

Columbus/Columbus Total Knee Investigation

Note: This analysis compares the Columbus/Columbus femoral/tibial combination with all other total knee prostheses.

This combination has been identified as having a significantly higher rate of revision. For a detailed explanation of the process used by the Registry that results in identification of prostheses that have a higher than anticipated rate of revision please refer to the Prostheses with Higher than Anticipated Rates of Revision chapter of the most recent AOANJRR Annual Report, <https://aoanjrr.sahmri.com/annual-reports-2025>.

Note: Procedures using prostheses with no recorded use in 2024 are excluded from the comparator.

TABLE 1

Revision Rate of Primary Total Knee Replacement

The revision rate of the Columbus/Columbus total knee combination is compared to all other total knee prostheses.

Table 1: Revision Rates of Primary Total Knee Replacement

Component	N Revised	N Total	Obs. Years	Revisions/100 Obs. Yrs (95% CI)
Columbus/Columbus	283	8502	37432	0.76 (0.67, 0.85)
Other Total Knee	24424	712559	4498106	0.54 (0.54, 0.55)
TOTAL	24707	721061	4535539	0.54 (0.54, 0.55)

Note: Prostheses no longer used in 2024 are excluded from the comparator.

TABLE 2

Yearly Cumulative Percent Revision of Primary Total Knee Replacement

The yearly cumulative percent revision of the Columbus/Columbus total knee combination is compared to all other total knee prostheses.

Table 2: Yearly Cumulative Percent Revision (95% CI) of Primary Total Knee Replacement

CPR	1 Yr	2 Yrs	3 Yrs	4 Yrs	5 Yrs	6 Yrs	7 Yrs	8 Yrs
Columbus/Columbus	1.2 (1.0, 1.4)	2.0 (1.7, 2.3)	2.8 (2.4, 3.2)	3.3 (2.9, 3.7)	3.8 (3.4, 4.4)	4.3 (3.8, 4.9)	4.8 (4.2, 5.5)	5.3 (4.6, 6.2)
Other Total Knee	1.0 (1.0, 1.0)	1.8 (1.8, 1.9)	2.4 (2.4, 2.4)	2.8 (2.8, 2.8)	3.1 (3.1, 3.2)	3.5 (3.4, 3.5)	3.8 (3.7, 3.8)	4.1 (4.0, 4.1)

CPR	9 Yrs	10 Yrs	11 Yrs	12 Yrs	13 Yrs	14 Yrs	15 Yrs	16 Yrs
Columbus/Columbus	5.6 (4.8, 6.6)	6.2 (5.2, 7.2)	6.3 (5.3, 7.4)	6.5 (5.5, 7.6)	7.0 (5.9, 8.4)	7.8 (6.4, 9.5)	8.5 (6.9, 10.6)	8.9 (7.2, 11.1)
Other Total Knee	4.4 (4.3, 4.5)	4.7 (4.7, 4.8)	5.0 (5.0, 5.1)	5.4 (5.3, 5.5)	5.7 (5.6, 5.8)	6.0 (5.9, 6.1)	6.4 (6.3, 6.5)	6.8 (6.7, 7.0)

CPR	17 Yrs	18 Yrs	19 Yrs	20 Yrs	21 Yrs	22 Yrs	23 Yrs
Columbus/Columbus	9.5 (7.5, 12.0)	9.5 (7.5, 12.0)					
Other Total Knee	7.2 (7.1, 7.4)	7.6 (7.4, 7.8)	7.9 (7.7, 8.0)	8.1 (7.9, 8.3)	8.3 (8.1, 8.6)	8.5 (8.2, 8.8)	8.6 (8.3, 8.9)

Note: Prostheses no longer used in 2024 are excluded from the comparator.

