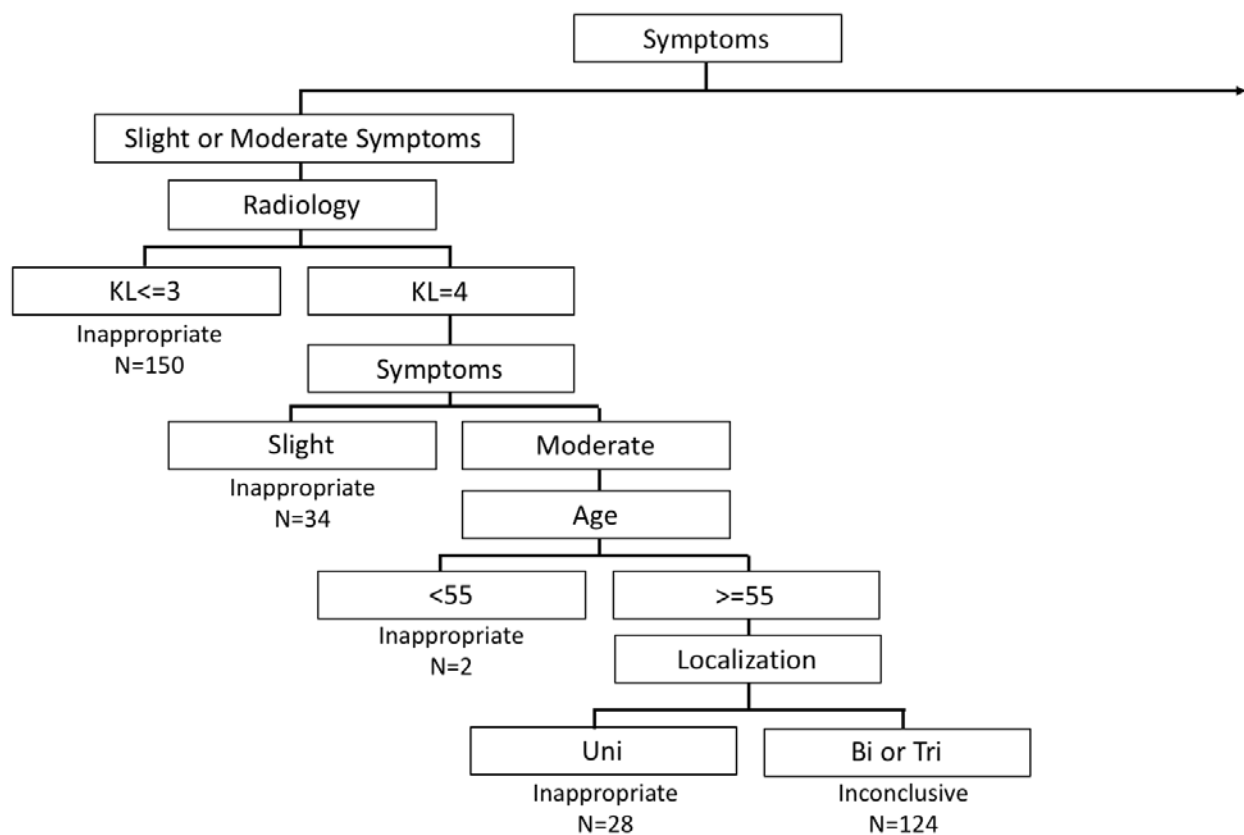
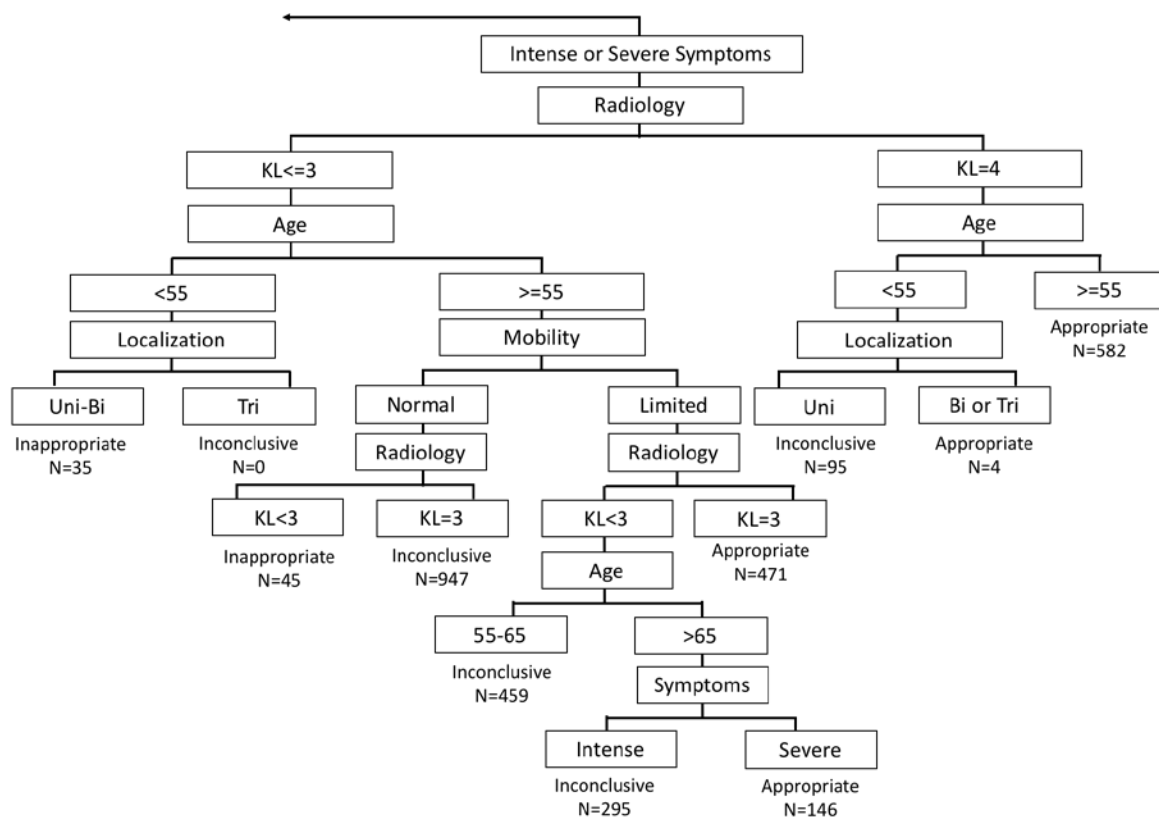


