, 174.x-195.x	<u>Add:</u> 209.00-209.03, 209.10-209.17, 209.20-209.27, 209.29, 209.30-209.36, 258.01-258.03
Rheumatoid arthritis / collagen vascular diseases	446.x, 701.0, 710.0-710.4, 710.8, 710.9, 711.2, 714.x, 719.3, 720.x, 725.x, 728.5, 728.89, 729.30	No change
Coagulopathy	286.x, 287.1, 287.3-287.5	<u>Add:</u> 289.84, 649.30-649.34
Obesity	278.0	<u>Add:</u> V85.3, V85.4, 649.10-649.14, 793.91, V85.54
Weight loss	260.x-263.x, 783.2, 799.4	No change
Fluid and electrolyte disorders	253.6, 276.x	No change
Blood loss anemia	280.0	<u>Add:</u> 648.20-648.24
Deficiency anemia	280.1-280.9, 281.x	<u>Add:</u> 285.21, 285.22, 285.29
Alcohol abuse	265.2, 291.1-291.3, 291.5-291.9, 303.0, 303.9, 305.0, 357.5, 425.5, 535.3, 571.0-571.3, 980.x, V11.3	<u>Add:</u> 291.0 <u>Remove:</u> V11.3
Drug abuse	292.x, 304.x, 305.2-305.9, V65.42	<u>Add:</u> 648.30-648.34
Psychoses	293.8, 295.x, 296.04, 296.14, 296.44, 296.54, 297.x, 298.x	No change
Depression	296.2, 296.3, 296.5, 300.4, 309.x, 311	No change

eFigure 1. Sample Flow Chart and Cohort Selection



Of the 4,722 excluded for race, the distribution was as follows: Asian (n=475), American Indian/Alaskan Native (n=80), Native Hawaiian/Other Pacific Islander (n=42), Two or more race groups (n=68), Other (n=2,212), Unknown (n=1,834), Missing (n=11)

eTable 2. Demographic and Clinical Characteristics by Discharge Destination Among African-American Patients

