

Australian Orthopaedic Association National Joint Replacement Registry

2024 SUPPLEMENTARY REPORT

Cement in Hip and Knee Arthroplasty



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Cement in Hip and Knee Arthroplasty

2024 Supplementary Report

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Australian Orthopaedic Association
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**Cement in Hip and Knee Arthroplasty
2024 Supplementary Report**



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The Registry greatly appreciates the participation of all joint replacement patients throughout Australia. Their contribution allows ongoing improvements in arthroplasty outcomes to be achieved.

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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 2023, 99.6% of cemented total conventional hip replacements and 99.6% 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). 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). However, this may be confounded by multiple factors and there is no difference in the rate of revision for infection.

Hip Replacement

CEMENT TRENDS IN HIP REPLACEMENT

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

2003		2020		2021		2022		2023	
N	Model	N	Model	N	Model	N	Model	N	Model
3225	Simplex P	13235	Simplex Tobra*	13479	Simplex Tobra*	13260	Simplex Tobra*	13859	Simplex Tobra*
3061	Antibiotic Simplex*	2667	Palacos R+G Pro*	3043	Palacos R+G Pro*	3334	Palacos R+G Pro*	3663	Palacos R+G Pro*
2394	Simplex Tobra*	2201	Palacos MV+G*	2504	Palacos MV+G*	2676	Palacos MV+G*	3107	Palacos MV+G*
672	CMW 1 G*	1643	Palacos R+G*	1596	Palacos R+G*	1354	Palacos R+G*	1745	Palacos R+G*
583	CMW 1 Plain	330	Cemex System GENTA FAST*	469	Palacos MV+G Pro*	744	Palacos MV+G Pro*	655	Palacos MV+G Pro*
438	Palacos R*	235	Simplex P	344	Cemex System GENTA FAST*	350	Cemex System GENTA FAST*	586	Palacos Fast R+G*
369	CMW 3 G*	229	Palacos MV+G Pro*	259	Simplex P	290	Palacos Fast R+G*	357	Cemex System GENTA FAST*
147	Palacos E*	211	Simplex HV*	224	Palacos Fast R+G*	222	Simplex P	277	Simplex HV*
139	Palamed G*	182	Refobacin Plus*	193	Simplex HV*	221	Simplex HV*	255	Simplex P
132	CMW 3 Plain	181	Palacos Fast R+G*	145	Refobacin Plus*	128	Refobacin Plus*	181	Copal G+C*
10 Most Used									
11160	(10) 93.5%	21114	(10) 98.2%	22256	(10) 98.2%	22579	(10) 98.3%	24685	(10) 98.4%
Remainder									
771	(19) 6.5%	394	(18) 1.8%	409	(15) 1.8%	402	(15) 1.7%	399	(14) 1.6%
TOTAL									
11931	(29) 100.0%	21508	(28) 100.0%	22665	(25) 100.0%	22981	(25) 100.0%	25084	(24) 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 Prostheses in Primary Hip Replacement

2003		2020		2021		2022		2023	
N	Model	N	Model	N	Model	N	Model	N	Model
470	Simplex Tobra*	459	Simplex Tobra*	398	Simplex Tobra*	328	Simplex Tobra*	318	Simplex Tobra*
409	CMW 1 Plain	208	Palacos R+G*	196	Palacos R+G*	191	Palacos R+G*	248	Palacos R+G*
315	Simplex P	111	Palacos Fast R+G*	113	Palacos Fast R+G*	131	Palacos Fast R+G*	114	Palacos Fast R+G*
275	Antibiotic Simplex*	70	CMW 2 G*	77	CMW 2 G*	55	Palacos MV+G*	53	Palacos MV+G*
265	CMW 1 G*	57	Palacos MV+G*	58	Palacos MV+G*	53	CMW 2 G*	49	CMW 2 G*
245	Palacos R*	17	Palacos R+G Pro*	37	Simplex HV*	47	Simplex HV*	24	Copal G+V*
183	CMW 2 G*	14	Copal G+V*	22	Copal G+V*	26	Copal G+V*	23	Simplex HV*
102	CMW 2 Plain	10	CMW 2	21	Palacos R+G Pro*	23	Palacos R+G Pro*	15	Palacos R+G Pro*
80	Palamed G*	10	Simplex HV*	8	CMW 2	11	Copal G+C*	9	Copal G+C*
33	Refobacin Plus*	5	SmartSet GHV*	7	Copal G+C*	5	CMW 2	4	Simplex P
10 Most Used									
2377	(10) 97.1%	961	(10) 98.1%	937	(10) 98.9%	870	(10) 99.2%	857	(10) 98.5%
Remainder									
71	(11) 2.9%	19	(10) 1.9%	10	(5) 1.1%	7	(6) 0.8%	13	(5) 1.5%
TOTAL									
2448	(21) 100.0%	980	(20) 100.0%	947	(15) 100.0%	877	(16) 100.0%	870	(15) 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		2020		2021		2022		2023	
N	Model	N	Model	N	Model	N	Model	N	Model
192	Simplex Tobra*	534	Simplex Tobra*	494	Simplex Tobra*	511	Simplex Tobra*	496	Simplex Tobra*
166	Antibiotic Simplex*	126	Copal G+V*	158	Copal G+V*	187	Copal G+V*	154	Copal G+V*
74	Simplex P	110	Palacos R+G*	101	Palacos R+G*	93	Palacos R+G*	118	Palacos R+G*
70	CMW 1 G*	78	Palacos MV+G*	75	Palacos R+G Pro*	88	Palacos MV+G*	97	Copal G+C*
37	Palacos R*	78	Palacos R+G Pro*	61	Palacos MV+G*	77	Palacos R+G Pro*	85	Palacos MV+G*
33	Palamed G*	60	Copal G+C*	49	Copal G+C*	70	Copal G+C*	83	Palacos R+G Pro*
21	CMW 3 G*	30	Palacos Fast R+G*	21	Palacos Fast R+G*	23	Palacos Fast R+G*	34	Palacos Fast R+G*
17	CMW 1 Plain	21	CMW 2 G*	16	CMW 2 G*	15	Palacos MV+G Pro*	19	CMW 2 G*
9	Refobacin Plus*	12	Palacos LV+G*	13	Palacos MV+G Pro*	11	CMW 2 G*	9	Palacos MV+G Pro*
8	Palacos E*	5	Refobacin Plus*	6	Simplex P	8	Palacos LV+G*	9	Simplex P
10 Most Used									
627 (10)	95.0%	1054 (10)	97.6%	994 (10)	97.6%	1083 (10)	97.3%	1104 (10)	98.7%
Remainder									
33 (11)	5.0%	26 (9)	2.4%	24 (10)	2.4%	30 (10)	2.7%	14 (6)	1.3%
TOTAL									
660 (21)	100.0%	1080 (19)	100.0%	1018 (20)	100.0%	1113 (20)	100.0%	1118 (16)	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