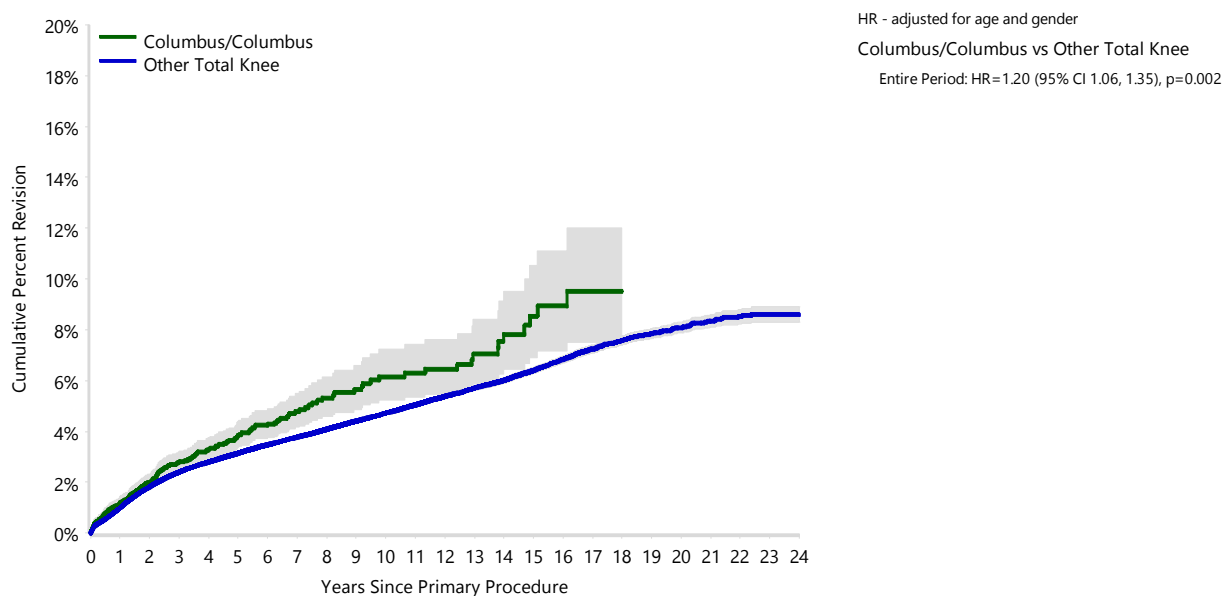
FIGURE 1

Yearly Cumulative Percent Revision of Primary Total Knee Replacement

The yearly cumulative percent revision of the Columbus/Columbus total knee combination is compared to all other total knee prostheses. In addition, hazard ratios are reported.

Hazard ratios are reported for specific time periods during which the hazard ratio is constant. This is done to enable more specific and valid comparisons of the risk of revision over time. The pattern of variation in risk has important implications with respect to the underlying reasons for any difference.

Figure 1: Cumulative Percent Revision of Primary Total Knee Replacement



Number at Risk	0 Yr	1 Yr	2 Yrs	3 Yrs	4 Yrs	5 Yrs	6 Yrs	7 Yrs	8 Yrs	9 Yrs	10 Yrs	11 Yrs
Columbus/Columbus	8502	7320	6167	5017	3879	2770	1938	1284	928	790	690	628
Other Total Knee	712559	633408	555868	493175	431446	377444	324337	275196	230549	190384	153892	123240

Number at Risk	12 Yrs	13 Yrs	14 Yrs	15 Yrs	16 Yrs	17 Yrs	18 Yrs	19 Yrs	20 Yrs	21 Yrs	22 Yrs	23 Yrs
Columbus/Columbus	543	459	342	241	165	106	64	25	0	0	0	0
Other Total Knee	97445	74762	56207	41267	29838	21117	14903	10396	6807	4051	2359	1090

Note: Prostheses no longer used in 2024 are excluded from the comparator.

TABLE 3

Primary Diagnosis for Revised Primary Total Knee Replacement

This table identifies the diagnosis of the primary procedure which was subsequently revised. This information is provided as there is a variation on outcome depending on the primary diagnosis. It is therefore important when considering the reasons for a higher than anticipated rate of revision that there is identification of the primary diagnosis. This information should be compared to the primary diagnosis for the revisions of all other total knee prostheses.

Table 3: Primary Diagnosis for Revised Primary Total Knee Replacement

Primary Diagnosis	Columbus/Columbus		Other Total Knee	
	Number	Percent	Number	Percent
Osteoarthritis	276	97.5	23614	96.7
Rheumatoid Arthritis	2	0.7	299	1.2
Tumour			192	0.8
Other Inflammatory Arthritis	4	1.4	154	0.6
Osteonecrosis	1	0.4	89	0.4
Fracture			50	0.2
Other			25	0.1
Chondrocalcinosis			1	0.0
TOTAL	283	100.0	24424	100.0

Note: Prostheses no longer used in 2024 are excluded from the comparator.

TABLE 4

Reasons for Revision

This is reported in two ways: a percentage of primary procedures revised and as a percentage of all revision procedures.

% Primaries Revised: This shows the proportional contribution of each revision diagnosis as a percentage of the total number of primary procedures. This percentage can be used to approximate the risk of being revised for that diagnosis. Differing percentages between groups, with the same distribution of follow up time, may identify problems of concern.

% Revisions: The number of revisions for each diagnosis is expressed as a percentage of the total number of revisions. This shows the distribution of reasons for revision within a group but cannot be used as a comparison between groups.