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Appendix A

The figure illustrates the left (the upper figure) and the right (the lower figure) sides of the algorithm modified from that proposed by Escobar and colleagues for classifying total knee arthroplasty procedures as appropriate, inappropriate or inconclusive. Each terminal node is classified as appropriate, inconclusive or inappropriate. The terminal nodes of each branch of the algorithm are also labeled with the number of subjects who matched the criteria for each branch in the study.





Appendix B

This appendix provides the results for our sensitivity analyses. Table 1 shows the subpopulations with different definitions/constraints of timely, premature, and potentially appropriate but not replaced. Table 2-6 show the regressions results for these subsets.

Table 1: Timely Class by Denominator

	Total	Timely (<2 yrs)	Potentially appropriate but not replaced	Premature
Consistent (2 Years)	2966	281 (9.47%)	2391 (80.61%)	294 (9.91%)
Consistent (4 Years)	2476	281 (11.35%)	1901 (76.78%)	294 (11.87%)
Appropriate cases only	1951	252 (12.92%)	1405 (72.01%)	294 (15.07%)
Surgery within a Year of prior wave	3177	258 (8.12%)	2690 (84.67%)	229 (7.21%)
Random Knee	2313	188 (8%)	1904 (82%)	221 (10%)
	Total	Timely (<4 yrs)	Potentially appropriate but not replaced	Premature
Full Cohort	3417	518 (15.16%)	2605 (76.24%)	294 (8.60%)

