

Australian Orthopaedic Association National Joint Replacement Registry

2025 SUPPLEMENTARY REPORT

Cement in Hip and Knee Arthroplasty



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Cement in Hip and Knee Arthroplasty

2025 Supplementary Report

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Joint Replacement Registry**

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Summary

This supplementary report provides information on the use of cement in primary total hip and primary total knee replacement. The trends in use over time and the revision rates for antibiotic cement and plain cement are provided.

The use of antibiotic cement has increased over time. In 2024, 100.0% of cemented total conventional hip replacements and 99.9% of cemented total knee replacements used antibiotic cement.

In primary total conventional hip replacement, antibiotic cement has a higher rate of revision in the first 6 months and a lower rate after this time compared to plain cement (Table C6 and Figure C3). The cumulative incidence of the 5 most common revision diagnoses for both types of cement is shown in Figure C4. A further figure is shown for the cumulative incidence of these diagnoses by three time periods 2003-2009, 2010-2015 and 2016-2024 (Figure C5). When revision for infection is analysed, antibiotic cement has a higher rate of revision in the first 3 months and a lower rate of revision for infection after this time compared to plain cement (Table C8 and Figure C6).

In primary total knee replacement, antibiotic cement has a lower rate of revision compared to plain cement (Table C16 and Figure C9). The cumulative incidence of the 5 most common revision diagnoses for both types of cement is shown in Figure C10. A further figure is shown for the cumulative incidence of these diagnoses by three time periods 2003-2009, 2010-2015 and 2016-2024 (Figure C11). There is no difference between cement types in the rate of revision for infection (Table C18 and Figure C12).

Hip Replacement

CEMENT TRENDS IN HIP REPLACEMENT

Table C1 10 Most Used Cement Types for Femoral Prosthesis in Primary Hip Replacement

2003		2021		2022		2023		2024	
N	Model	N	Model	N	Model	N	Model	N	Model
3225	Simplex P	13509	Simplex Tobra*	13425	Simplex Tobra*	14249	Simplex Tobra*	13303	Simplex Tobra*
3061	Antibiotic Simplex*	3042	Palacos R+G Pro*	3333	Palacos R+G Pro*	3720	Palacos R+G Pro*	3784	Palacos R+G Pro*
2394	Simplex Tobra*	2505	Palacos MV+G*	2682	Palacos MV+G*	3167	Palacos MV+G*	3383	Palacos MV+G*
672	CMW 1 G*	1596	Palacos R+G*	1355	Palacos R+G*	1777	Palacos R+G*	1890	Palacos R+G*
583	CMW 1 Plain	469	Palacos MV+G Pro*	744	Palacos MV+G Pro*	666	Palacos MV+G Pro*	875	Palacos MV+G Pro*
438	Palacos R*	344	Cemex System GENTA FAST*	351	Cemex System GENTA FAST*	609	Palacos Fast R+G*	828	Palacos Fast R+G*
369	CMW 3 G*	259	Simplex P	290	Palacos Fast R+G*	363	Cemex System GENTA FAST*	321	Cemex System GENTA FAST*
147	Palacos E*	224	Palacos Fast R+G*	223	Simplex P	279	Simplex HV*	282	Simplex HV*
139	Palamed G*	193	Simplex HV*	221	Simplex HV*	260	Simplex P	176	Simplex P
132	CMW 3 Plain	145	Refobacin Plus*	129	Refobacin Plus*	185	Copal G+C*	165	Copal G+C*
10 Most Used									
11160	(10) 93.5%	22286	(10) 98.2%	22753	(10) 98.3%	25275	(10) 98.4%	25007	(10) 98.6%
Remainder									
771	(19) 6.5%	408	(15) 1.8%	405	(15) 1.7%	409	(14) 1.6%	364	(17) 1.4%
TOTAL									
11931	(29) 100.0%	22694	(25) 100.0%	23158	(25) 100.0%	25684	(24) 100.0%	25371	(27) 100.0%

Note: *denotes antibiotic cement

More than one cement type was used in some procedures

Table C2 10 Most Used Cement Types for Acetabular Prosthesis in Primary Hip Replacement

2003		2021		2022		2023		2024	
N	Model	N	Model	N	Model	N	Model	N	Model
470	Simplex Tobra*	398	Simplex Tobra*	327	Simplex Tobra*	327	Simplex Tobra*	236	Simplex Tobra*
409	CMW 1 Plain	196	Palacos R+G*	192	Palacos R+G*	258	Palacos R+G*	211	Palacos R+G*
315	Simplex P	113	Palacos Fast R+G*	131	Palacos Fast R+G*	118	Palacos Fast R+G*	131	Palacos Fast R+G*
275	Antibiotic Simplex*	77	CMW 2 G*	55	Palacos MV+G*	53	Palacos MV+G*	51	Palacos MV+G*
265	CMW 1 G*	58	Palacos MV+G*	53	CMW 2 G*	48	CMW 2 G*	35	CMW 2 G*
245	Palacos R*	37	Simplex HV*	47	Simplex HV*	25	Copal G+V*	28	Simplex HV*
183	CMW 2 G*	22	Copal G+V*	26	Copal G+V*	23	Simplex HV*	27	Copal G+V*
102	CMW 2 Plain	21	Palacos R+G Pro*	22	Palacos R+G Pro*	16	Palacos R+G Pro*	14	Copal G+C*
80	Palamed G*	8	CMW 2	11	Copal G+C*	9	Copal G+C*	11	Palacos R+G Pro*
33	Refobacin Plus*	7	Copal G+C*	5	CMW 2	4	Simplex P	3	Palacos MV+G Pro*
10 Most Used									
2377	(10) 97.1%	937	(10) 98.9%	869	(10) 99.2%	881	(10) 98.5%	747	(10) 98.8%
Remainder									
71	(11) 2.9%	10	(5) 1.1%	7	(6) 0.8%	13	(5) 1.5%	9	(6) 1.2%
TOTAL									
2448	(21) 100.0%	947	(15) 100.0%	876	(16) 100.0%	894	(15) 100.0%	756	(16) 100.0%

Note: *denotes antibiotic cement

More than one cement type was used in some procedures

Table C3 10 Most Used Cement Types for Femoral Prostheses in Revision Hip Replacement

2003		2021		2022		2023		2024	
N	Model	N	Model	N	Model	N	Model	N	Model
192	Simplex Tobra*	493	Simplex Tobra*	514	Simplex Tobra*	514	Simplex Tobra*	482	Simplex Tobra*
166	Antibiotic Simplex*	158	Copal G+V*	188	Copal G+V*	159	Copal G+V*	160	Copal G+V*
74	Simplex P	101	Palacos R+G*	94	Palacos R+G*	120	Palacos R+G*	102	Palacos R+G*
70	CMW 1 G*	75	Palacos R+G Pro*	90	Palacos MV+G*	96	Copal G+C*	99	Palacos MV+G*
37	Palacos R*	61	Palacos MV+G*	77	Palacos R+G Pro*	85	Palacos MV+G*	83	Palacos R+G Pro*
33	Palamed G*	49	Copal G+C*	70	Copal G+C*	84	Palacos R+G Pro*	66	Copal G+C*
21	CMW 3 G*	21	Palacos Fast R+G*	23	Palacos Fast R+G*	35	Palacos Fast R+G*	44	Palacos Fast R+G*
17	CMW 1 Plain	16	CMW 2 G*	15	Palacos MV+G Pro*	20	CMW 2 G*	19	Palacos MV+G Pro*
9	Refobacin Plus*	13	Palacos MV+G Pro*	11	CMW 2 G*	11	Simplex P	13	CMW 2 G*
8	Palacos E*	6	Simplex P	8	Palacos LV+G*	9	Palacos MV+G Pro*	7	Palacos LV+G*
10 Most Used									
627	(10) 95.0%	993	(10) 97.6%	1090	(10) 97.3%	1133	(10) 98.7%	1075	(10) 97.7%
Remainder									
33	(11) 5.0%	24	(10) 2.4%	30	(10) 2.7%	15	(6) 1.3%	25	(13) 2.3%
TOTAL									
660	(21) 100.0%	1017	(20) 100.0%	1120	(20) 100.0%	1148	(16) 100.0%	1100	(23) 100.0%

Note: *denotes antibiotic cement
More than one cement type was used in some procedures