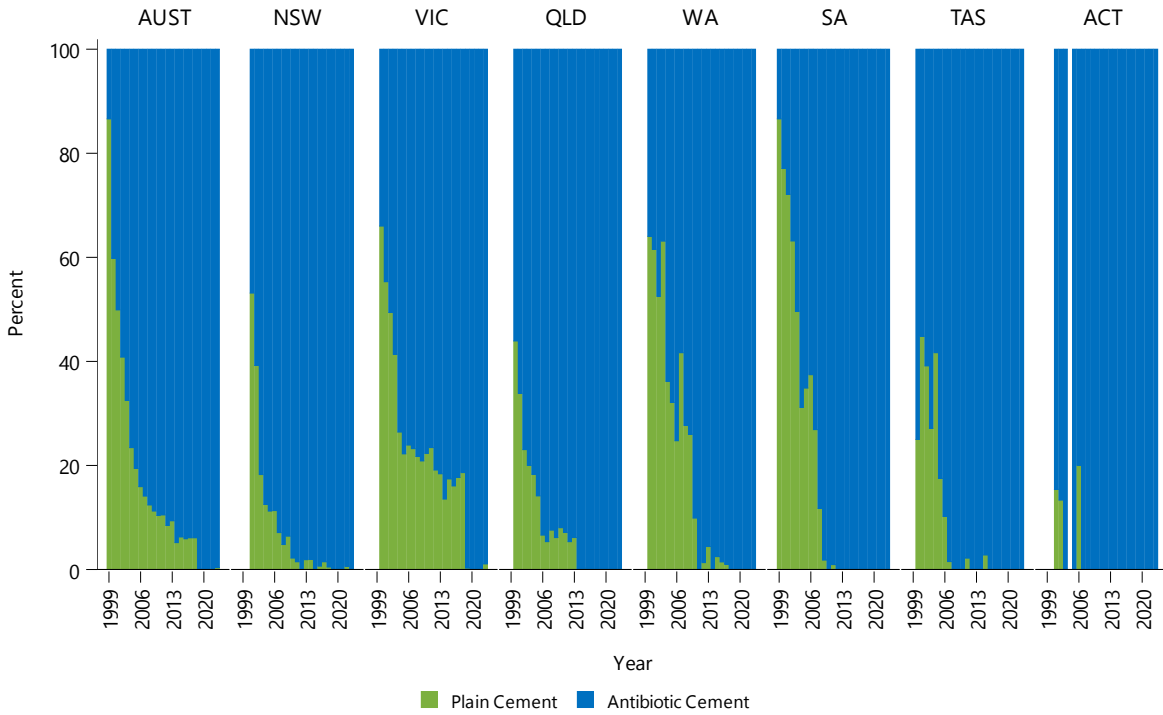
2003		2020		2021		2022		2023	
N	Model	N	Model	N	Model	N	Model	N	Model
197	CMW 1 G*	136	Palacos R+G*	146	Copal G+V*	144	Copal G+V*	153	Palacos R+G*
144	Simplex Tobra*	118	Simplex Tobra*	133	Palacos R+G*	129	Palacos R+G*	114	Copal G+V*
115	Antibiotic Simplex*	94	Copal G+V*	99	Simplex Tobra*	122	Simplex Tobra*	95	Palacos Fast R+G*
85	Palacos R*	74	CMW 2 G*	71	Palacos Fast R+G*	90	Palacos Fast R+G*	81	Simplex Tobra*
51	CMW 2 G*	62	Palacos Fast R+G*	57	CMW 2 G*	58	CMW 2 G*	79	Copal G+C*
48	CMW 1 Plain	45	Copal G+C*	48	Copal G+C*	57	Copal G+C*	60	CMW 2 G*
44	Palamed G*	38	Palacos MV+G*	29	Palacos MV+G*	37	Palacos MV+G*	52	Palacos MV+G*
40	Simplex P	10	Palacos R+G Pro*	12	Simplex HV*	8	Palacos R+G Pro*	9	Palacos R+G Pro*
20	CMW 2 Plain	7	Simplex HV*	7	Palacos R+G Pro*	5	Simplex HV*	3	Palacos LV+G*
15	Refobacin Plus*	4	Optipac*	3	CMW 2	3	SmartSet GHV*	3	Refobacin Plus*
10 Most Used									
759 (10)	97.9%	588 (10)	97.7%	605 (10)	98.4%	653 (10)	98.3%	649 (10)	98.6%
Remainder									
16 (8)	2.1%	14 (5)	2.3%	10 (6)	1.6%	11 (8)	1.7%	9 (5)	1.4%
TOTAL									
775 (18)	100.0%	602 (15)	100.0%	615 (16)	100.0%	664 (18)	100.0%	658 (15)	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