Table 2: Subset Consistent 2 Years: Odds Ratios from Multinomial Logistic Regression W/ Site Random Effect

	Potentially appropriate but not replaced			Premature		
	OR	95% CI	95% CI	OR	95% CI	95% CI
<u>Gender (ref=Female)</u>						
Male	1.1962	0.9082	1.5754	0.9928	0.6849	1.4392
<u>Age (ref= under 55)</u>						
56-63	1.0515	0.6775	1.632	0.5588	0.3195	0.9774
64-69	0.6509	0.4268	0.9929	0.3607	0.2098	0.62
70-75	0.9228	0.5859	1.4532	0.5467	0.31	0.9642
76+	0.8755	0.5254	1.4589	0.7702	0.4094	1.4491
<u>Race (ref=NHW)</u>						
Black	2.9218	1.9159	4.456	1.7114	0.9642	3.0378
Other/Missing	2.303	0.8042	6.5951	3.0878	0.9377	10.1681
<u>BMI (ref= <25)</u>						
25-29	1.132	0.7383	1.7356	0.339	0.2029	0.5663
30-34	1.0749	0.7017	1.6467	0.3131	0.1862	0.5267
35+	0.9543	0.6137	1.4841	0.3338	0.1933	0.5766
<u>Education (ref=HS or Less/Missing)</u>						
Some College	0.823	0.5967	1.1352	0.9284	0.5879	1.4661
College Degree	1.0491	0.7062	1.5583	1.1268	0.6574	1.9314
More than College	0.8718	0.6164	1.233	1.5359	0.9702	2.4313
<u>Charlson Score (ref=0)</u>						
1	1.0134	0.7769	1.3218	0.8076	0.5591	1.1666
Depressed	0.8602	0.6198	1.1937	0.372	0.2178	0.6351
	1.0187	1.0045	1.0331	1.0432	1.0235	1.0634
<u>SF12:Physical Function Scale Live Alone (ref=No)</u>						
Yes	1.4899	1.03	2.155	2.0827	1.3073	3.318

Table 3: Subset Consistent 4 Years: Odds Ratios from Multinomial Logistic Regression W/ Site Random Effect

	Potentially appropriate but not replaced			Premature		
	OR	95% CI	95% CI	OR	95% CI	95% CI
<u>Gender (ref=Female)</u>						
Male	1.2102	0.9134	1.6035	0.9737	0.67	1.4149
<u>Age (ref= under 55)</u>						
56-63	0.9797	0.6261	1.533	0.5639	0.3208	0.9912
64-69	0.6341	0.4123	0.9751	0.3697	0.2142	0.6383
70-75	0.8777	0.5527	1.3938	0.5573	0.3146	0.987
76+	0.8675	0.5158	1.459	0.8007	0.4234	1.5143
<u>Race (ref=NHW)</u>						
Black	2.9588	1.8718	4.6768	1.7464	0.9756	3.1262
Other/Missing	2.4197	0.8401	6.9696	3.5706	1.0823	11.78
<u>BMI (ref= <25)</u>						
25-29	1.1819	0.7629	1.8309	0.3344	0.1994	0.561
30-34	1.1554	0.7474	1.7861	0.3115	0.1848	0.525
35+	1.0353	0.6592	1.6259	0.3416	0.1974	0.591
<u>Education (ref=HS or Less/Missing)</u>						
Some College	0.8205	0.5911	1.1389	0.9769	0.6167	1.5476
College Degree	1.0286	0.6872	1.5395	1.1505	0.6686	1.9798
More than College	0.9186	0.6439	1.3105	1.6478	1.0367	2.6191
<u>Charlson Score (ref=0)</u>						
1	1.0646	0.8125	1.395	0.7839	0.5415	1.1349
Depressed	0.926	0.6641	1.2911	0.3766	0.2199	0.6451
	1.0116	0.9971	1.0262	1.0463	1.0262	1.0667
<u>SF12:Physical Function Scale Live Alone (ref=No)</u>						
Yes	1.471	1.0112	2.1398	2.0353	1.2724	3.2555