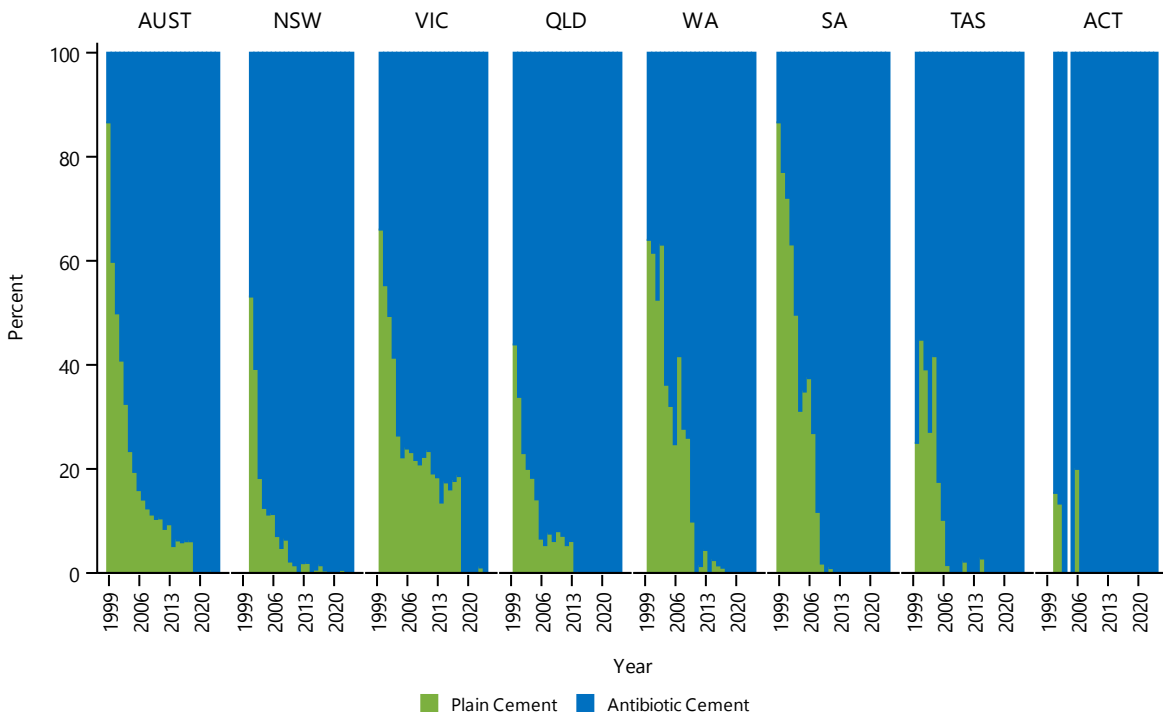
Table C4 10 Most Used Cement Types for Acetabular Prostheses in Revision Hip Replacement

2003		2021		2022		2023		2024	
N	Model	N	Model	N	Model	N	Model	N	Model
197	CMW 1 G*	146	Copal G+V*	145	Copal G+V*	155	Palacos R+G*	156	Palacos R+G*
144	Simplex Tobra*	133	Palacos R+G*	128	Palacos R+G*	116	Copal G+V*	121	Palacos Fast R+G*
115	Antibiotic Simplex*	99	Simplex Tobra*	121	Simplex Tobra*	99	Palacos Fast R+G*	109	Copal G+V*
85	Palacos R*	71	Palacos Fast R+G*	90	Palacos Fast R+G*	81	Copal G+C*	79	Simplex Tobra*
51	CMW 2 G*	57	CMW 2 G*	58	CMW 2 G*	81	Simplex Tobra*	65	Copal G+C*
48	CMW 1 Plain	48	Copal G+C*	57	Copal G+C*	61	CMW 2 G*	54	Palacos MV+G*
44	Palamed G*	29	Palacos MV+G*	37	Palacos MV+G*	52	Palacos MV+G*	41	CMW 2 G*
40	Simplex P	13	Simplex HV*	8	Palacos R+G Pro*	9	Palacos R+G Pro*	5	Palacos LV+G*
20	CMW 2 Plain	7	Palacos R+G Pro*	5	Simplex HV*	4	SmartSet GHV*	4	Palacos R+G Pro*
15	Refobacin Plus*	3	CMW 2	3	SmartSet GHV*	3	Palacos LV+G*	3	Palacos MV+G Pro*
10 Most Used									
759	(10) 97.9%	606	(10) 98.4%	652	(10) 98.3%	661	(10) 98.5%	637	(10) 98.5%
Remainder									
16	(8) 2.1%	10	(6) 1.6%	11	(8) 1.7%	10	(5) 1.5%	10	(7) 1.5%
TOTAL									
775	(18) 100.0%	616	(16) 100.0%	663	(18) 100.0%	671	(15) 100.0%	647	(17) 100.0%

Note: *denotes antibiotic cement
More than one cement type was used in some procedures

CEMENTED PRIMARY TOTAL CONVENTIONAL HIP REPLACEMENT

Figure C1 Trends in Usage of Cemented Primary Total Conventional Hip Replacement by State/Territory and Year



Note: There were no cemented primary total conventional hips undertaken in ACT in 2004
 NT has been excluded due to low procedure numbers

Figure C2 Trends in Usage of Femur Cemented Primary Total Conventional Hip Replacement by State/Territory and Year

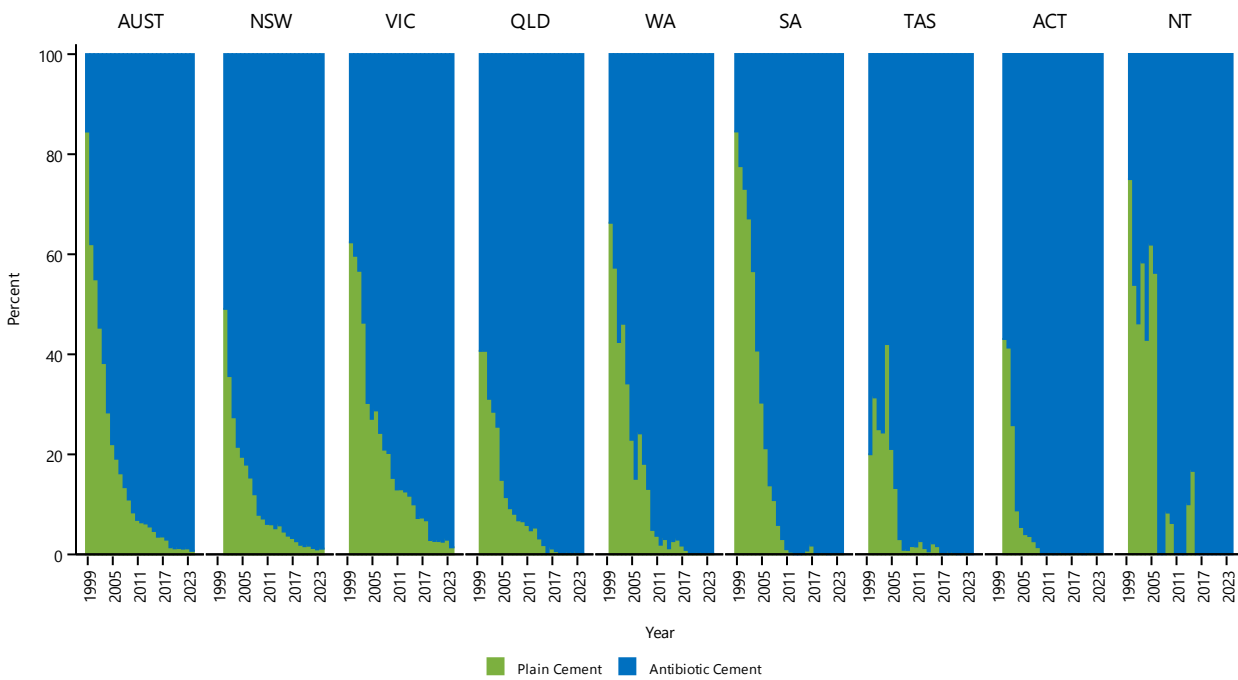


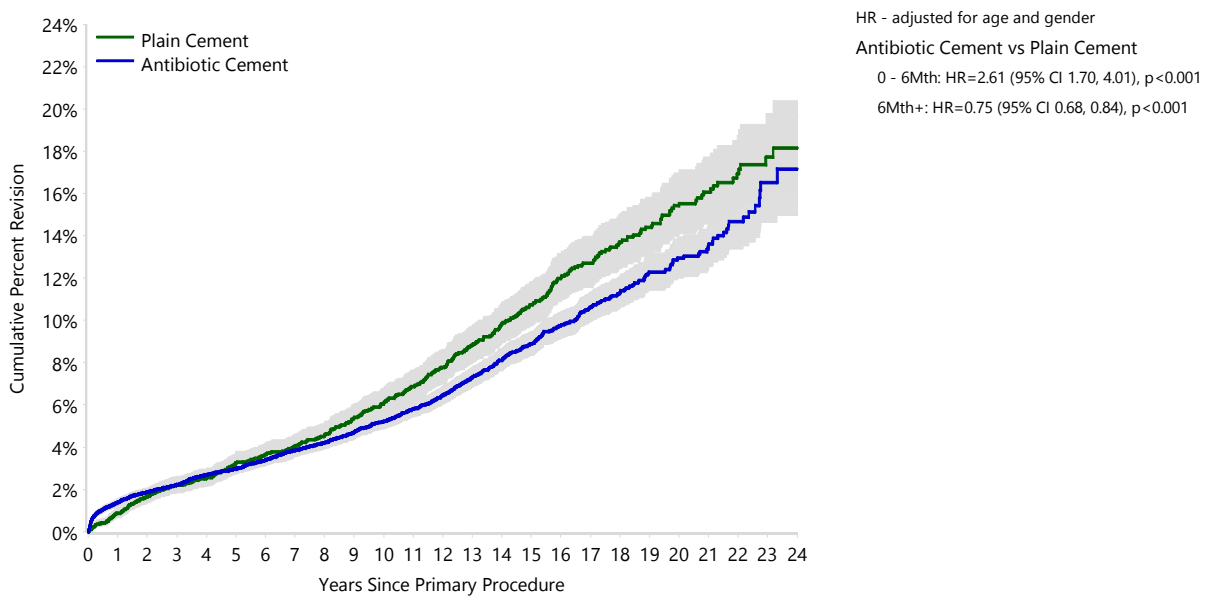
Table C5 Cumulative Percent Revision of Cemented Primary Total Conventional Hip Replacement by Cement Type and Location (Primary Diagnosis OA)