Table 4: Primary Total Knee Replacement - Reason for Revision (Follow-up Limited to 19.5 Years)

Revision Diagnosis	Columbus/Columbus			Other Total Knee		
	Number	% Primaries Revised	% Revisions	Number	% Primaries Revised	% Revisions
Infection	104	1.2	36.7	6983	1.0	28.6
Loosening	53	0.6	18.7	5196	0.7	21.3
Instability	39	0.5	13.8	2497	0.4	10.2
Patella Erosion	15	0.2	5.3	1799	0.3	7.4
Pain	12	0.1	4.2	1748	0.2	7.2
Patellofemoral Pain	21	0.2	7.4	1458	0.2	6.0
Arthrofibrosis	6	0.1	2.1	1041	0.1	4.3
Fracture	6	0.1	2.1	1008	0.1	4.1
Malalignment	8	0.1	2.8	480	0.1	2.0
Wear Tibial Insert	1	0.0	0.4	319	0.0	1.3
Lysis	1	0.0	0.4	262	0.0	1.1
Incorrect Sizing	4	0.0	1.4	206	0.0	0.8
Implant Breakage Tibial Insert	1	0.0	0.4	203	0.0	0.8
Patella Maltracking				175	0.0	0.7
Bearing Dislocation	1	0.0	0.4	140	0.0	0.6
Implant Breakage Patella	1	0.0	0.4	131	0.0	0.5
Metal Related Pathology	1	0.0	0.4	100	0.0	0.4
Prosthesis Dislocation				70	0.0	0.3
Synovitis	3	0.0	1.1	56	0.0	0.2
Osteonecrosis	1	0.0	0.4	45	0.0	0.2
Implant Breakage Femoral				44	0.0	0.2
Wear Patella				43	0.0	0.2
Implant Breakage Tibial				35	0.0	0.1
Tumour	1	0.0	0.4	29	0.0	0.1
Heterotopic Bone				14	0.0	0.1
Progression Of Disease				8	0.0	0.0
Wear Tibial				6	0.0	0.0
Incorrect Side				1	0.0	0.0
Patella Dislocation				1	0.0	0.0
Wear Femoral				1	0.0	0.0
Other	4	0.0	1.4	291	0.0	1.2
N Revision	283	3.3	100.0	24390	3.4	100.0
N Primary	8502			712559		

Note: This table is restricted to revisions within 19.5 years for all groups to allow a time-matched comparison of revisions.

Note: Prostheses no longer used in 2024 are excluded from the comparator.

FIGURE 2

Cumulative Incidence Revision Diagnosis of Primary Total Knee Replacement

This figure details the cumulative incidence of the most common reasons for revision. The five most common reasons for revision are included as long as each of these reasons account for more than 10 procedures or at least 5% of all revisions for the Columbus/Columbus total knee combination. A comparative graph is provided of the cumulative incidence for the same reasons for revisions for all other total knee prostheses.

Figure 2: Cumulative Incidence Revision Diagnosis for Primary Total Knee Replacement

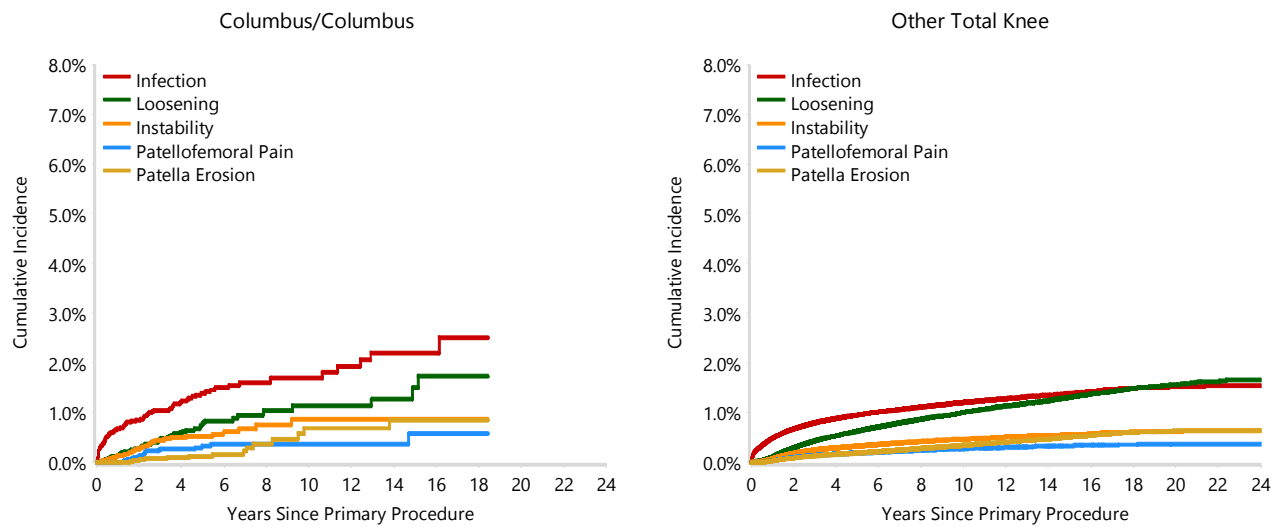


TABLE 5

Type of Revision Performed for Primary Total Knee Replacement

This analysis identifies the components used in the revision of the Columbus/Columbus total knee combination and compares it to the components used in the revision of all other total knee prostheses.