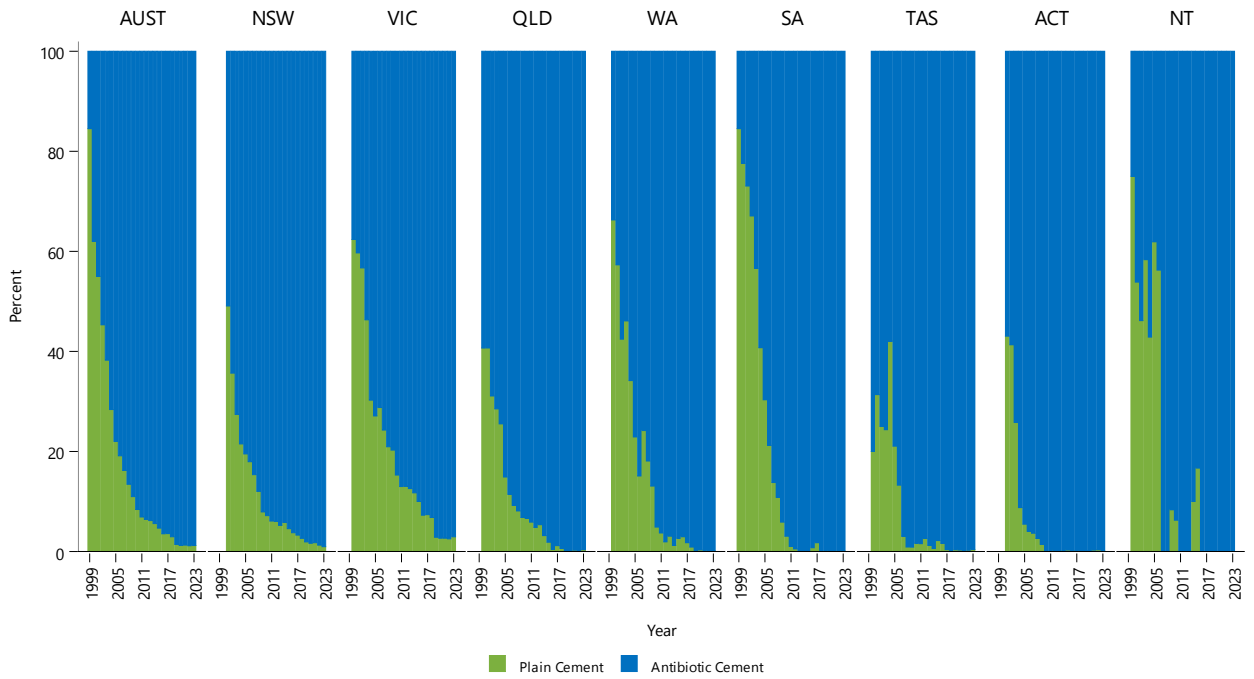


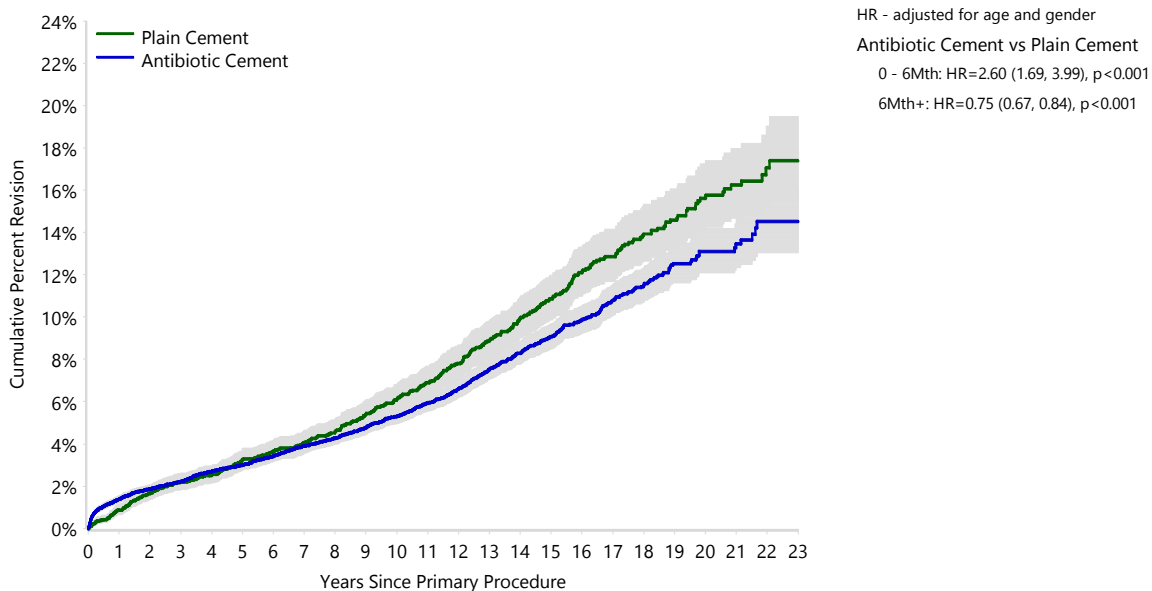
Table C5 Cumulative Percent Revision of Cemented Primary Total Conventional Hip Replacement by Cement Type and Location (Primary Diagnosis OA)