Cement Femur	Cement Acetabular	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	10 Yrs	15 Yrs	20 Yrs
Plain Cement	Plain Cement	498	5642	0.9 (0.7, 1.2)	2.2 (1.8, 2.6)	3.3 (2.8, 3.8)	6.0 (5.4, 6.8)	10.7 (9.7, 11.8)	15.4 (14.0, 17.0)
	Antibiotic Cement	71	858	0.9 (0.5, 1.9)	2.2 (1.4, 3.4)	3.1 (2.1, 4.5)	6.3 (4.7, 8.3)	10.9 (8.5, 14.0)	14.1 (10.6, 18.5)
Antibiotic Cement	Plain Cement	29	343	2.4 (1.2, 4.7)	3.3 (1.9, 5.9)	3.7 (2.1, 6.4)	7.8 (5.1, 11.9)	12.4 (8.2, 18.5)	
	Antibiotic Cement	1151	20235	1.4 (1.2, 1.6)	2.2 (2.0, 2.4)	3.0 (2.7, 3.2)	5.1 (4.8, 5.5)	8.7 (8.1, 9.3)	12.8 (11.9, 13.9)
TOTAL		1749	27078						

Table C6 Cumulative Percent Revision of Cemented Primary Total Conventional Hip Replacement by Cement Type (Primary Diagnosis OA)

Antibiotic Status	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	10 Yrs	15 Yrs	20 Yrs
Plain Cement	498	5642	0.9 (0.7, 1.2)	2.2 (1.8, 2.6)	3.3 (2.8, 3.8)	6.0 (5.4, 6.8)	10.7 (9.7, 11.8)	15.4 (14.0, 17.0)
Antibiotic Cement	1251	21436	1.4 (1.2, 1.6)	2.2 (2.0, 2.4)	3.0 (2.7, 3.2)	5.2 (4.9, 5.6)	8.9 (8.3, 9.5)	12.9 (12.0, 13.9)
TOTAL	1749	27078						

Figure C3 Cumulative Percent Revision of Cemented Primary Total Conventional Hip Replacement by Cement Type (Primary Diagnosis OA)



Number at Risk	0 Yr	1 Yr	3 Yrs	5 Yrs	10 Yrs	15 Yrs	20 Yrs
Plain Cement	5642	5488	5138	4740	3278	1783	743
Antibiotic Cement	21436	20309	18080	15703	9203	4033	1064

Table C7 Yearly Cumulative Incidence Revision Diagnosis of Cemented Primary Total Conventional Hip Replacement by Cement Type (Primary Diagnosis OA)

Antibiotic Status	Event	N Events	1 Yr	3 Yrs	5 Yrs	10 Yrs	15 Yrs	20 Yrs
Plain Cement	Loosening	280	0.2 (0.1, 0.4)	0.6 (0.5, 0.9)	1.2 (0.9, 1.5)	2.7 (2.3, 3.1)	4.2 (3.7, 4.7)	5.3 (4.7, 5.9)
Plain Cement	Prosthesis Dislocation/Instability	72	0.3 (0.2, 0.5)	0.7 (0.5, 0.9)	0.8 (0.6, 1.0)	0.9 (0.7, 1.2)	1.2 (0.9, 1.5)	1.3 (1.0, 1.6)
Plain Cement	Infection	67	0.2 (0.1, 0.4)	0.5 (0.4, 0.8)	0.7 (0.5, 0.9)	0.8 (0.6, 1.1)	1.1 (0.8, 1.4)	1.3 (1.0, 1.6)
Plain Cement	Fracture	54	0.1 (0.0, 0.2)	0.2 (0.1, 0.4)	0.3 (0.2, 0.5)	0.6 (0.4, 0.8)	0.9 (0.6, 1.1)	1.0 (0.7, 1.3)
Plain Cement	Lysis	8	0.0 (0.0, 0.0)	0.0 (0.0, 0.1)	0.0 (0.0, 0.1)	0.0 (0.0, 0.1)	0.1 (0.0, 0.2)	0.1 (0.1, 0.3)
Plain Cement	Other	17	0.0 (0.0, 0.0)	0.1 (0.0, 0.2)	0.1 (0.0, 0.2)	0.2 (0.1, 0.3)	0.3 (0.2, 0.5)	0.3 (0.2, 0.5)
Plain Cement	Deceased	3706	1.9 (1.5, 2.2)	6.8 (6.1, 7.4)	12.9 (12.0, 13.8)	33.4 (32.2, 34.7)	53.9 (52.5, 55.2)	69.0 (67.6, 70.3)
Plain Cement	All Revision	498	0.9 (0.7, 1.1)	2.1 (1.8, 2.5)	3.1 (2.7, 3.6)	5.2 (4.6, 5.8)	7.7 (7.0, 8.4)	9.3 (8.5, 10.1)
Antibiotic Cement	Loosening	515	0.2 (0.1, 0.2)	0.4 (0.3, 0.5)	0.7 (0.6, 0.8)	1.5 (1.3, 1.7)	2.7 (2.4, 2.9)	3.5 (3.2, 3.8)
Antibiotic Cement	Prosthesis Dislocation/Instability	237	0.5 (0.4, 0.6)	0.7 (0.6, 0.8)	0.8 (0.7, 1.0)	1.0 (0.9, 1.2)	1.2 (1.1, 1.4)	1.2 (1.1, 1.4)
Antibiotic Cement	Infection	212	0.5 (0.4, 0.6)	0.6 (0.5, 0.7)	0.7 (0.6, 0.9)	0.9 (0.8, 1.1)	1.0 (0.9, 1.2)	1.2 (1.0, 1.3)
Antibiotic Cement	Fracture	211	0.2 (0.1, 0.2)	0.4 (0.3, 0.4)	0.5 (0.4, 0.6)	0.8 (0.7, 0.9)	1.1 (1.0, 1.3)	1.2 (1.1, 1.4)
Antibiotic Cement	Lysis	23	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.1)	0.0 (0.0, 0.1)	0.1 (0.1, 0.2)	0.2 (0.1, 0.3)
Antibiotic Cement	Other	53	0.0 (0.0, 0.1)	0.1 (0.0, 0.1)	0.1 (0.1, 0.1)	0.2 (0.1, 0.2)	0.2 (0.2, 0.3)	0.4 (0.3, 0.5)
Antibiotic Cement	Deceased	10756	2.1 (1.9, 2.3)	7.7 (7.3, 8.0)	14.4 (13.9, 14.8)	35.8 (35.1, 36.5)	56.2 (55.4, 57.0)	71.8 (70.9, 72.7)
Antibiotic Cement	All Revision	1251	1.4 (1.2, 1.5)	2.2 (2.0, 2.4)	2.8 (2.6, 3.1)	4.5 (4.2, 4.8)	6.4 (6.0, 6.8)	7.7 (7.2, 8.1)

Figure C4 Cumulative Incidence Revision Diagnosis of Cemented Primary Total Conventional Hip Replacement by Cement Type (Primary Diagnosis OA)

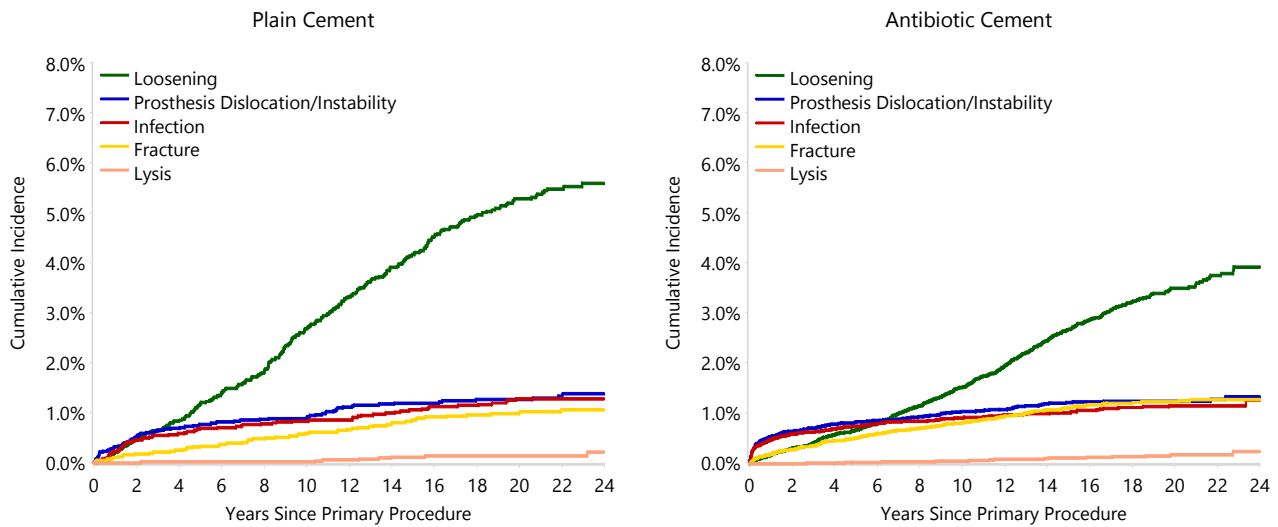


Figure C5 Cumulative Incidence Revision Diagnosis of Cemented Primary Total Conventional Hip Replacement by Year of Implant and Cement Type (Primary Diagnosis OA)