	IRF (N=602)	SNF (N=2,997)	Home Health Care (N=2,744)	Home Self- Care (N=944)	p-value
Sex, n (%) female	478 (79.4)	2,407 (80.3)	1,851 (67.5)	594 (62.9)	<0.001
Age, n (%)					
<45 years	12 (2.0)	49 (1.6)	120 (4.4)	42 (4.4)	<0.001
45-54 years	87 (14.5)	454 (15.1)	692 (25.2)	221 (23.4)	
55-64 years	218 (36.2)	914 (30.5)	1,087 (39.6)	369 (39.1)	
65-74 years	183 (30.4)	979 (32.7)	638 (23.3)	245 (26.0)	
75-84 years	82 (13.6)	531 (17.7)	192 (7.0)	64 (6.8)	
85+ years	20 (3.3)	70 (2.3)	15 (0.5)	3 (0.3)	
Insurance Type, n (%)					
Medicaid	85 (14.1)	461 (15.4)	469 (17.1)	130 (13.8)	<0.001
Medicare / Government	347 (57.6)	1,814 (60.5)	1,097 (40.0)	350 (37.1)	
Private	170 (28.2)	722 (24.1)	1,178 (42.9)	464 (49.2)	
Metro Area (facility level), n (%)	592 (98.3)	2,987 (99.7)	2,708 (98.7)	937 (99.3)	<0.001
Volume of Cases (by PAF and quarter), n (%)					
<50 / quarter	138 (22.9)	639 (21.3)	472 (17.2)	117 (12.4)	0.09
50-99 / quarter	137 (22.8)	628 (21.0)	700 (25.5)	173 (18.3)	
100+ / quarter	327 (54.3)	1,730 (57.7)	1,572 (57.3)	654 (69.3)	
Complications, n (%)					
Venous thromboembolism (VTE)	7 (1.2)	38 (1.3)	24 (0.9)	3 (0.3)	0.14
Postoperative myocardial infarction (MI)	0 (0.0)	1 (<0.1)	0 (0.0)	0 (0.0)	n/a
Prosthetic device complication	0 (0.0)	1 (<0.1)	7 (0.3)	1 (0.1)	n/a
Surgical wound infection	1 (0.2)	0 (0.0)	3 (0.1)	0 (0.0)	n/a
Comorbidities, n (%)					
Congestive heart failure (CHF)	51 (8.5)	197 (6.6)	79 (2.9)	25 (2.6)	<0.001
Cardiac arrhythmias	86 (14.3)	418 (13.9)	249 (9.1)	72 (7.6)	<0.001
Valvular disease	19 (3.2)	113 (3.8)	62 (2.3)	23 (2.4)	0.002
Pulmonary circulation disorders	11 (1.8)	64 (2.1)	40 (1.5)	3 (0.3)	0.002
Peripheral vascular disorders	16 (2.7)	87 (2.9)	35 (1.3)	11 (1.2)	<0.001
Hypertension (combined)	442 (73.4)	2,218 (74.0)	1,936 (70.6)	650 (68.9)	0.004
Paralysis	9 (1.5)	12 (0.4)	3 (0.1)	1 (0.1)	<0.001
Other neurological disorders	26 (4.3)	118 (3.9)	64 (2.3)	19 (2.0)	0.001
Chronic pulmonary disease	142 (23.6)	795 (26.5)	603 (22.0)	162 (17.2)	<0.001
Diabetes, uncomplicated	185 (30.7)	935 (31.2)	656 (23.9)	200 (21.2)	<0.001
Diabetes, complicated	34 (5.6)	111 (3.7)	57 (2.1)	21 (2.2)	<0.001
Hypothyroidism	71 (11.8)	331 (11.0)	249 (9.1)	78 (8.3)	0.002
Renal failure	66 (11.0)	328 (10.9)	147 (5.4)	45 (4.8)	<0.001
Liver disease	13 (2.2)	77 (2.6)	60 (2.2)	17 (1.8)	0.70
Peptic ulcer disease excluding bleeding	4 (0.7)	20 (0.7)	9 (0.3)	1 (0.1)	0.07
AIDS/HIV	1 (0.2)	7 (0.2)	8 (0.3)	4 (0.4)	0.56
Lymphoma	2 (0.3)	12 (0.4)	5 (0.2)	2 (0.2)	0.60
Metastatic cancer	0 (0.0)	2 (0.1)	4 (0.1)	0 (0.0)	n/a
Solid tumor (without metastasis)	2 (0.3)	9 (0.3)	13 (0.5)	2 (0.2)	0.67
Rheumatoid arthritis/collagen vascular diseases	43 (7.1)	184 (6.1)	130 (4.7)	33 (3.5)	<0.001
Coagulopathy	17 (2.8)	61 (2.0)	41 (1.5)	10 (1.1)	0.04
Obesity	300 (49.8)	1,323 (44.1)	981 (35.8)	318 (33.7)	0.003
Weight loss	2 (0.3)	3 (0.1)	5 (0.2)	0 (0.0)	<0.001
Fluid and electrolyte disorders	64 (10.6)	279 (9.3)	183 (6.7)	46 (4.9)	0.003
Blood loss anemia	4 (0.7)	32 (1.1)	23 (0.8)	7 (0.7)	0.57
Deficiency anemia	24 (4.0)	95 (3.2)	83 (3.0)	19 (2.0)	0.23

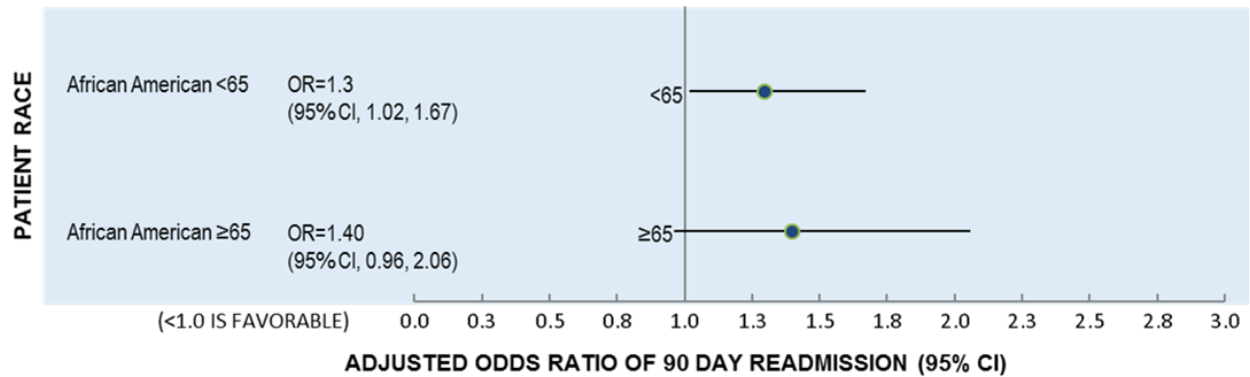
Alcohol abuse	12 (2.0)	53 (1.8)	36 (1.3)	13 (1.4)	0.26
Drug abuse	11 (1.8)	68 (2.3)	62 (2.3)	23 (2.4)	0.93
Psychoses	2 (0.3)	54 (1.8)	29 (1.1)	8 (0.8)	0.002
Depression	82 (13.6)	411 (13.7)	378 (13.8)	93 (9.9)	0.007
* Uses Wald Chi-Square from unadjusted logistic / multinomial models AND accounts for the clustering by Pennsylvania Area Facility.					

