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Appendix 1. Surgical indication for patients undergoing total hip arthroplasty

Surgical indication	n
Osteoarthritis	3030
Post-traumatic arthritis	25
Rheumatoid Arthritis	14
Other inflammatory condition	6
Avascular Necrosis	166
Dysplasia	134
Perthes	13
Hardware failure	8
Other	8
Missing	115
Total	3,519

Orthopaedic Minimal Data Set Episode of Care (OME)

Appendix 2. Baseline characteristics of the included cohort vs. that lost to one-year patient-reported outcomes follow-up.

Variable	Level	Cohort with Year 1 PROMS (N=3,625)	Lost to FU (N=1,046)	p- value	N
Age, Median [25th;75th]		66.0 [58.0;72.0]	61.0 [53.0;70.0]	<0.001	4671
Sex, N (%)	Female	2104 (58.0%)	562 (53.7%)	0.014	4671
	Male	1521 (42.0%)	484 (46.3%)		
Race, N (%)	Nonwhite	413 (12.4%)	231 (23.5%)	<0.001	4325
	White	2929 (87.6%)	752 (76.5%)		
BMI, Median [25th;75th]		29.0 [25.4;33.6]	29.8 [25.7;34.4]	0.010	4668
Years of Education, Median [25th;75th]		14.0 [12.0;16.0]	13.0 [12.0;16.0]	<0.001	4670
Smoking Status, N (%)	Never	1921 (53.0%)	476 (45.5%)	<0.001	4670
	Quit	1407 (38.8%)	371 (35.5%)		
	Current	296 (8.17%)	199 (19.0%)		
CCI, N (%)	0	2162 (59.7%)	612 (58.7%)	0.099	4667
	1	660 (18.2%)	223 (21.4%)		
	2	385 (10.6%)	98 (9.40%)		
	3+	417 (11.5%)	110 (10.5%)		
Approach, N (%)	Anterior	1145 (31.6%)	328 (31.4%)	0.087	4671
	Lateral/Anterolateral	884 (24.4%)	239 (22.8%)		
	Posterolateral	1509 (41.6%)	465 (44.5%)		
	Other	87 (2.40%)	14 (1.34%)		
Indication, N (%)	Osteoarthritis	3211 (88.6%)	879 (84.0%)	<0.001	4671
	Non-OA	414 (11.4%)	167 (16.0%)		
Femoral fixation, N (%)	Cemented	95 (2.62%)	27 (2.58%)	1.000	4671
	Uncemented	3530 (97.4%)	1019 (97.4%)		
Femoral fixation type, N (%)	Taper	2692 (76.3%)	744 (73.0%)	0.037	4549
	Anatomic/Other	838 (23.7%)	275 (27.0%)		
Femoral stem offset, N (%)	Standard	710 (63.6%)	209 (64.3%)	0.857	1442
	High	407 (36.4%)	116 (35.7%)		
Femoral head size, N (%)	22	10 (0.28%)	5 (0.48%)	.	4671
	28	112 (3.09%)	49 (4.68%)		
	32	1289 (35.6%)	366 (35.0%)		
	36	2119 (58.5%)	582 (55.6%)		
	40	84 (2.32%)	41 (3.92%)		

Femoral head type, N (%)	Other	11 (0.30%)	3 (0.29%)	0.024	4592
	Metal	169 (4.73%)	62 (6.08%)		
	Ceramic	3324 (93.1%)	924 (90.6%)		
Acetabular fixation, N (%)	Other	79 (2.21%)	34 (3.33%)	0.789	4671
	Cemented	15 (0.41%)	5 (0.48%)		
	Uncemented	3610 (99.6%)	1041 (99.5%)		
Acetabular socket size, Median [25th;75th]		52.0 [50.0;56.0]	52.0 [50.0;56.0]	0.853	4671
Acetabular liner material, N (%)	Other	111 (3.11%)	46 (4.51%)	0.038	4592
	Polyethylene	3461 (96.9%)	974 (95.5%)		
Acetabular liner type, N (%)	Unconstrained	2760 (76.1%)	785 (75.0%)	<0.001	4671
	Lipped/face changing	613 (16.9%)	148 (14.1%)		
	Other	252 (6.95%)	113 (10.8%)		
Baseline HOOS Pain, Median [25th;75th]		35.0 [25.0;45.0]	30.0 [20.0;42.5]	<0.001	4669
Baseline HOOS-PS, Median [25th;75th]		49.2 [38.4;62.3]	44.1 [32.1;58.3]	<0.001	4662
Baseline UCLA, Median [25th;75th]		4.00 [2.00;5.00]	3.00 [2.00;4.00]	<0.001	4668
Baseline VR-12 PCS, Median [25th;75th]		25.2 [20.4;31.9]	24.3 [19.7;29.9]	<0.001	4669
Baseline VR-12 MCS, Median [25th;75th]		51.0 [40.6;60.1]	45.4 [35.0;56.3]	<0.001	4669