Cement Femur	Cement Acetabular	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	10 Yrs	15 Yrs	20 Yrs
Plain Cement	Plain Cement	487	5642	0.9 (0.7, 1.2)	2.2 (1.8, 2.6)	3.3 (2.8, 3.8)	6.1 (5.4, 6.8)	10.9 (9.9, 12.0)	15.6 (14.1, 17.2)
	Antibiotic Cement	67	858	0.9 (0.5, 1.9)	2.2 (1.4, 3.4)	3.1 (2.1, 4.5)	6.3 (4.7, 8.4)	11.1 (8.6, 14.3)	12.7 (9.8, 16.5)
Antibiotic Cement	Plain Cement	28	341	2.4 (1.2, 4.7)	3.3 (1.9, 6.0)	3.7 (2.1, 6.5)	7.9 (5.1, 11.9)	12.5 (8.2, 18.7)	
	Antibiotic Cement	1105	19828	1.4 (1.2, 1.6)	2.2 (2.0, 2.4)	3.0 (2.7, 3.2)	5.2 (4.8, 5.6)	8.9 (8.3, 9.5)	13.1 (12.0, 14.2)
TOTAL		1687	26669						

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	487	5642	0.9 (0.7, 1.2)	2.2 (1.8, 2.6)	3.3 (2.8, 3.8)	6.1 (5.4, 6.8)	10.9 (9.9, 12.0)	15.6 (14.1, 17.2)
Antibiotic Cement	1200	21027	1.4 (1.2, 1.6)	2.2 (2.0, 2.4)	3.0 (2.8, 3.3)	5.3 (5.0, 5.7)	9.1 (8.5, 9.7)	13.1 (12.1, 14.2)
TOTAL	1687	26669						

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	5486	5138	4740	3236	1715	646
Antibiotic Cement	21027	19836	17579	15122	8647	3650	795

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	273	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, 4.8)	5.3 (4.7, 6.0)
Plain Cement	Prosthesis Dislocation/Instability	71	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	65	0.2 (0.1, 0.4)	0.5 (0.4, 0.8)	0.7 (0.5, 0.9)	0.8 (0.6, 1.1)	1.0 (0.8, 1.3)	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 (0.8, 1.3)
Plain Cement	Lysis	7	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 (0.1, 0.3)	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	3601	1.9 (1.5, 2.2)	6.8 (6.1, 7.4)	12.9 (12.0, 13.8)	33.5 (32.3, 34.8)	54.1 (52.8, 55.5)	69.2 (67.9, 70.6)
Plain Cement	All Revision	487	0.9 (0.7, 1.1)	2.1 (1.8, 2.5)	3.1 (2.7, 3.6)	5.2 (4.6, 5.8)	7.8 (7.1, 8.5)	9.4 (8.6, 10.2)
Antibiotic Cement	Loosening	495	0.2 (0.1, 0.2)	0.4 (0.3, 0.5)	0.7 (0.6, 0.8)	1.6 (1.4, 1.8)	2.8 (2.5, 3.0)	3.6 (3.3, 3.9)
Antibiotic Cement	Prosthesis Dislocation/Instability	231	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)	1.3 (1.1, 1.4)
Antibiotic Cement	Infection	203	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)	1.1 (1.0, 1.3)
Antibiotic Cement	Fracture	201	0.2 (0.1, 0.3)	0.4 (0.3, 0.4)	0.5 (0.4, 0.6)	0.8 (0.7, 1.0)	1.1 (1.0, 1.3)	1.2 (1.1, 1.4)
Antibiotic Cement	Lysis	21	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.1)	0.1 (0.0, 0.1)	0.1 (0.1, 0.2)	0.2 (0.1, 0.3)
Antibiotic Cement	Other	49	0.0 (0.0, 0.1)	0.1 (0.0, 0.1)	0.1 (0.1, 0.1)	0.2 (0.1, 0.2)	0.3 (0.2, 0.3)	0.4 (0.3, 0.5)
Antibiotic Cement	Deceased	10159	2.1 (1.9, 2.3)	7.7 (7.3, 8.1)	14.4 (13.9, 14.9)	35.8 (35.1, 36.5)	56.3 (55.4, 57.1)	72.2 (71.2, 73.1)
Antibiotic Cement	All Revision	1200	1.4 (1.2, 1.5)	2.2 (2.0, 2.4)	2.9 (2.6, 3.1)	4.6 (4.3, 4.9)	6.5 (6.1, 6.9)	7.8 (7.3, 8.2)