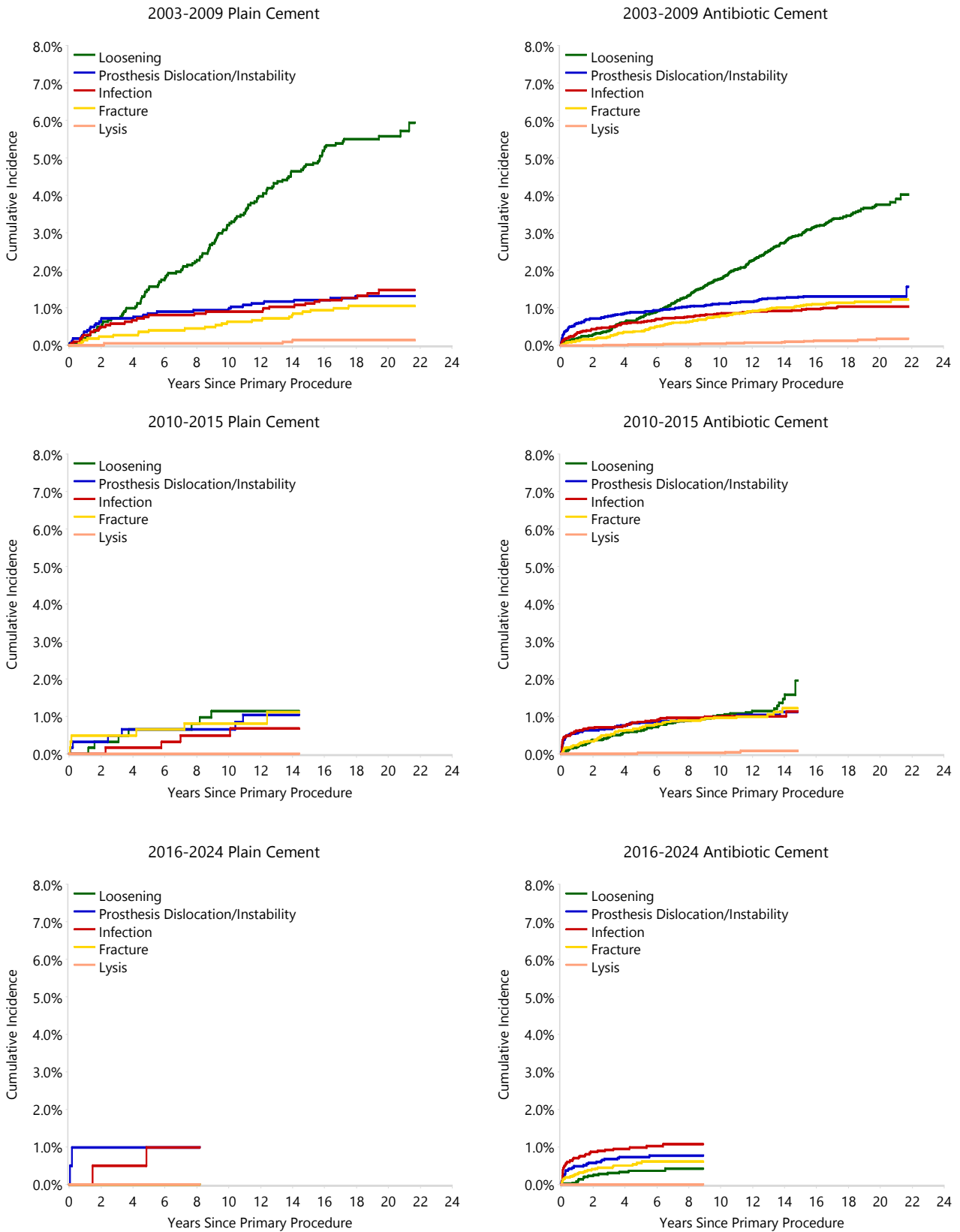
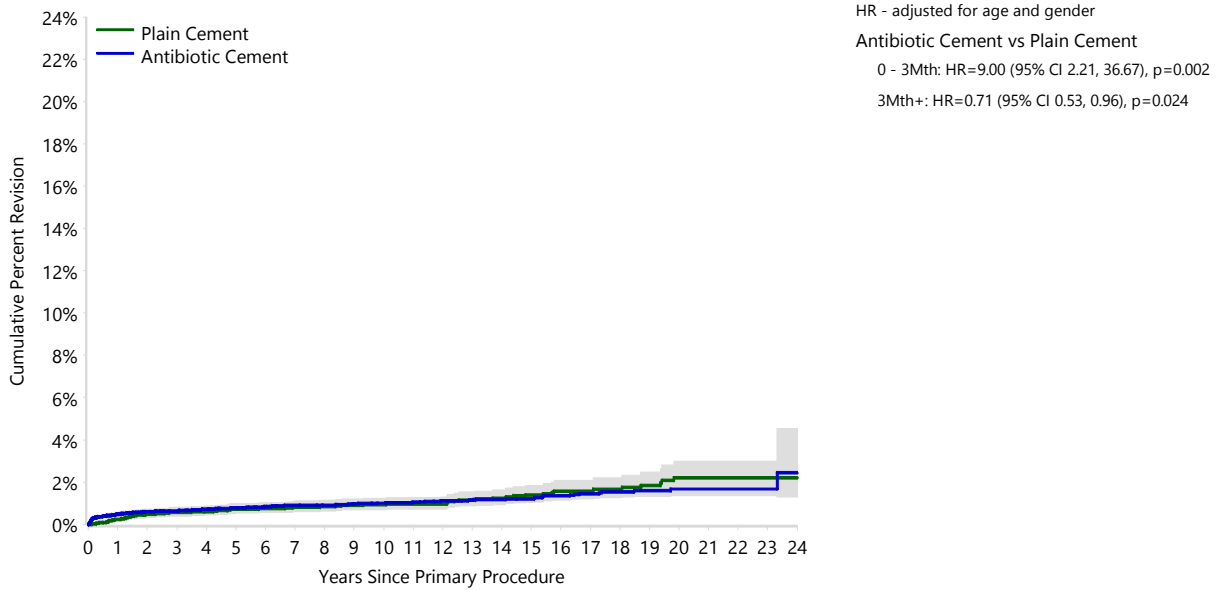


Table C8 Cumulative Percent Revision of Cemented Primary Total Conventional Hip Replacement by Cement Type (Primary Diagnosis OA, Revision for Infection)

Antibiotic Status	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	10 Yrs	15 Yrs	20 Yrs
Plain Cement	67	5642	0.2 (0.1, 0.4)	0.6 (0.4, 0.8)	0.7 (0.5, 1.0)	0.9 (0.7, 1.2)	1.4 (1.1, 1.8)	2.2 (1.6, 3.0)
Antibiotic Cement	212	21436	0.5 (0.4, 0.6)	0.6 (0.5, 0.8)	0.8 (0.7, 0.9)	1.0 (0.9, 1.2)	1.2 (1.0, 1.4)	1.7 (1.4, 2.0)
TOTAL	279	27078						

Figure C6 Cumulative Percent Revision of Cemented Primary Total Conventional Hip Replacement by Cement Type (Primary Diagnosis OA, Revision for Infection)



Number at Risk	0 Yr	1 Yr	3 Yrs	5 Yrs	10 Yrs	15 Yrs	20 Yrs
Plain Cement	5642	5488	5138	4740	3278	1783	743
Antibiotic Cement	21436	20309	18080	15703	9203	4033	1064

Knee Replacement

CEMENT TRENDS IN KNEE REPLACEMENT

Table C9 10 Most Used Cement Types for Femoral Prostheses in Primary Knee Replacement

2003		2021		2022		2023		2024	
N	Model	N	Model	N	Model	N	Model	N	Model
2215	CMW 1 G*	14680	Palacos R+G*	13048	Palacos R+G*	15680	Palacos R+G*	14658	Palacos R+G*
1744	Simplex P	9818	Palacos R+G Pro*	9989	Palacos R+G Pro*	11981	Palacos R+G Pro*	11298	Palacos R+G Pro*
1733	CMW 1 Plain	3823	Simplex Tobra*	3746	Palacos Fast R+G*	4999	Palacos Fast R+G*	5732	Palacos Fast R+G*
1686	Antibiotic Simplex*	3597	Palacos Fast R+G*	3478	Simplex Tobra*	3913	Palacos MV+G*	3982	Palacos MV+G*
1468	Simplex Tobra*	3197	Palacos MV+G*	2999	Palacos MV+G*	3913	Simplex Tobra*	3749	Simplex Tobra*
1352	Palacos R*	1849	CMW 2 G*	1670	CMW 2 G*	1743	CMW 2 G*	1642	CMW 2 G*
996	CMW 2 Plain	874	Copal G+C*	844	Copal G+C*	1008	Copal G+C*	1084	Copal G+C*
936	CMW 2 G*	674	Palacos MV+G Pro*	700	Palacos MV+G Pro*	812	Palacos MV+G Pro*	1073	Palacos MV+G Pro*
935	Palamed G*	565	SmartSet GHV*	406	Optipac*	357	SmartSet GHV*	285	SmartSet GHV*
296	Refobacin Plus*	430	Simplex HV*	403	SmartSet GHV*	356	Refobacin Plus*	231	Optipac*
10 Most Used									
13361	(10) 97.0%	39507	(10) 95.9%	37283	(10) 96.0%	44762	(10) 97.2%	43734	(10) 97.9%
Remainder									
417	(18) 3.0%	1677	(16) 4.1%	1539	(15) 4.0%	1310	(17) 2.8%	959	(13) 2.1%
TOTAL									
13778	(28) 100.0%	41184	(26) 100.0%	38822	(25) 100.0%	46072	(27) 100.0%	44693	(23) 100.0%