Table 4: Only Appropriate Cases: Odds Ratios from Multinomial Logistic Regression W/ Site Random Effect

	Potentially appropriate but not replaced			Premature		
	OR	95% CI	95% CI	OR	95% CI	95% CI
<u>Gender (ref=Female)</u>						
Male	1.09	0.81	1.47	0.86	0.59	1.27
<u>Age (ref= under 55)</u>						
56-63	0.93	0.53	1.65	0.37	0.19	0.71
64-69	0.54	0.32	0.92	0.18	0.10	0.34
70-75	0.95	0.54	1.65	0.31	0.16	0.59
76+	0.93	0.51	1.70	0.41	0.20	0.82
<u>Race (ref=NHW)</u>						
Black	3.23	2.00	5.21	1.82	0.97	3.39
Other/Missing	1.96	0.67	5.68	3.35	1.01	11.08
<u>BMI (ref= <25)</u>						
25-29	1.00	0.63	1.60	0.30	0.17	0.51
30-34	1.04	0.65	1.67	0.29	0.17	0.49
35+	1.21	0.73	2.01	0.39	0.22	0.71
<u>Education (ref=HS or Less/Missing)</u>						
Some College	0.79	0.55	1.14	0.90	0.55	1.47
College Degree	0.88	0.58	1.34	1.00	0.57	1.74
More than College	0.76	0.52	1.11	1.35	0.83	2.19
<u>Charlson Score (ref=0)</u>						
1	1.17	0.88	1.57	0.90	0.61	1.32
Depressed	0.81	0.56	1.16	0.33	0.19	0.58
	1.03	1.01	1.04	1.06	1.04	1.08
<u>SF12:Physical Function Scale Live Alone (ref=No)</u>						
Yes	1.00	0.67	1.51	2.29	1.39	3.77

Table 5: 4 Year Timely Surgery Version: Odds Ratios from Multinomial Logistic Regression W/ Site Random Effect

	Potentially appropriate but not replaced			Premature		
	OR	95% CI	95% CI	OR	95% CI	95% CI
<u>Gender (ref=Female)</u>						
Male	1.1834	0.9608	1.4577	0.9713	0.7037	1.3406
<u>Age (ref= under 55)</u>						
56-63	0.9735	0.6966	1.3604	0.5221	0.3235	0.8427
64-69	0.6454	0.4663	0.8934	0.3672	0.2299	0.5864
70-75	0.8345	0.5923	1.1756	0.5176	0.3205	0.836
76+	0.9886	0.6626	1.4751	0.8927	0.5193	1.5348
<u>Race (ref=NHW)</u>						
Black	2.7057	1.9914	3.6761	1.5241	0.9511	2.4423
Other/Missing	2.1385	1.016	4.501	3.1391	1.2507	7.8784
<u>BMI (ref= <25)</u>						
25-29	0.9092	0.65	1.2719	0.2943	0.1902	0.4552
30-34	0.8798	0.6279	1.2329	0.2734	0.1747	0.4279
35+	0.8083	0.5676	1.151	0.3076	0.191	0.4954
<u>Education (ref=HS or Less/Missing)</u>						
Some College	0.9626	0.7505	1.2346	1.0782	0.7198	1.615
College Degree	1.2196	0.904	1.6455	1.1937	0.7466	1.9084
More than College	0.966	0.7437	1.2547	1.5951	1.0772	2.3619
<u>Charlson Score (ref=0)</u>						
1	0.9807	0.8	1.2023	0.7893	0.5709	1.0914
Depressed	1.1517	0.8819	1.504	0.4749	0.2887	0.7814
	1.0125	1.0018	1.0234	1.0336	1.0165	1.051
SF12:Physical Function Scale						
<u>Live Alone (ref=No)</u>						
Yes	1.2002	0.9155	1.5733	1.7203	1.1687	2.5322

Table 6: Random Knee (Only 1 knee per person): Odds Ratios from Multinomial Logistic Regression W/ Site Random Effect