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

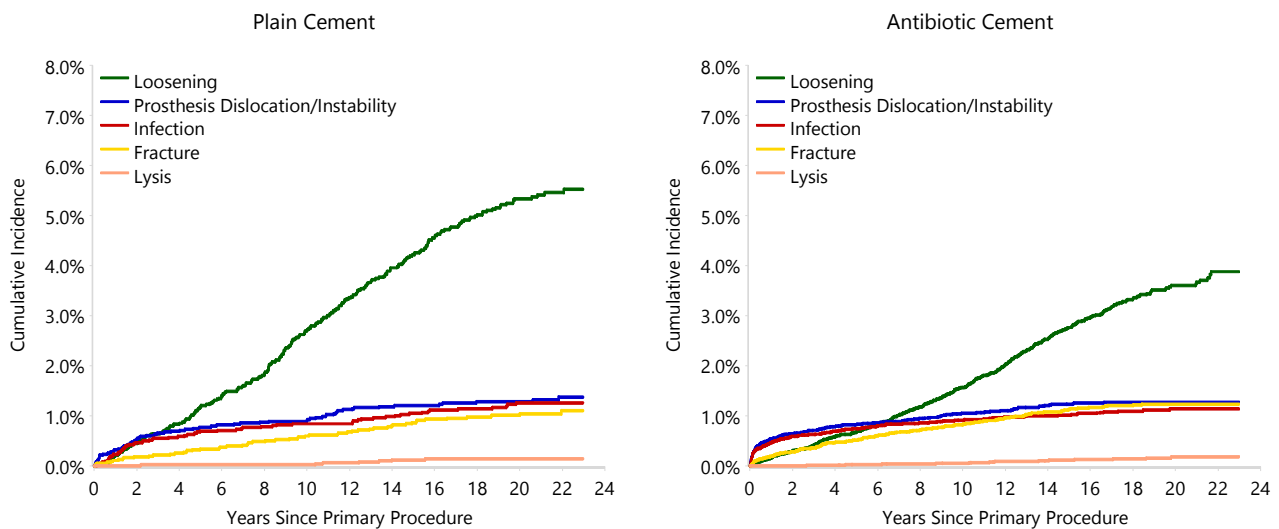


Figure C5 Cumulative Incidence Revision Diagnosis of Cemented Primary Total Conventional Hip Replacement by Year of Implant and Cement Type (Primary Diagnosis OA)

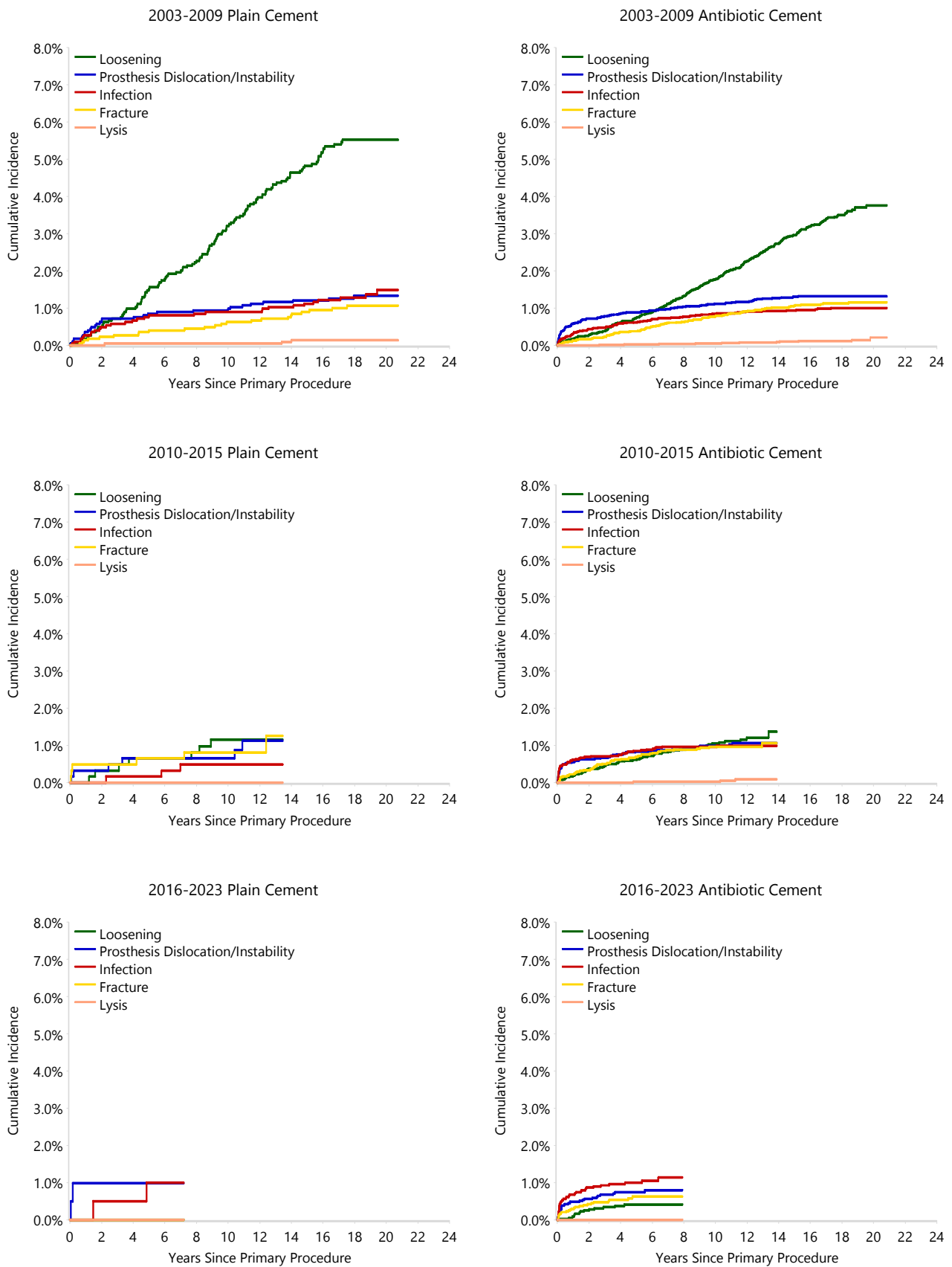
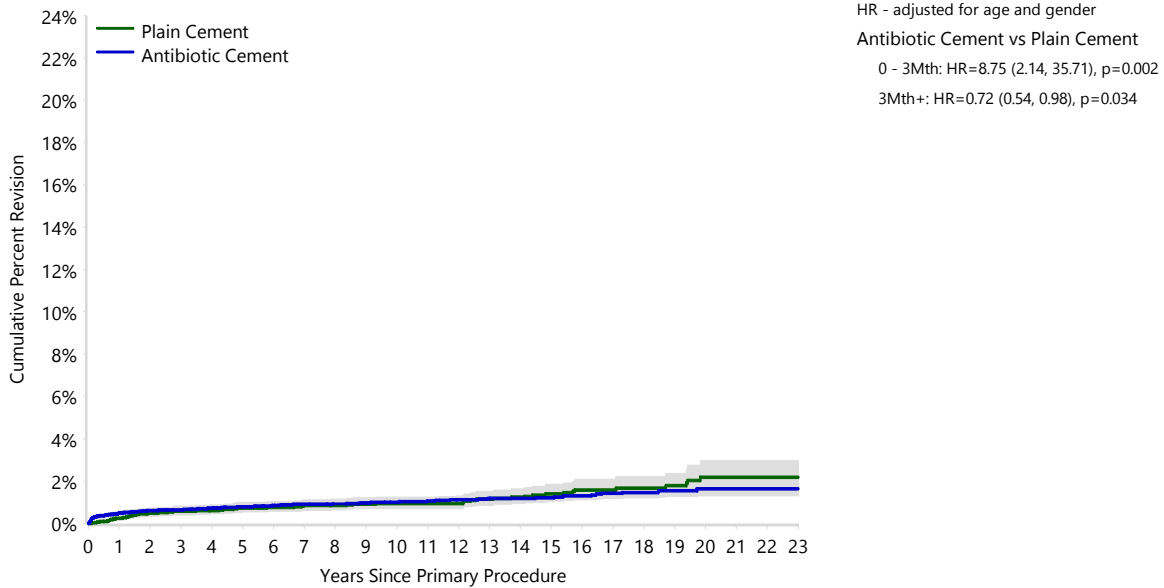