eTable 3. Demographic and Clinical Characteristics by Discharge Destination Among White Patients

	IRF (N=7,780)	SNF (N=20,173)	Home Health Care (N=49,928)	Home Self- Care (N=22,600)	p-value
Sex, n (%) female	5,401 (69.4)	14,719 (73.0)	30,122 (60.3)	12,800 (56.6)	<0.001
Age, n (%)					
<45 years	40 (0.5)	79 (0.4)	812 (1.6)	439 (1.9)	<0.001
45-54 years	379 (4.9)	979 (4.9)	6,118 (12.3)	2,995 (13.3)	
55-64 years	1,401 (18.0)	3,623 (18.0)	17,003 (34.1)	8,287 (36.7)	
65-74 years	2,619 (33.7)	7,068 (35.0)	17,988 (36.0)	7,876 (34.8)	
75-84 years	2,459 (31.6)	7,058 (35.0)	7,428 (14.9)	2,815 (12.5)	
85+ years	882 (11.3)	1,366 (6.8)	579 (1.2)	188 (0.8)	
Insurance Type, n (%)					
Medicaid	156 (2.0)	490 (2.4)	1,440 (2.9)	599 (2.7)	<0.001
Medicare / Government	6,169 (79.3)	15,079 (74.7)	25,305 (50.7)	10,475 (46.3)	
Private	1,455 (18.7)	4,604 (22.8)	23,183 (46.4)	11,526 (51.0)	
Metro Area (facility level), n (%)	6,625 (85.2)	18,965 (94.0)	46,881 (93.9)	19,952 (88.3)	0.001
Volume of Cases (by PAF and quarter), n (%)					
<50 / quarter	2,174 (27.9)	3,625 (18.0)	7,574 (15.2)	2,747 (12.2)	<0.001
50-99 / quarter	2,276 (29.3)	5,336 (26.5)	14,263 (28.6)	5,796 (25.6)	
100+ / quarter	3,330 (42.8)	11,212 (55.6)	28,091 (56.3)	14,057 (62.2)	
Complications, n (%)					
Venous thromboembolism (VTE)	86 (1.1)	217 (1.1)	349 (0.7)	102 (0.5)	<0.001
Postoperative myocardial infarction (MI)	13 (0.2)	15 (0.1)	9 (<0.1)	4 (<0.1)	<0.001
Prosthetic device complication	12 (0.2)	14 (0.1)	47 (0.1)	17 (0.1)	0.24
Surgical wound infection	24 (0.3)	61 (0.3)	71 (0.1)	33 (0.1)	<0.001
Comorbidities, n (%)					
Congestive heart failure (CHF)	429 (5.5)	1,060 (5.3)	1,071 (2.1)	435 (1.9)	<0.001
Cardiac arrhythmias	1,392 (17.9)	3,722 (18.5)	5,583 (11.2)	2,383 (10.5)	<0.001
Valvular disease	456 (5.9)	1,265 (6.3)	1,758 (3.5)	659 (2.9)	<0.001
Pulmonary circulation disorders	168 (2.2)	412 (2.0)	482 (1.0)	134 (0.6)	<0.001
Peripheral vascular disorders	306 (3.9)	659 (3.3)	1,024 (2.1)	335 (1.5)	<0.001
Hypertension (combined)	5,273 (67.8)	13,847 (68.6)	31,640 (63.4)	13,911 (61.6)	<0.001
Paralysis	79 (1.0)	72 (0.4)	45 (0.1)	18 (0.1)	<0.001
Other neurological disorders	554 (7.1)	1,143 (5.7)	1,673 (3.4)	773 (3.4)	<0.001
Chronic pulmonary disease	1,493 (19.2)	3,836 (19.0)	7,344 (14.7)	3,149 (13.9)	<0.001
Diabetes, uncomplicated	1,948 (25.0)	4,855 (24.1)	9,095 (18.2)	3,740 (16.5)	<0.001
Diabetes, complicated	290 (3.7)	598 (3.0)	733 (1.5)	330 (1.5)	<0.001
Hypothyroidism	1,851 (23.8)	4,649 (23.0)	8,673 (17.4)	3,648 (16.1)	<0.001
Renal failure	720 (9.3)	1,614 (8.0)	1,822 (3.6)	756 (3.3)	<0.001
Liver disease	93 (1.2)	251 (1.2)	578 (1.2)	272 (1.2)	0.90
Peptic ulcer disease excluding bleeding	34 (0.4)	118 (0.6)	204 (0.4)	91 (0.4)	0.01
AIDS/HIV	1 (<0.1)	2 (<0.1)	4 (<0.1)	0 (<0.1)	<0.001
Lymphoma	22 (0.3)	72 (0.4)	100 (0.2)	39 (0.2)	<0.001
Metastatic cancer	10 (0.1)	22 (0.1)	24 (<0.1)	13 (0.1)	0.002
Solid tumor (without metastasis)	47 (0.6)	117 (0.6)	197 (0.4)	90 (0.4)	0.002
Rheumatoid arthritis/collagen vascular diseases	371 (4.8)	988 (4.9)	1,931 (3.9)	901 (4.0)	<0.001
Coagulopathy	184 (2.4)	540 (2.7)	849 (1.7)	414 (1.8)	<0.001
Obesity	2,293 (29.5)	5,564 (27.6)	12,681 (25.4)	5,795 (25.6)	0.005
Weight loss	17 (0.2)	71 (0.4)	53 (0.1)	15 (0.1)	<0.001
Fluid and electrolyte disorders	806 (10.4)	2,297 (11.4)	3,561 (7.1)	1,664 (7.4)	<0.001
Blood loss anemia	100 (1.3)	259 (1.3)	441 (0.9)	123 (0.5)	<0.001
Deficiency anemia	257 (3.3)	507 (2.5)	789 (1.6)	315 (1.4)	<0.001