BMI: Body mass index; CCI: Charlson comorbidity index; HOOS: Hip disability and Osteoarthritis Outcome Score; VR: veteran rand; MCS: Mental composite score; MCID: minimal clinically important difference; PASS: patient-acceptable symptomatic state; SCB: substantial clinical benefit; OR: odds ratio; CI: confidence interval.

Appendix 3. Thresholds for a significant clinical 1-year improvement (MCID), patient acceptable symptomatic state (PASS) and substantial clinical benefit (SCB) for each patient reported outcome measure (PROM) of interest.

PROM	Point change for MCID	Point change for SCB
HOOS-PAIN	10	36
HOOS-PS	10	-

Appendix 4. Distribution of baseline determinants among patients who attained vs. did not attain a minimal clinically important difference in HOOS Pain

Variable	Level	Did not achieve MCID (n=111)	Improved by MCID (n=3385)	p.overall	N
Age, Median [25th;75th]		63.0 [55.5;73.5]	66.0 [58.0;72.0]	0.172	3496
Sex, N (%)	Female	63 (56.8%)	1959 (57.9%)	0.891	3496
	Male	48 (43.2%)	1426 (42.1%)		
Race, N (%)	Nonwhite	23 (21.7%)	377 (12.1%)	0.005	3219
	White	83 (78.3%)	2736 (87.9%)		
BMI, Median [25th;75th]		28.4 [25.5;32.6]	29.0 [25.4;33.6]	0.621	3494
Years of Education, Median [25th;75th]		14.0 [12.0;16.0]	14.0 [12.0;16.0]	0.247	3495
Smoking Status, N (%)	Never	51 (45.9%)	1800 (53.2%)	0.042	3495
	Quit	44 (39.6%)	1311 (38.7%)		
	Current	16 (14.4%)	273 (8.07%)		
CCI, N (%)	0	55 (49.5%)	2036 (60.2%)	0.102	3495
	1	24 (21.6%)	608 (18.0%)		
	2	13 (11.7%)	360 (10.6%)		
	3+	19 (17.1%)	380 (11.2%)		
Approach, N (%)	Anterior	25 (22.5%)	1077 (31.8%)	0.009	3496
	Lateral/Anterolateral	41 (36.9%)	811 (24.0%)		
	Posterolateral	41 (36.9%)	1417 (41.9%)		
	Other	4 (3.60%)	80 (2.36%)		
Indication, N (%)	Osteoarthritis	99 (89.2%)	3000 (88.6%)	0.975	3496
	Non-OA	12 (10.8%)	385 (11.4%)		
Femoral fixation, N (%)	Cemented	2 (1.80%)	86 (2.54%)	1.000	3496
	Uncemented	109 (98.2%)	3299 (97.5%)		
Femoral fixation type, N (%)	Taper	75 (68.8%)	2525 (76.5%)	0.080	3408
	Anatomic/Other	34 (31.2%)	774 (23.5%)		
Femoral stem offset, N (%)	Standard	18 (56.2%)	672 (63.8%)	0.495	1086
	High	14 (43.8%)	382 (36.2%)		
Femoral head size, N (%)	22	0 (0.00%)	9 (0.27%)	0.457	3496
	28	5 (4.50%)	101 (2.98%)		
	32	36 (32.4%)	1209 (35.7%)		
	36	68 (61.3%)	1977 (58.4%)		