Table C8 Cumulative Percent Revision of Cemented Primary Total Conventional Hip Replacement by Cement Type (Primary Diagnosis OA, Revision for Infection)

Antibiotic Status	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	10 Yrs	15 Yrs	20 Yrs
Plain Cement	65	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 (1.0, 1.8)	2.2 (1.6, 3.0)
Antibiotic Cement	203	21027	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)	1.6 (1.3, 2.0)
TOTAL	268	26669						

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	5486	5138	4740	3236	1715	646
Antibiotic Cement	21027	19836	17579	15122	8647	3650	795

Knee Replacement

CEMENT TRENDS IN KNEE REPLACEMENT

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

2003		2020		2021		2022		2023	
N	Model	N	Model	N	Model	N	Model	N	Model
2215	CMW 1 G*	14603	Palacos R+G*	14677	Palacos R+G*	13013	Palacos R+G*	15468	Palacos R+G*
1744	Simplex P	8545	Palacos R+G Pro*	9817	Palacos R+G Pro*	9982	Palacos R+G Pro*	11876	Palacos R+G Pro*
1733	CMW 1 Plain	3864	Simplex Tobra*	3823	Simplex Tobra*	3743	Palacos Fast R+G*	4921	Palacos Fast R+G*
1686	Antibiotic Simplex*	3122	Palacos MV+G*	3595	Palacos Fast R+G*	3477	Simplex Tobra*	3882	Simplex Tobra*
1468	Simplex Tobra*	2878	Palacos Fast R+G*	3197	Palacos MV+G*	2994	Palacos MV+G*	3881	Palacos MV+G*
1352	Palacos R*	1924	CMW 2 G*	1849	CMW 2 G*	1667	CMW 2 G*	1726	CMW 2 G*
996	CMW 2 Plain	1023	Copal G+C*	874	Copal G+C*	843	Copal G+C*	992	Copal G+C*
936	CMW 2 G*	488	Palacos MV+G Pro*	674	Palacos MV+G Pro*	701	Palacos MV+G Pro*	801	Palacos MV+G Pro*
935	Palamed G*	467	Simplex HV*	565	SmartSet GHV*	407	Optipac*	355	SmartSet GHV*
296	Refobacin Plus*	415	Cemex System GENTA FAST*	430	Simplex HV*	403	SmartSet GHV*	353	Refobacin Plus*
10 Most Used									
13361	(10) 97.0%	37329	(10) 94.9%	39501	(10) 95.9%	37230	(10) 96.0%	44255	(10) 97.1%
Remainder									
417	(18) 3.0%	2009	(14) 5.1%	1676	(16) 4.1%	1537	(15) 4.0%	1301	(16) 2.9%
TOTAL									
13778	(28) 100.0%	39338	(24) 100.0%	41177	(26) 100.0%	38767	(25) 100.0%	45556	(26) 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 Protheses in Primary Knee Replacement

2003		2020		2021		2022		2023	
N	Model	N	Model	N	Model	N	Model	N	Model
3020	CMW 1 G*	16900	Palacos R+G*	17074	Palacos R+G*	15182	Palacos R+G*	18175	Palacos R+G*
2661	CMW 1 Plain	9250	Palacos R+G Pro*	10379	Palacos R+G Pro*	10667	Palacos R+G Pro*	12922	Palacos R+G Pro*
2658	Simplex P	4635	Simplex Tobra*	5508	Palacos Fast R+G*	5492	Palacos Fast R+G*	7527	Palacos Fast R+G*
2270	Antibiotic Simplex*	4569	Palacos Fast R+G*	4794	Simplex Tobra*	4429	Simplex Tobra*	4962	Simplex Tobra*
1981	Simplex Tobra*	3647	Palacos MV+G*	3945	Palacos MV+G*	3791	Palacos MV+G*	4790	Palacos MV+G*
1870	CMW 2 Plain	3130	CMW 2 G*	3034	CMW 2 G*	2714	CMW 2 G*	2947	CMW 2 G*
1672	Palacos R*	1228	Copal G+C*	1420	Copal G+C*	1518	Copal G+C*	1706	Copal G+C*
1411	CMW 2 G*	758	Optipac*	702	Palacos MV+G Pro*	758	Optipac*	820	Palacos MV+G Pro*
1126	Palamed G*	642	Cemex System GENTA FAST*	687	Optipac*	728	Palacos MV+G Pro*	543	Optipac*
350	Refobacin Plus*	621	Simplex HV*	629	SmartSet GHV*	465	SmartSet GHV*	496	Refobacin Plus*
10 Most Used									
19019	(10) 96.8%	45380	(10) 94.8%	48172	(10) 95.4%	45744	(10) 95.7%	54888	(10) 96.5%
Remainder									
628	(19) 3.2%	2512	(15) 5.2%	2348	(17) 4.6%	2035	(17) 4.3%	1970	(16) 3.5%
TOTAL									
19647	(29) 100.0%	47892	(25) 100.0%	50520	(27) 100.0%	47779	(27) 100.0%	56858	(26) 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 Protheses in Primary Knee Replacement