Alcohol abuse	55 (0.7)	215 (1.1)	444 (0.9)	190 (0.8)	0.13
Drug abuse	77 (1.0)	194 (1.0)	321 (0.6)	117 (0.5)	<0.001
Psychoses	84 (1.1)	204 (1.0)	137 (0.3)	56 (0.2)	<0.001
Depression	1,446 (18.6)	3,934 (19.5)	8,086 (16.2)	3,396 (15.0)	<0.001
* Uses Wald Chi-Square from unadjusted logistic / multinomial models AND accounts for the clustering by Pennsylvania Area Facility.					

eFigure 2. Adjusted Association of Race/Ethnicity With 90-Day Hospital Readmission



X-axis shows the adjusted odds ratios [OR] of the association of race with 90-day hospital readmission after knee replacement surgery in African-Americans compared to white patients (reference category); the Y-axis shows each of the two age categories of African-Americans (<65 and ≥65 year groups).

The point estimate is shown with a solid circle and the 95% confidence intervals with horizontal lines. A vertical line for adjusted odds ratio passes through 1.0, indicating no statistical significance. Compared to white, African-American race was not associated with the risk of 90-day hospital readmission in ≥65 year group, but was significantly associated with higher odds of 90-day hospital readmission in <65 age group.

Variables adjusted in the model:

For these models with 90-day readmission as outcome, we included all of the potential covariates (age, gender, insurance type, comorbidities, metro area location, hospital annual TKA volume, complications) from the corresponding descriptive tables except for the following that had a p-value >0.10:

- (1) <65 years: Female (p=0.11), metro area location (p=0.50), volume of cases by quarter (p=0.25), postop MI (p=0.16), valvular disease (p=0.52), hypothyroid (p=0.77), peptic ulcer disease (p=0.72)
- (2) ≥65 years: volume of cases by quarter (p=0.98), prosthetic device complication (p=0.89), hypertension (p=0.13), hypothyroid (p=0.36), solid tumor without metastasis (p=0.36)