	40	1 (0.90%)	79 (2.33%)		
	Other	1 (0.90%)	10 (0.30%)		
Femoral head type, N (%)	Metal	4 (3.60%)	156 (4.67%)	0.953	3448
	Ceramic	105 (94.6%)	3105 (93.0%)		
	Other	2 (1.80%)	76 (2.28%)		
Acetabular fixation, N (%)	Cemented	1 (0.90%)	13 (0.38%)	0.364	3496
	Uncemented	110 (99.1%)	3372 (99.6%)		
Acetabular socket size, Median [25th;75th]		52.0 [50.0;56.0]	52.0 [50.0;56.0]	0.892	3496
Acetabular liner material, N (%)	Other	3 (2.70%)	107 (3.21%)	1.000	3448
	Polyethylene	108 (97.3%)	3230 (96.8%)		
Acetabular liner type, N (%)	Unconstrained	82 (73.9%)	2580 (76.2%)	0.655	3496
	Lipped/face changing	19 (17.1%)	575 (17.0%)		
	Other	10 (9.01%)	230 (6.79%)		
Baseline HOOS Pain, Median [25th;75th]		47.5 [40.0;65.0]	35.0 [25.0;45.0]	<0.001	3496
Baseline HOOS-PS, Median [25th;75th]		58.3 [49.2;76.6]	49.2 [38.4;62.3]	<0.001	3489
Baseline UCLA, Median [25th;75th]		4.00 [3.00;5.00]	4.00 [2.00;5.00]	0.271	3494
Baseline VR-12 PCS, Median [25th;75th]		28.8 [22.9;37.9]	25.2 [20.4;31.8]	<0.001	3495
Baseline VR-12 MCS, Median [25th;75th]		47.8 [40.3;57.4]	51.1 [40.8;60.3]	0.048	3495

BMI: Body mass index; CCI: Charlson comorbidity index; HOOS: Hip disability and Osteoarthritis Outcome Score; VR: veteran rand; MCS: Mental composite score; MCID: minimal clinically important difference; PASS: patient-acceptable symptomatic state; SCB: substantial clinical benefit; OR: odds ratio; CI: confidence interval.

Appendix 5. Distribution of baseline determinants among patients who attained vs. did not attain a minimal clinically important difference in HOOS-PS

Variable	Level	Did not achieve MCID (n=224)	Improved by MCID (n=2919)	p.overall	N
Age, Median [25th;75th]		64.5 [58.0;72.0]	65.0 [58.0;71.0]	0.933	3143
Sex, N (%)	Female	124 (55.4%)	1662 (56.9%)	0.696	3143
	Male	100 (44.6%)	1257 (43.1%)		
Race, N (%)	Nonwhite	44 (21.3%)	312 (11.6%)	<0.001	2892
	White	163 (78.7%)	2373 (88.4%)		
BMI, Median [25th;75th]		28.9 [25.7;33.5]	28.9 [25.4;33.6]	0.968	3141
Years of Education, Median [25th;75th]		14.0 [12.0;16.0]	14.0 [12.0;16.0]	0.042	3142
Smoking Status, N (%)	Never	111 (49.6%)	1546 (53.0%)	0.288	3142
	Quit	89 (39.7%)	1141 (39.1%)		
	Current	24 (10.7%)	231 (7.92%)		
CCI, N (%)	0	124 (55.4%)	1769 (60.6%)	0.194	3142
	1	47 (21.0%)	514 (17.6%)		
	2	21 (9.38%)	315 (10.8%)		
	3+	32 (14.3%)	320 (11.0%)		
Approach, N (%)	Anterior	49 (21.9%)	965 (33.1%)	0.001	3143
	Lateral/Anterolateral	74 (33.0%)	682 (23.4%)		
	Posterolateral	94 (42.0%)	1202 (41.2%)		
	Other	7 (3.12%)	70 (2.40%)		
Indication, N (%)	Osteoarthritis	200 (89.3%)	2573 (88.1%)	0.688	3143
	Non-OA	24 (10.7%)	346 (11.9%)		
Femoral fixation, N (%)	Cemented	5 (2.23%)	73 (2.50%)	0.979	3143
	Uncemented	219 (97.8%)	2846 (97.5%)		
Femoral fixation type, N (%)	Taper	163 (74.4%)	2190 (77.0%)	0.442	3065
	Anatomic/Other	56 (25.6%)	656 (23.0%)		
Femoral stem offset, N (%)	Standard	48 (64.0%)	559 (62.7%)	0.917	967
	High	27 (36.0%)	333 (37.3%)		
Femoral head size, N (%)	22	0 (0.00%)	6 (0.21%)	0.224	3143
	28	10 (4.46%)	82 (2.81%)		
	32	70 (31.2%)	1061 (36.3%)		
	36	141 (62.9%)	1694 (58.0%)		