Note: *denotes antibiotic cement

More than one cement type was used in some procedures

Table C10 10 Most Used Cement Types for Tibial Prostheses in Primary Knee Replacement

2003		2021		2022		2023		2024	
N	Model	N	Model	N	Model	N	Model	N	Model
3020	CMW 1 G*	17076	Palacos R+G*	15221	Palacos R+G*	18424	Palacos R+G*	17306	Palacos R+G*
2661	CMW 1 Plain	10381	Palacos R+G Pro*	10676	Palacos R+G Pro*	13038	Palacos R+G Pro*	12300	Palacos R+G Pro*
2658	Simplex P	5509	Palacos Fast R+G*	5498	Palacos Fast R+G*	7641	Palacos Fast R+G*	8909	Palacos Fast R+G*
2270	Antibiotic Simplex*	4794	Simplex Tobra*	4429	Simplex Tobra*	5007	Simplex Tobra*	4922	Palacos MV+G*
1981	Simplex Tobra*	3946	Palacos MV+G*	3796	Palacos MV+G*	4839	Palacos MV+G*	4727	Simplex Tobra*
1870	CMW 2 Plain	3035	CMW 2 G*	2718	CMW 2 G*	2984	CMW 2 G*	2810	CMW 2 G*
1672	Palacos R*	1420	Copal G+C*	1519	Copal G+C*	1721	Copal G+C*	1901	Copal G+C*
1411	CMW 2 G*	702	Palacos MV+G Pro*	757	Optipac*	833	Palacos MV+G Pro*	1150	Palacos MV+G Pro*
1126	Palamed G*	687	Optipac*	727	Palacos MV+G Pro*	541	Optipac*	538	Optipac*
350	Refobacin Plus*	629	SmartSet GHV*	465	SmartSet GHV*	499	Refobacin Plus*	347	Simplex HV*
10 Most Used									
19019	(10) 96.8%	48179	(10) 95.4%	45806	(10) 95.7%	55527	(10) 96.5%	54910	(10) 97.4%
Remainder									
628	(19) 3.2%	2349	(17) 4.6%	2036	(17) 4.3%	1985	(17) 3.5%	1493	(17) 2.6%
TOTAL									
19647	(29) 100.0%	50528	(27) 100.0%	47842	(27) 100.0%	57512	(27) 100.0%	56403	(27) 100.0%

Note: *denotes antibiotic cement

More than one cement type was used in some procedures

Table C11 10 Most Used Cement Types for Patella Prostheses in Primary Knee Replacement

2003		2021		2022		2023		2024	
N	Model	N	Model	N	Model	N	Model	N	Model
1305	Antibiotic Simplex*	13006	Palacos R+G*	11813	Palacos R+G*	14247	Palacos R+G*	13587	Palacos R+G*
1172	CMW 1 G*	8690	Palacos R+G Pro*	8751	Palacos R+G Pro*	10463	Palacos R+G Pro*	11706	Palacos Fast R+G*
1059	CMW 1 Plain	6889	Palacos Fast R+G*	7249	Palacos Fast R+G*	10229	Palacos Fast R+G*	10200	Palacos R+G Pro*
1053	CMW 2 Plain	4852	CMW 2 G*	4972	CMW 2 G*	5418	CMW 2 G*	5178	CMW 2 G*
1002	Simplex P	3613	Simplex Tobra*	3502	Simplex Tobra*	3756	Palacos MV+G*	3950	Palacos MV+G*
982	Simplex Tobra*	2858	Palacos MV+G*	2865	Palacos MV+G*	3736	Simplex Tobra*	3511	Simplex Tobra*
694	Palacos R*	1098	Copal G+C*	1391	Copal G+C*	1347	Copal G+C*	1244	Copal G+C*
630	Palamed G*	785	CMW 2	812	CMW 2	881	CMW 2	986	Palacos MV+G Pro*
591	CMW 2 G*	767	Simplex HV*	649	Optipac*	715	Palacos MV+G Pro*	828	CMW 2
188	Refobacin Plus*	615	Palacos MV+G Pro*	612	Palacos MV+G Pro*	521	Simplex HV*	449	Simplex HV*
10 Most Used									
8676	(10) 96.8%	43173	(10) 95.4%	42616	(10) 95.9%	51313	(10) 96.7%	51639	(10) 97.6%
Remainder									
290	(14) 3.2%	2063	(16) 4.6%	1830	(16) 4.1%	1724	(18) 3.3%	1296	(16) 2.4%
TOTAL									
8966	(24) 100.0%	45236	(26) 100.0%	44446	(26) 100.0%	53037	(28) 100.0%	52935	(26) 100.0%

Note: *denotes antibiotic cement

More than one cement type was used in some procedures

Table C12 10 Most Used Cement Types for Femoral Prostheses in Revision Knee Replacement

2003		2021		2022		2023		2024	
N	Model	N	Model	N	Model	N	Model	N	Model
254	CMW 1 G*	673	Palacos R+G*	604	Palacos R+G*	656	Palacos R+G*	594	Palacos R+G*
187	Antibiotic Simplex*	553	Copal G+V*	547	Copal G+V*	504	Copal G+V*	563	Copal G+V*
152	Simplex Tobra*	363	Palacos R+G Pro*	357	Palacos R+G Pro*	434	Palacos R+G Pro*	427	Palacos R+G Pro*
134	Palacos R*	265	Copal G+C*	282	Simplex Tobra*	306	Copal G+C*	322	Simplex Tobra*
100	CMW 2 G*	256	Simplex Tobra*	237	Copal G+C*	299	Palacos Fast R+G*	314	Palacos Fast R+G*
81	Palamed G*	216	Palacos Fast R+G*	222	Palacos Fast R+G*	296	Simplex Tobra*	290	Copal G+C*
68	Simplex P	169	Palacos MV+G*	140	Palacos MV+G*	204	Palacos MV+G*	185	Palacos MV+G*
50	CMW 1 Plain	108	CMW 2 G*	82	CMW 2 G*	119	CMW 2 G*	121	CMW 2 G*
41	CMW 2 Plain	31	SmartSet GHV*	39	Palacos MV+G Pro*	39	Palacos MV+G Pro*	58	Palacos MV+G Pro*
38	Refobacin Plus*	21	Palacos MV+G Pro*	27	Simplex HV*	25	SmartSet GHV*	23	Optipac*
10 Most Used									
1105 (10)	96.3%	2655 (10)	97.1%	2537 (10)	96.9%	2882 (10)	96.6%	2897 (10)	97.3%
Remainder									
42 (9)	3.7%	80 (14)	2.9%	80 (14)	3.1%	101 (13)	3.4%	80 (11)	2.7%
TOTAL									
1147 (19)	100.0%	2735 (24)	100.0%	2617 (24)	100.0%	2983 (23)	100.0%	2977 (21)	100.0%

Note: *denotes antibiotic cement

More than one cement type was used in some procedures

Table C13 10 Most Used Cement Types for Tibial Prostheses in Revision Knee Replacement

2003		2020		2021		2022		2023	
N	Model	N	Model	N	Model	N	Model	N	Model
307	CMW 1 G*	709	Palacos R+G*	618	Palacos R+G*	662	Palacos R+G*	627	Palacos R+G*
215	Antibiotic Simplex*	538	Copal G+V*	532	Copal G+V*	490	Copal G+V*	545	Copal G+V*
165	Simplex Tobra*	360	Palacos R+G Pro*	363	Palacos R+G Pro*	436	Palacos R+G Pro*	428	Palacos R+G Pro*
145	Palacos R*	281	Copal G+C*	278	Simplex Tobra*	311	Palacos Fast R+G*	341	Palacos Fast R+G*
126	CMW 2 G*	264	Simplex Tobra*	259	Palacos Fast R+G*	305	Copal G+C*	310	Copal G+C*
97	Palamed G*	224	Palacos Fast R+G*	250	Copal G+C*	288	Simplex Tobra*	290	Simplex Tobra*
74	CMW 1 Plain	168	Palacos MV+G*	141	Palacos MV+G*	212	Palacos MV+G*	201	Palacos MV+G*
73	Simplex P	126	CMW 2 G*	112	CMW 2 G*	137	CMW 2 G*	139	CMW 2 G*
71	CMW 2 Plain	34	SmartSet GHV*	42	Palacos MV+G Pro*	40	Palacos MV+G Pro*	59	Palacos MV+G Pro*
29	Refobacin Plus*	25	Simplex HV*	26	Simplex HV*	28	Simplex HV*	23	Optipac*
10 Most Used									
1302 (10)	95.9%	2729 (10)	96.7%	2621 (10)	96.8%	2909 (10)	96.6%	2963 (10)	97.5%
Remainder									
56 (11)	4.1%	92 (13)	3.3%	86 (13)	3.2%	102 (11)	3.4%	75 (11)	2.5%
TOTAL									
1358 (21)	100.0%	2821 (23)	100.0%	2707 (23)	100.0%	3011 (21)	100.0%	3038 (21)	100.0%