The reason this analysis is undertaken is to identify whether there is one or more components which are being replaced that differ from the components replaced for revisions of all other total knee prostheses i.e. is there a difference in the type of revision undertaken for the Columbus/Columbus total knee combination compared to all other total knee prostheses.

Table 5: Primary Total Knee Replacement - Type of Revision (Follow-up Limited to 19.5 Years)

Type of Revision	Columbus/Columbus		Other Total Knee	
	Number	Percent	Number	Percent
TKR (Tibial/Femoral)	72	25.4	5823	23.9
Tibial Component	16	5.7	1786	7.3
Femoral Component	13	4.6	1171	4.8
Cement Spacer	14	4.9	1068	4.4
Removal of Prostheses			125	0.5
Total Femoral			22	0.1
Reinsertion of Components			7	0.0
N Major	115	40.6	10002	41.0
Insert Only	105	37.1	7558	31.0
Patella Only	45	15.9	4116	16.9
Insert/Patella	17	6.0	2643	10.8
Minor Components	1	0.4	62	0.3
Cement Only			9	0.0
N Minor	168	59.4	14388	59.0
TOTAL	283	100.0	24390	100.0

Note: This table is restricted to revisions within 19.5 years for all groups to allow a time-matched comparison of revisions.

Note: Prostheses no longer used in 2024 are excluded from the comparator.

TABLE 6**Revision Rates of Columbus/Columbus Primary Total Knee Replacement by Fixation**

This analysis is provided as some prostheses have more than one fixation option. Additionally there are prostheses where an alternative to the recommended approach to fixation was used e.g. a cementless prosthesis that has been cemented or vice-versa.

Table 6: Revised Number of Columbus/Columbus Primary Total Knee Replacement by Fixation

Fixation	N Revised	N Total
Cemented	180	7711
Cementless	72	500
Hybrid (Tibial Cemented)	31	290
Hybrid (Tibial Cementless)	0	1
TOTAL	283	8502

TABLE 7**Revision Rates of Columbus/Columbus Primary Total Knee Replacement by Bearing Surface**

This analysis is provided as some prostheses are combined with a variety of bearing surfaces. All bearing surfaces used with this combination are listed.

Table 7: Revised Number of Columbus/Columbus Primary Total Knee Replacement by Bearing Surface

Bearing Surface	N Revised	N Total
Non XLPE	283	8499
Unknown	0	3
TOTAL	283	8502

TABLE 8**Revision Rates of Columbus/Columbus Primary Total Knee Replacement by Bearing Mobility**

This analysis is provided as some prostheses are combined with a variety of bearing mobilities. All bearing mobilities used with this combination are listed.

Table 8: Revised Number of Columbus/Columbus Primary Total Knee Replacement by Bearing Mobility

Bearing Mobility	N Revised	N Total
Fixed	269	8435
Rotating	14	64
Unknown	0	3
TOTAL	283	8502

TABLE 9**Revision Rates of Columbus/Columbus Primary Total Knee Replacement by Stability**

This analysis is provided as some prostheses are combined with a variety of stabilities. All stabilities used with this combination are listed.

Table 9: Revised Number of Columbus/Columbus Primary Total Knee Replacement by Stability

Stability	N Revised	N Total
Fully Stabilised	0	2
Minimally Stabilised	281	8445
Posterior Stabilised	2	52
Unknown	0	3
TOTAL	283	8502

TABLE 10**Number of Revisions of Columbus/Columbus Primary Total Knee Replacement by Year of Implant**

This analysis details the number of prostheses reported each year to the Registry for the Columbus/Columbus total knee combination. It also provides the subsequent number of revisions of the primaries reported in that year.

Primary procedures performed in later years have had less follow up time therefore the number revised is expected to be less than the number revised in earlier years. For example, a primary procedure performed in 2024 has a maximum of one year to be revised, whereas a primary procedure performed in 2022 has a maximum of three years to be revised.

Table 10: Number of Revisions of Columbus/Columbus Primary Total Knee Replacement by Year of Implant

Year of Implant	Number Revised	Total Number
2005	4	49
2006	13	91
2007	13	90
2008	20	148
2009	24	156
2010	12	135
2011	12	135
2012	11	108
2013	3	69
2014	0	36
2015	0	60
2016	5	118
2017	12	358
2018	18	670
2019	28	828
2020	28	1115
2021	31	1105
2022	20	1080
2023	18	1084
2024	11	1067
TOTAL	283	8502