	40	2 (0.89%)	66 (2.26%)		
	Other	1 (0.45%)	10 (0.34%)		
Femoral head type, N (%)	Metal	8 (3.62%)	127 (4.41%)	0.857	3101
	Ceramic	208 (94.1%)	2687 (93.3%)		
	Other	5 (2.26%)	66 (2.29%)		
Acetabular fixation, N (%)	Cemented	2 (0.89%)	10 (0.34%)	0.209	3143
	Uncemented	222 (99.1%)	2909 (99.7%)		
Acetabular socket size, Median [25th;75th]		52.0 [50.0;56.0]	52.0 [50.0;56.0]	0.770	3143
Acetabular liner material, N (%)	Other	8 (3.62%)	93 (3.23%)	0.905	3101
	Polyethylene	213 (96.4%)	2787 (96.8%)		
Acetabular liner type, N (%)	Unconstrained	161 (71.9%)	2238 (76.7%)	0.227	3143
	Lipped/face changing	47 (21.0%)	487 (16.7%)		
	Other	16 (7.14%)	194 (6.65%)		
Baseline HOOS Pain, Median [25th;75th]		42.5 [30.0;57.5]	35.0 [25.0;45.0]	<0.001	3143
Baseline HOOS-PS, Median [25th;75th]		66.1 [53.9;80.0]	49.2 [38.4;58.3]	<0.001	3143
Baseline UCLA, Median [25th;75th]		4.00 [2.00;5.25]	4.00 [2.00;5.00]	0.795	3141
Baseline VR-12 PCS, Median [25th;75th]		28.7 [22.4;38.1]	25.2 [20.5;31.8]	<0.001	3142
Baseline VR-12 MCS, Median [25th;75th]		49.9 [39.1;58.4]	51.2 [41.0;60.4]	0.107	3142

BMI: Body mass index; CCI: Charlson comorbidity index; HOOS: Hip disability and Osteoarthritis Outcome Score; VR: veteran rand; MCS: Mental composite score; MCID: minimal clinically important difference; PASS: patient-acceptable symptomatic state; SCB: substantial clinical benefit; OR: odds ratio; CI: confidence interval.

Appendix 6. Distribution of baseline determinants among patients who demonstrated adequate vs. inadequate improvement in UCLA-Activity Score