Note: *denotes antibiotic cement

More than one cement type was used in some procedures

Table C14 10 Most Used Cement Types for Patella Prostheses in Revision Knee Replacement

2003		2020		2021		2022		2023	
N	Model	N	Model	N	Model	N	Model	N	Model
179	CMW 1 G*	535	Palacos Fast R+G*	517	Palacos Fast R+G*	617	Palacos Fast R+G*	661	Palacos Fast R+G*
150	CMW 2 Plain	523	Palacos R+G*	398	Palacos R+G*	460	Palacos R+G*	381	Palacos R+G*
130	Antibiotic Simplex*	333	CMW 2 G*	310	CMW 2 G*	295	CMW 2 G*	321	CMW 2 G*
114	CMW 2 G*	189	Copal G+V*	210	Palacos R+G Pro*	232	Palacos R+G Pro*	223	Copal G+V*
113	Simplex Tobra*	187	Palacos R+G Pro*	194	Copal G+V*	203	Copal G+V*	213	Palacos R+G Pro*
85	Simplex P	139	Simplex Tobra*	152	Simplex Tobra*	139	Copal G+C*	118	Palacos MV+G*
78	Palacos R*	117	Copal G+C*	89	Copal G+C*	122	Simplex Tobra*	118	Simplex Tobra*
59	Palamed G*	108	Palacos MV+G*	87	Palacos MV+G*	119	Palacos MV+G*	105	Copal G+C*
56	CMW 1 Plain	31	CMW 2	23	Palacos MV+G Pro*	23	Simplex HV*	28	Palacos MV+G Pro*
17	Refobacin Plus*	20	SmartSet GHV*	20	Simplex HV*	21	CMW 2	24	Simplex HV*
10 Most Used									
981 (10)	96.1%	2182 (10)	96.5%	2000 (10)	96.8%	2231 (10)	97.4%	2192 (10)	96.9%
Remainder									
40 (10)	3.9%	80 (12)	3.5%	66 (9)	3.2%	60 (8)	2.6%	69 (11)	3.1%
TOTAL									
1021 (20)	100.0%	2262 (22)	100.0%	2066 (19)	100.0%	2291 (18)	100.0%	2261 (21)	100.0%

Note: *denotes antibiotic cement

More than one cement type was used in some procedures

This includes patella prostheses that have been revised and de novo patella in revision procedures

CEMENTED PRIMARY TOTAL KNEE REPLACEMENT

Figure C7 Trends in Usage of Cemented Primary Total Knee Replacement by State/Territory and Year

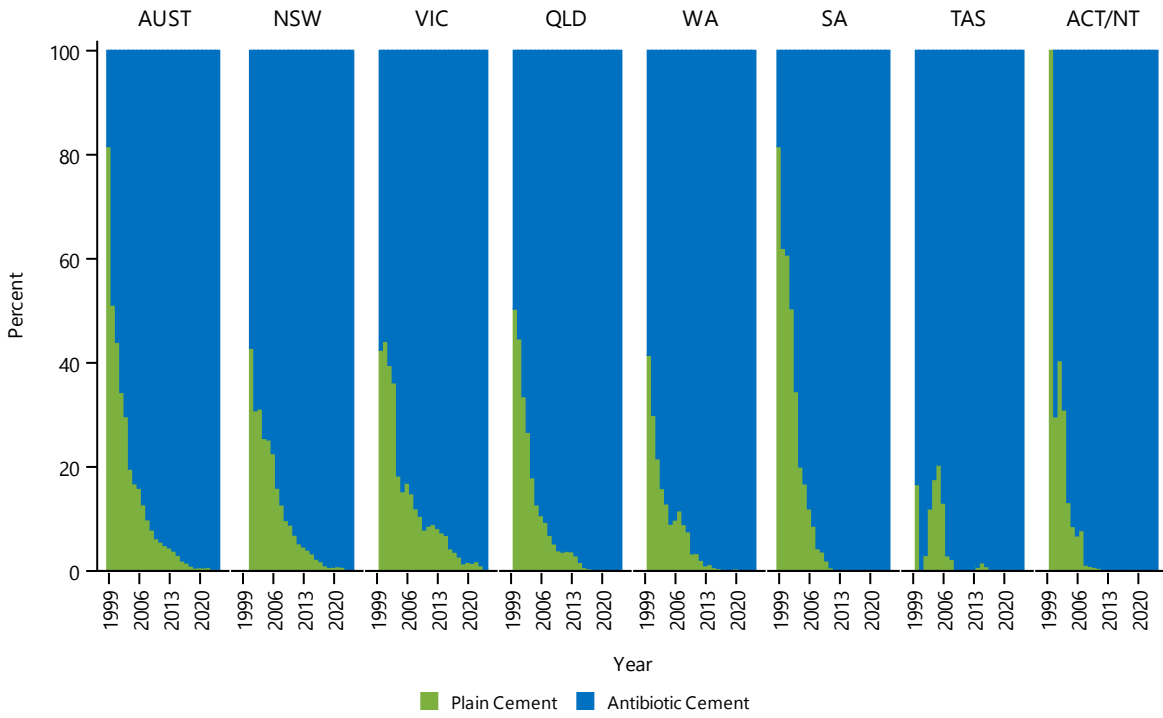


Figure C8 Trends in Usage of Tibia Cemented Primary Total Knee Replacement by State/Territory and Year