2003		2020		2021		2022		2023	
N	Model	N	Model	N	Model	N	Model	N	Model
1305	Antibiotic Simplex*	12275	Palacos R+G*	13003	Palacos R+G*	11780	Palacos R+G*	14049	Palacos R+G*
1172	CMW 1 G*	7492	Palacos R+G Pro*	8687	Palacos R+G Pro*	8744	Palacos R+G Pro*	10373	Palacos R+G Pro*
1059	CMW 1 Plain	5544	Palacos Fast R+G*	6887	Palacos Fast R+G*	7241	Palacos Fast R+G*	10093	Palacos Fast R+G*
1053	CMW 2 Plain	4077	CMW 2 G*	4851	CMW 2 G*	4961	CMW 2 G*	5367	CMW 2 G*
1002	Simplex P	3299	Simplex Tobra*	3613	Simplex Tobra*	3501	Simplex Tobra*	3725	Palacos MV+G*
982	Simplex Tobra*	2487	Palacos MV+G*	2856	Palacos MV+G*	2862	Palacos MV+G*	3702	Simplex Tobra*
694	Palacos R*	1142	Copal G+C*	1098	Copal G+C*	1390	Copal G+C*	1336	Copal G+C*
630	Palamed G*	742	CMW 2	785	CMW 2	811	CMW 2	873	CMW 2
591	CMW 2 G*	658	Simplex HV*	767	Simplex HV*	649	Optipac*	704	Palacos MV+G Pro*
188	Refobacin Plus*	630	Optipac*	615	Palacos MV+G Pro*	613	Palacos MV+G Pro*	521	Simplex HV*
10 Most Used									
8676	(10) 96.8%	38346	(10) 94.8%	43162	(10) 95.4%	42552	(10) 95.9%	50743	(10) 96.7%
Remainder									
290	(14) 3.2%	2123	(15) 5.2%	2062	(16) 4.6%	1829	(16) 4.1%	1719	(17) 3.3%
TOTAL									
8966	(24) 100.0%	40469	(25) 100.0%	45224	(26) 100.0%	44381	(26) 100.0%	52462	(27) 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		2020		2021		2022		2023	
N	Model	N	Model	N	Model	N	Model	N	Model
254	CMW 1 G*	655	Palacos R+G*	673	Palacos R+G*	596	Palacos R+G*	637	Palacos R+G*
187	Antibiotic Simplex*	427	Copal G+V*	553	Copal G+V*	544	Copal G+V*	494	Copal G+V*
152	Simplex Tobra*	363	Palacos R+G Pro*	363	Palacos R+G Pro*	357	Palacos R+G Pro*	418	Palacos R+G Pro*
134	Palacos R*	294	Simplex Tobra*	265	Copal G+C*	281	Simplex Tobra*	295	Copal G+C*
100	CMW 2 G*	208	Copal G+C*	255	Simplex Tobra*	234	Copal G+C*	293	Simplex Tobra*
81	Palamed G*	179	Palacos Fast R+G*	216	Palacos Fast R+G*	221	Palacos Fast R+G*	290	Palacos Fast R+G*
68	Simplex P	151	Palacos MV+G*	169	Palacos MV+G*	139	Palacos MV+G*	198	Palacos MV+G*
50	CMW 1 Plain	118	CMW 2 G*	108	CMW 2 G*	82	CMW 2 G*	119	CMW 2 G*
41	CMW 2 Plain	35	SmartSet GHV*	31	SmartSet GHV*	38	Palacos MV+G Pro*	39	Palacos MV+G Pro*
38	Refobacin Plus*	27	Refobacin Plus*	21	Palacos MV+G Pro*	27	Simplex HV*	25	SmartSet GHV*
10 Most Used									
1105 (10)	96.3%	2457 (10)	95.9%	2654 (10)	97.1%	2519 (10)	96.9%	2808 (10)	96.6%
Remainder									
42 (9)	3.7%	104 (14)	4.1%	80 (14)	2.9%	80 (14)	3.1%	100 (13)	3.4%
TOTAL									
1147 (19)	100.0%	2561 (24)	100.0%	2734 (24)	100.0%	2599 (24)	100.0%	2908 (23)	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*	675	Palacos R+G*	709	Palacos R+G*	615	Palacos R+G*	645	Palacos R+G*
215	Antibiotic Simplex*	414	Copal G+V*	538	Copal G+V*	531	Copal G+V*	482	Copal G+V*
165	Simplex Tobra*	378	Palacos R+G Pro*	360	Palacos R+G Pro*	363	Palacos R+G Pro*	422	Palacos R+G Pro*
145	Palacos R*	271	Simplex Tobra*	281	Copal G+C*	279	Simplex Tobra*	303	Palacos Fast R+G*
126	CMW 2 G*	218	Copal G+C*	263	Simplex Tobra*	258	Palacos Fast R+G*	298	Copal G+C*
97	Palamed G*	206	Palacos Fast R+G*	224	Palacos Fast R+G*	248	Copal G+C*	282	Simplex Tobra*
74	CMW 1 Plain	149	Palacos MV+G*	168	Palacos MV+G*	139	Palacos MV+G*	205	Palacos MV+G*
73	Simplex P	136	CMW 2 G*	126	CMW 2 G*	112	CMW 2 G*	134	CMW 2 G*
71	CMW 2 Plain	32	SmartSet GHV*	34	SmartSet GHV*	41	Palacos MV+G Pro*	40	Palacos MV+G Pro*
29	Refobacin Plus*	30	Simplex HV*	25	Simplex HV*	26	Simplex HV*	28	Simplex HV*
10 Most Used									
1302 (10)	95.9%	2509 (10)	95.6%	2728 (10)	96.7%	2612 (10)	96.8%	2839 (10)	96.5%
Remainder									
56 (11)	4.1%	116 (16)	4.4%	92 (13)	3.3%	86 (13)	3.2%	102 (12)	3.5%
TOTAL									
1358 (21)	100.0%	2625 (26)	100.0%	2820 (23)	100.0%	2698 (23)	100.0%	2941 (22)	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*	502	Palacos R+G*	535	Palacos Fast R+G*	517	Palacos Fast R+G*	599	Palacos Fast R+G*
150	CMW 2 Plain	427	Palacos Fast R+G*	524	Palacos R+G*	397	Palacos R+G*	448	Palacos R+G*
130	Antibiotic Simplex*	251	CMW 2 G*	332	CMW 2 G*	309	CMW 2 G*	292	CMW 2 G*
114	CMW 2 G*	189	Palacos R+G Pro*	189	Copal G+V*	210	Palacos R+G Pro*	222	Palacos R+G Pro*
113	Simplex Tobra*	150	Simplex Tobra*	187	Palacos R+G Pro*	194	Copal G+V*	202	Copal G+V*
85	Simplex P	146	Copal G+V*	139	Simplex Tobra*	152	Simplex Tobra*	137	Copal G+C*
78	Palacos R*	89	Copal G+C*	117	Copal G+C*	89	Copal G+C*	121	Simplex Tobra*
59	Palamed G*	88	Palacos MV+G*	108	Palacos MV+G*	87	Palacos MV+G*	116	Palacos MV+G*
56	CMW 1 Plain	35	CMW 2	31	CMW 2	22	Palacos MV+G Pro*	23	Simplex HV*
17	Refobacin Plus*	20	Simplex HV*	20	SmartSet GHV*	20	Simplex HV*	21	CMW 2
10 Most Used									
981 (10)	96.1%	1897 (10)	95.6%	2182 (10)	96.5%	1997 (10)	96.8%	2181 (10)	97.3%
Remainder									
40 (10)	3.9%	88 (13)	4.4%	80 (12)	3.5%	65 (9)	3.2%	60 (8)	2.7%
TOTAL									
1021 (20)	100.0%	1985 (23)	100.0%	2262 (22)	100.0%	2062 (19)	100.0%	2241 (18)	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