Variable	Level	Adequate improvement* (n=2995)	Inadequate improvement* (n=492)	p.overall	N
Age, Median [25th;75th]		65.0 [58.0;71.0]	68.0 [60.0;75.0]	<0.001	3447
Sex, N (%)	Female	1710 (57.9%)	287 (58.3%)	0.885	3447
	Male	1245 (42.1%)	205 (41.7%)		
Race, N (%)	Nonwhite	304 (11.3%)	82 (17.3%)	<0.001	3174
	White	2396 (88.7%)	392 (82.7%)		
BMI, Median [25th;75th]		28.7 [25.2;33.2]	31.0 [26.6;35.9]	<0.001	3445
Years of Education, Median [25th;75th]		14.0 [12.0;16.0]	13.0 [12.0;16.0]	<0.001	3446
Smoking Status, N (%)	Never	1600 (54.2%)	232 (47.2%)	0.002	3446
	Quit	1131 (38.3%)	204 (41.5%)		
	Current	223 (7.55%)	56 (11.4%)		
CCI, N (%)	0	1841 (62.3%)	229 (46.5%)	<0.001	3446
	1	525 (17.8%)	98 (19.9%)		
	2	296 (10.0%)	67 (13.6%)		
	3+	292 (9.88%)	98 (19.9%)		
Approach, N (%)	Anterior	963 (32.6%)	127 (25.8%)	0.006	3447
	Lateral/Anterolateral	696 (23.6%)	139 (28.3%)		
	Posterolateral	1220 (41.3%)	218 (44.3%)		
	Other	76 (2.57%)	8 (1.63%)		
Indication, N (%)	Osteoarthritis	2632 (89.1%)	417 (84.8%)	0.007	3447
	Non-OA	323 (10.9%)	75 (15.2%)		
Femoral fixation, N (%)	Cemented	72 (2.44%)	15 (3.05%)	0.518	3447
	Uncemented	2883 (97.6%)	477 (97.0%)		
Femoral fixation type, N (%)	Taper	2235 (77.5%)	336 (70.4%)	0.001	3360
	Anatomic/Other	648 (22.5%)	141 (29.6%)		
Femoral stem offset, N (%)	Standard	575 (64.5%)	103 (58.5%)	0.159	1068
	High	317 (35.5%)	73 (41.5%)		
Femoral head size, N (%)	22	5 (0.17%)	3 (0.61%)	0.053	3447
	28	84 (2.84%)	21 (4.27%)		
	32	1065 (36.0%)	161 (32.7%)		
	36	1726 (58.4%)	292 (59.3%)		

	40	64 (2.17%)	15 (3.05%)		
	Other	11 (0.37%)	0 (0.00%)		
Femoral head type, N (%)	Metal	128 (4.39%)	29 (6.05%)	0.141	3398
	Ceramic	2729 (93.5%)	436 (91.0%)		
	Other	62 (2.12%)	14 (2.92%)		
Acetabular fixation, N (%)	Cemented	8 (0.27%)	4 (0.81%)	0.079	3447
	Uncemented	2947 (99.7%)	488 (99.2%)		
Acetabular socket size, Median [25th;75th]		52.0 [50.0;56.0]	52.0 [50.0;56.0]	0.987	3447
Acetabular liner material, N (%)	Other	93 (3.19%)	15 (3.13%)	1.000	3398
	Polyethylene	2826 (96.8%)	464 (96.9%)		
Acetabular liner type, N (%)	Unconstrained	2268 (76.8%)	354 (72.0%)	0.024	3447
	Lipped/face changing	493 (16.7%)	91 (18.5%)		
	Other	194 (6.57%)	47 (9.55%)		
Baseline HOOS Pain, Median [25th;75th]		37.5 [27.5;47.5]	32.5 [20.0;42.5]	<0.001	3446
Baseline HOOS-PS, Median [25th;75th]		49.2 [38.4;62.3]	44.1 [32.1;58.3]	<0.001	3439
Baseline UCLA, Median [25th;75th]		4.00 [2.00;6.00]	2.00 [2.00;4.00]	<0.001	3447
Baseline VR-12 PCS, Median [25th;75th]		25.7 [20.7;32.7]	22.8 [18.9;27.8]	<0.001	3446
Baseline VR-12 MCS, Median [25th;75th]		52.1 [42.2;60.9]	45.2 [34.9;54.3]	<0.001	3446

BMI: Body mass index; CCI: Charlson comorbidity index; HOOS: Hip disability and Osteoarthritis Outcome Score; VR: veteran rand; MCS: Mental composite score; MCID: minimal clinically important difference; PASS: patient-acceptable symptomatic state; SCB: substantial clinical benefit; OR: odds ratio; CI: confidence interval. *Inadequate improvement in UCLA-activity score was defined as a score ≤ 3 postoperatively indicating 1) failure to transition from a score ≤ 3 preoperatively to ≥ 4 at one year or 2) deterioration from a score of ≥ 4 preoperatively to ≤ 3 at one year.