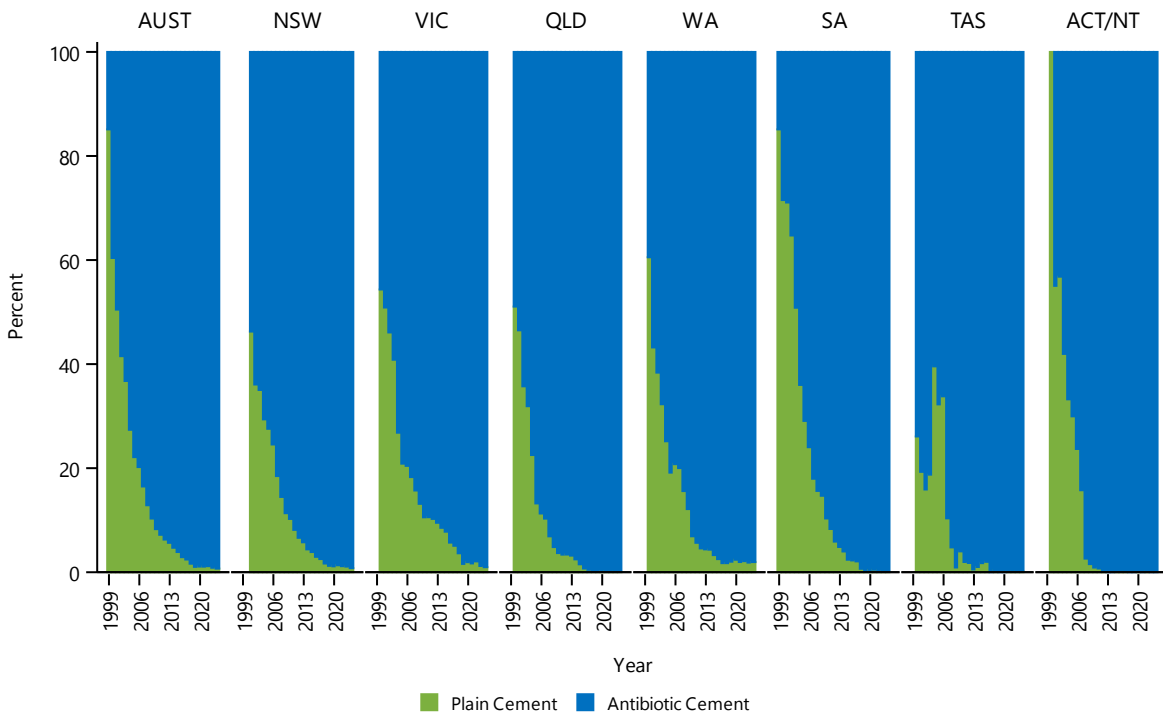


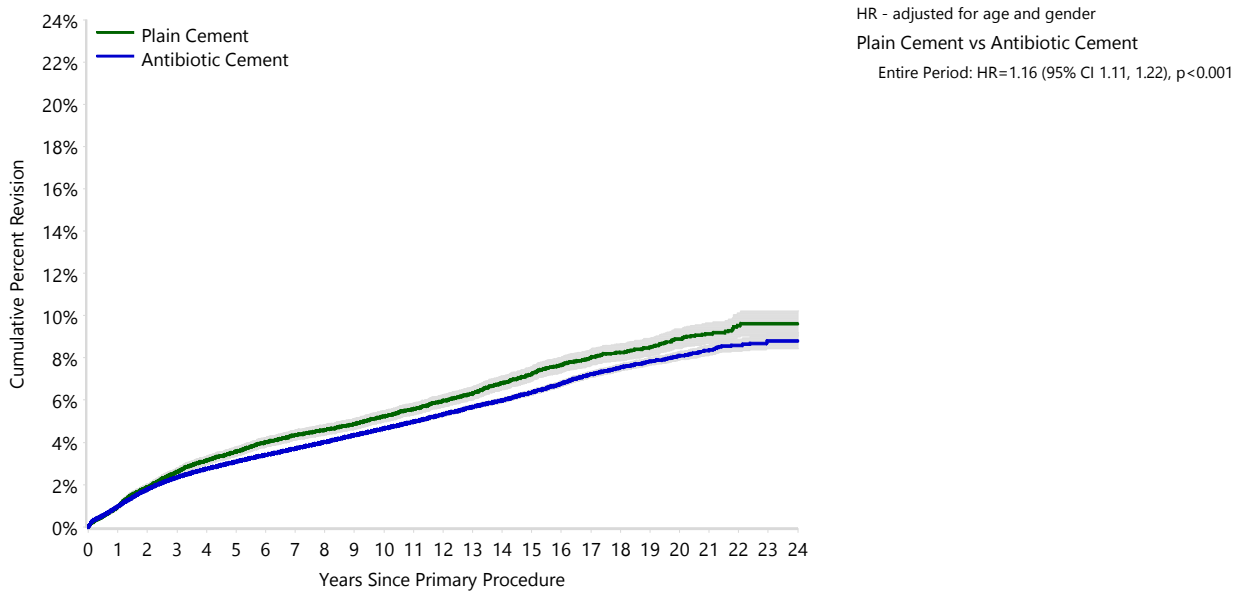
Table C15 Cumulative Percent Revision of Cemented Primary Total Knee Replacement by Cement Type and Location (Primary Diagnosis OA)

Cement Femur	Cement Tibia	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	10 Yrs	15 Yrs	20 Yrs
Plain Cement	Plain Cement	1878	30368	1.0 (0.8, 1.1)	2.6 (2.4, 2.8)	3.6 (3.4, 3.8)	5.2 (5.0, 5.5)	7.2 (6.9, 7.6)	8.9 (8.4, 9.4)
	Antibiotic Cement	35	549	1.3 (0.6, 2.7)	3.1 (1.9, 5.1)	4.3 (2.8, 6.5)	6.1 (4.2, 8.8)	8.9 (6.1, 12.9)	
Antibiotic Cement	Plain Cement	38	677	0.8 (0.3, 1.8)	2.5 (1.5, 4.0)	3.4 (2.2, 5.1)	5.5 (3.9, 7.7)	7.0 (5.0, 9.7)	8.0 (5.7, 11.1)
	Antibiotic Cement	20779	562983	1.0 (0.9, 1.0)	2.3 (2.3, 2.4)	3.1 (3.0, 3.1)	4.7 (4.6, 4.7)	6.4 (6.2, 6.5)	8.1 (7.9, 8.3)
TOTAL		22730	594577						

Table C16 Cumulative Percent Revision of Cemented Primary Total Knee Replacement by Cement Type (Primary Diagnosis OA)

Antibiotic Status	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	10 Yrs	15 Yrs	20 Yrs
Plain Cement	1878	30368	1.0 (0.8, 1.1)	2.6 (2.4, 2.8)	3.6 (3.4, 3.8)	5.2 (5.0, 5.5)	7.2 (6.9, 7.6)	8.9 (8.4, 9.4)
Antibiotic Cement	20852	564209	1.0 (0.9, 1.0)	2.3 (2.3, 2.4)	3.1 (3.0, 3.1)	4.7 (4.6, 4.7)	6.4 (6.3, 6.5)	8.1 (7.9, 8.3)
TOTAL	22730	594577						

Figure C9 Cumulative Percent Revision of Cemented Primary Total Knee Replacement by Cement Type (Primary Diagnosis OA)



Number at Risk	0 Yr	1 Yr	3 Yrs	5 Yrs	10 Yrs	15 Yrs	20 Yrs
Plain Cement	30368	29747	27989	26032	18737	10072	3177
Antibiotic Cement	564209	515528	424278	340135	148645	47666	7662

Table C17 Yearly Cumulative Incidence Revision Diagnosis of Cemented Primary Total Knee Replacement by Cement Type (Primary Diagnosis OA)

Antibiotic Status	Event	N Events	1 Yr	3 Yrs	5 Yrs	10 Yrs	15 Yrs	20 Yrs
Plain Cement	Infection	409	0.4 (0.3, 0.5)	0.8 (0.7, 0.9)	1.0 (0.9, 1.1)	1.2 (1.1, 1.3)	1.4 (1.2, 1.5)	1.4 (1.3, 1.6)
Plain Cement	Loosening	558	0.2 (0.2, 0.3)	0.6 (0.6, 0.7)	1.0 (0.9, 1.1)	1.4 (1.3, 1.6)	1.9 (1.7, 2.0)	2.1 (1.9, 2.2)
Plain Cement	Instability	125	0.1 (0.0, 0.1)	0.2 (0.1, 0.2)	0.2 (0.2, 0.3)	0.3 (0.3, 0.4)	0.4 (0.3, 0.5)	0.5 (0.4, 0.5)
Plain Cement	Pain	144	0.0 (0.0, 0.0)	0.2 (0.1, 0.2)	0.3 (0.2, 0.3)	0.4 (0.3, 0.5)	0.5 (0.4, 0.6)	0.5 (0.5, 0.6)
Plain Cement	Patellofemoral Pain	148	0.1 (0.0, 0.1)	0.2 (0.2, 0.3)	0.3 (0.2, 0.4)	0.4 (0.4, 0.5)	0.5 (0.4, 0.6)	0.5 (0.4, 0.6)
Plain Cement	Other	494	0.2 (0.2, 0.3)	0.5 (0.5, 0.6)	0.7 (0.6, 0.8)	1.1 (1.0, 1.2)	1.6 (1.4, 1.7)	1.9 (1.7, 2.1)
Plain Cement	Deceased	14744	0.9 (0.8, 1.0)	3.8 (3.6, 4.0)	7.9 (7.6, 8.3)	23.8 (23.3, 24.3)	43.4 (42.8, 44.0)	61.5 (60.8, 62.2)
Plain Cement	All Revision	1878	0.9 (0.8, 1.1)	2.6 (2.4, 2.7)	3.5 (3.3, 3.7)	4.9 (4.6, 5.1)	6.2 (5.9, 6.5)	6.9 (6.6, 7.2)
Antibiotic Cement	Infection	6122	0.5 (0.5, 0.5)	0.8 (0.8, 0.9)	1.0 (1.0, 1.0)	1.3 (1.2, 1.3)	1.4 (1.4, 1.5)	1.6 (1.5, 1.6)
Antibiotic Cement	Loosening	4746	0.1 (0.1, 0.1)	0.4 (0.4, 0.4)	0.6 (0.6, 0.6)	1.0 (1.0, 1.1)	1.4 (1.4, 1.5)	1.7 (1.6, 1.8)
Antibiotic Cement	Instability	1981	0.1 (0.1, 0.1)	0.2 (0.2, 0.3)	0.3 (0.3, 0.3)	0.4 (0.4, 0.4)	0.5 (0.5, 0.5)	0.5 (0.5, 0.6)
Antibiotic Cement	Pain	1502	0.0 (0.0, 0.0)	0.2 (0.2, 0.2)	0.2 (0.2, 0.3)	0.3 (0.3, 0.3)	0.4 (0.4, 0.4)	0.4 (0.4, 0.4)
Antibiotic Cement	Patellofemoral Pain	1225	0.0 (0.0, 0.0)	0.1 (0.1, 0.2)	0.2 (0.2, 0.2)	0.3 (0.3, 0.3)	0.3 (0.3, 0.3)	0.3 (0.3, 0.4)
Antibiotic Cement	Other	5276	0.2 (0.2, 0.2)	0.5 (0.5, 0.5)	0.7 (0.7, 0.7)	1.1 (1.0, 1.1)	1.6 (1.5, 1.6)	1.9 (1.8, 2.0)
Antibiotic Cement	Deceased	99982	0.6 (0.6, 0.7)	2.8 (2.8, 2.9)	6.2 (6.1, 6.3)	19.6 (19.5, 19.8)	38.2 (38.0, 38.4)	57.0 (56.6, 57.3)
Antibiotic Cement	All Revision	20852	1.0 (0.9, 1.0)	2.3 (2.3, 2.4)	3.0 (3.0, 3.1)	4.4 (4.3, 4.5)	5.6 (5.5, 5.7)	6.5 (6.4, 6.6)

Figure C10 Cumulative Incidence Revision Diagnosis of Cemented Primary Total Knee Replacement by Cement Type (Primary Diagnosis OA)