	Potentially appropriate but not replaced			Premature		
	OR	95% CI	95% CI	OR	95% CI	95% CI
<u>Gender (ref=Female)</u>						
Male	1.1868	0.853	1.6511	0.8388	0.5405	1.3015
<u>Age (ref= under 55)</u>						
56-63	0.8869	0.5221	1.5067	0.5326	0.2718	1.0436
64-69	0.6248	0.3731	1.0462	0.4282	0.223	0.8223
70-75	0.8865	0.5087	1.5451	0.6168	0.3109	1.2238
76+	0.8928	0.4745	1.6798	1.1476	0.5369	2.4531
<u>Race (ref=NHW)</u>						
Black	2.8939	1.6986	4.9304	1.679	0.8617	3.2712
Other/Missing	2.274	0.6857	7.5415	3.6372	0.9403	14.0686
<u>BMI (ref= <25)</u>						
25-29	0.7729	0.4449	1.3426	0.2207	0.1166	0.4178
30-34	0.7819	0.4477	1.3655	0.2287	0.1193	0.4385
35+	0.7594	0.4212	1.3694	0.2762	0.1377	0.5541
<u>Education (ref=HS or Less/Missing)</u>						
Some College	0.8619	0.5761	1.2894	0.8935	0.5215	1.5307
College Degree	1.0482	0.6527	1.6832	0.8911	0.4755	1.6699
More than College	0.9622	0.6284	1.4734	1.2457	0.7252	2.1398
<u>Charlson Score (ref=0)</u>						
1	1.0283	0.7421	1.4248	0.7458	0.4796	1.1596
Depressed	0.706	0.4754	1.0484	0.3141	0.1662	0.5937
	1.0218	1.0045	1.0395	1.0401	1.0167	1.0639
<u>SF12:Physical Function Scale Live Alone (ref=No)</u>						
Yes	1.3488	0.8593	2.1171	1.9257	1.1054	3.3548
<u>Knee Order (ref=First)</u>						
Second	3.1444	1.9413	5.0934	2.4193	1.3493	4.3377

Table 7: Subset Surgery within a Year: Odds Ratios from Multinomial Logistic Regression W/ Site Random Effect

	Potentially appropriate but not replaced			Premature		
	OR	95% CI	95% CI	OR	95% CI	95% CI
<u>Gender (ref=Female)</u>						
Male	1.0973	0.8295	1.4515	1.0062	0.6777	1.4939
<u>Age (ref= under 55)</u>						
56-63	1.0322	0.6491	1.6413	0.5713	0.3099	1.0533
64-69	0.6105	0.392	0.9507	0.3203	0.176	0.5829
70-75	0.8095	0.5072	1.2919	0.5223	0.2844	0.9592
76+	0.8769	0.5155	1.4919	0.8317	0.4227	1.6365
<u>Race (ref=NHW)</u>						
Black	2.5663	1.692	3.8924	1.5212	0.8381	2.7611
Other/Missing	4.4636	1.0532	18.9175	7.6285	1.6079	36.1915
<u>BMI (ref= <25)</u>						
25-29	1.0963	0.7106	1.6912	0.3615	0.2101	0.6221
30-34	1.1193	0.7224	1.7343	0.3447	0.1969	0.6034
35+	0.9838	0.6217	1.5567	0.3643	0.2	0.6635
<u>Education (ref=HS or Less/Missing)</u>						
Some College	0.852	0.6099	1.1902	0.9928	0.6004	1.6416
College Degree	1.0777	0.7202	1.6129	1.1905	0.6679	2.1221
More than College	0.9813	0.6844	1.4068	1.6368	0.9871	2.7142
<u>Charlson Score (ref=0)</u>						
1	0.9622	0.7321	1.2645	0.7978	0.5367	1.1859
Depressed	0.8803	0.626	1.2379	0.37	0.2056	0.6658
	1.0222	1.0074	1.0372	1.0394	1.018	1.0612
<u>SF12:Physical Function Scale Live Alone (ref=No)</u>						
Yes	1.408	0.9571	2.0714	2.1957	1.3278	3.631