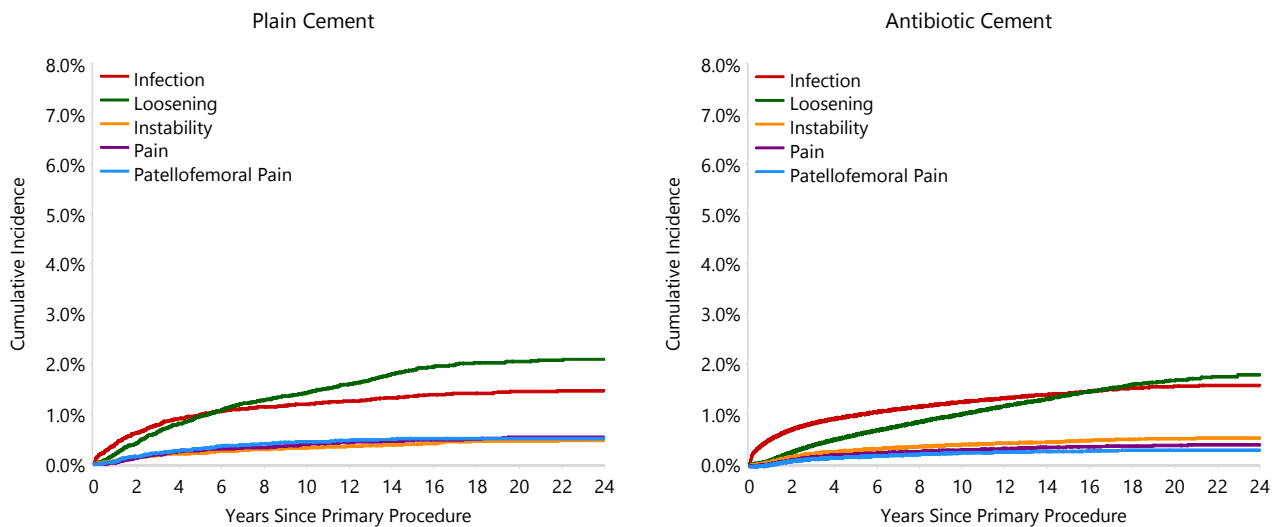


Figure C11 Cumulative Incidence Revision Diagnosis of Cemented Primary Total Knee Replacement by Year of Implant and Cement Type (Primary Diagnosis OA)

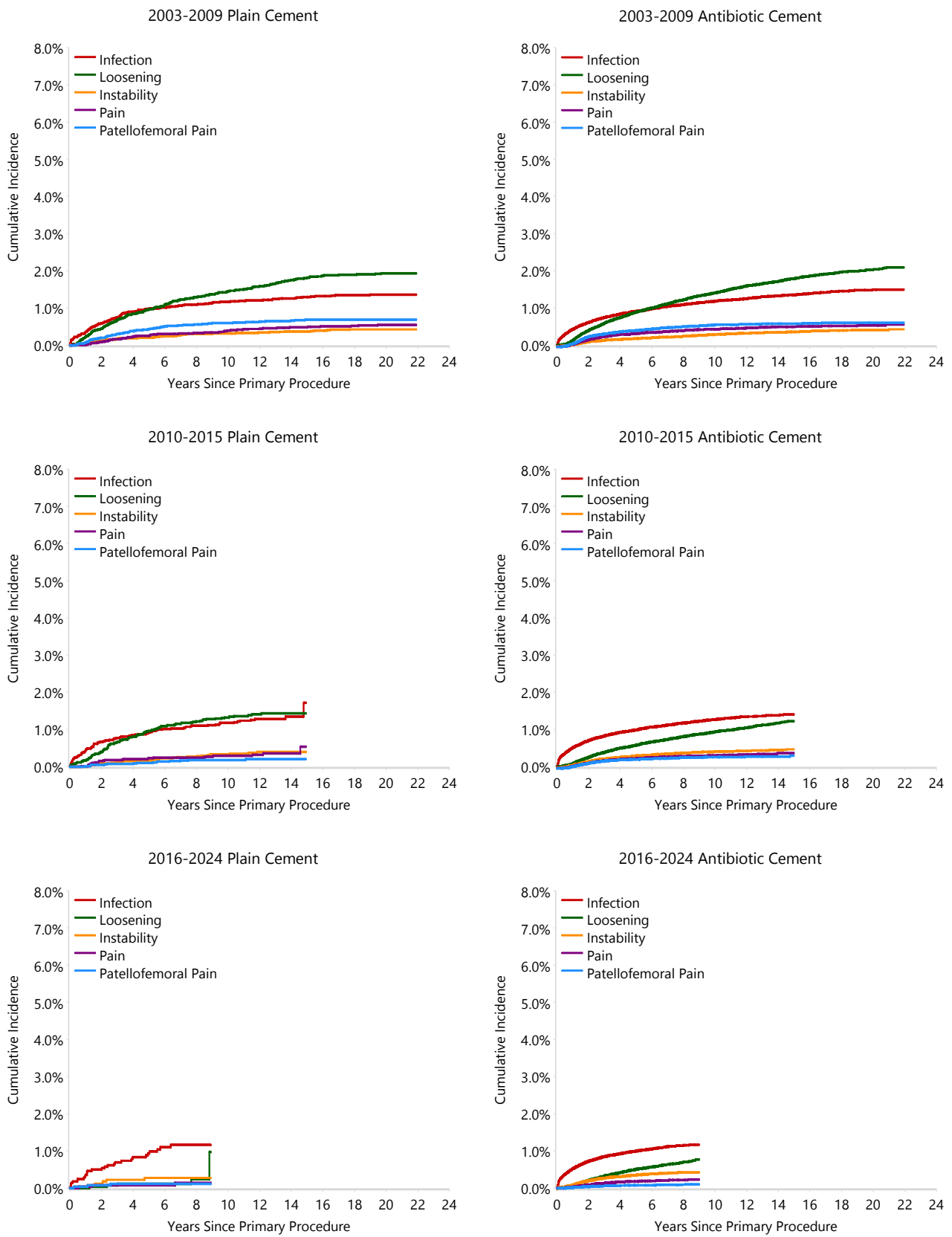
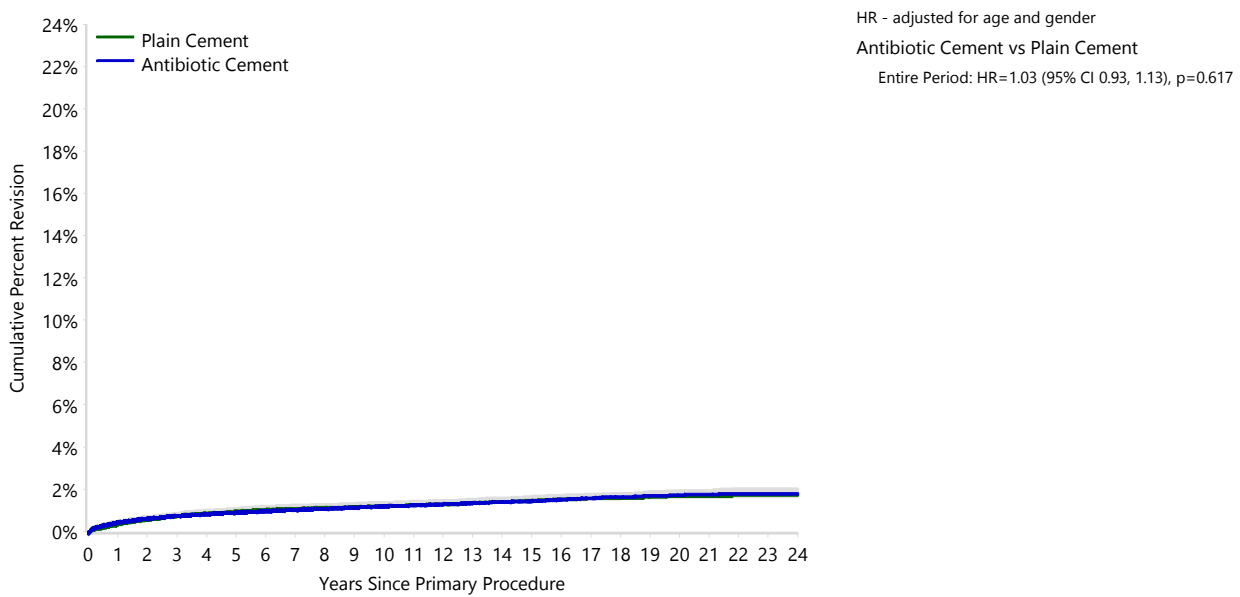


Table C 18 Cumulative Percent Revision of Cemented Primary Total Knee Replacement by Cement Type (Primary Diagnosis OA, Revision for Infection)

Antibiotic Status	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	10 Yrs	15 Yrs	20 Yrs
Plain Cement	409	30368	0.4 (0.3, 0.5)	0.8 (0.7, 0.9)	1.0 (0.9, 1.1)	1.3 (1.1, 1.4)	1.5 (1.4, 1.7)	1.8 (1.6, 2.0)
Antibiotic Cement	6122	564209	0.5 (0.5, 0.5)	0.8 (0.8, 0.9)	1.0 (1.0, 1.0)	1.3 (1.3, 1.4)	1.6 (1.5, 1.6)	1.9 (1.8, 2.0)
TOTAL	6531	594577						

Figure C12 Cumulative Percent Revision of Cemented Primary Total Knee Replacement by Cement Type (Primary Diagnosis OA, Revision for Infection)



Number at Risk	0 Yr	1 Yr	3 Yrs	5 Yrs	10 Yrs	15 Yrs	20 Yrs
Plain Cement	30368	29747	27989	26032	18737	10072	3177
Antibiotic Cement	564209	515528	424278	340135	148645	47666	7662