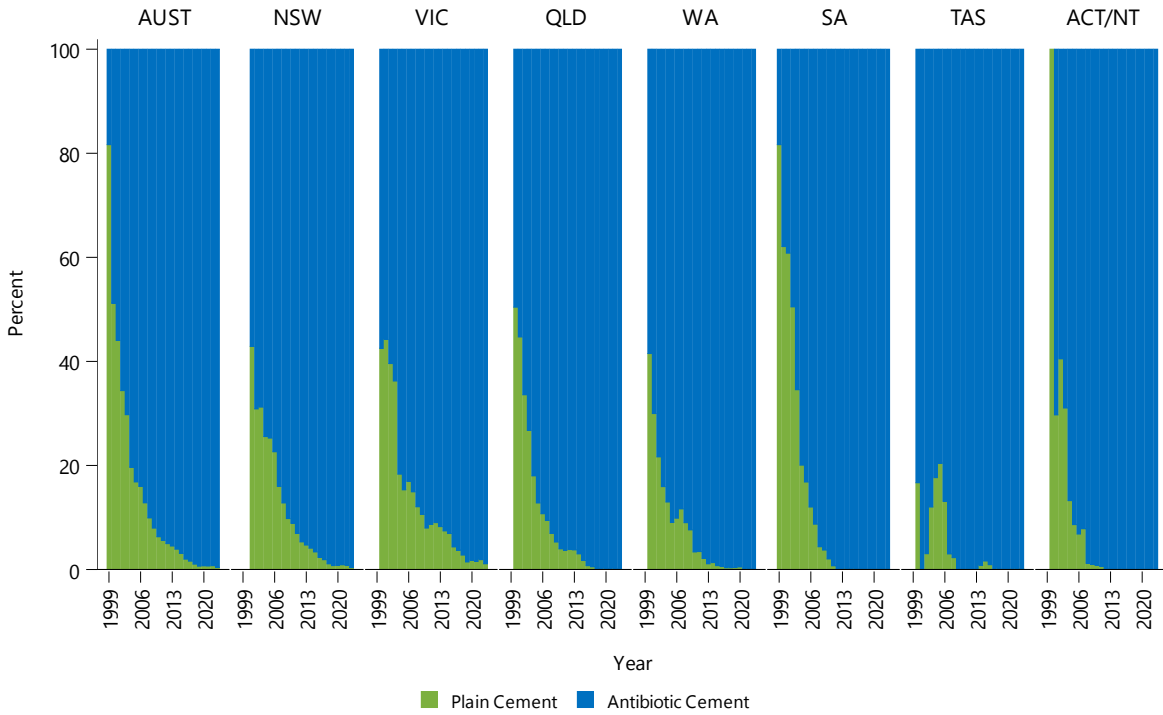


Figure C8 Trends in Usage of Tibia Cemented Primary Total Knee Replacement by State/Territory and Year

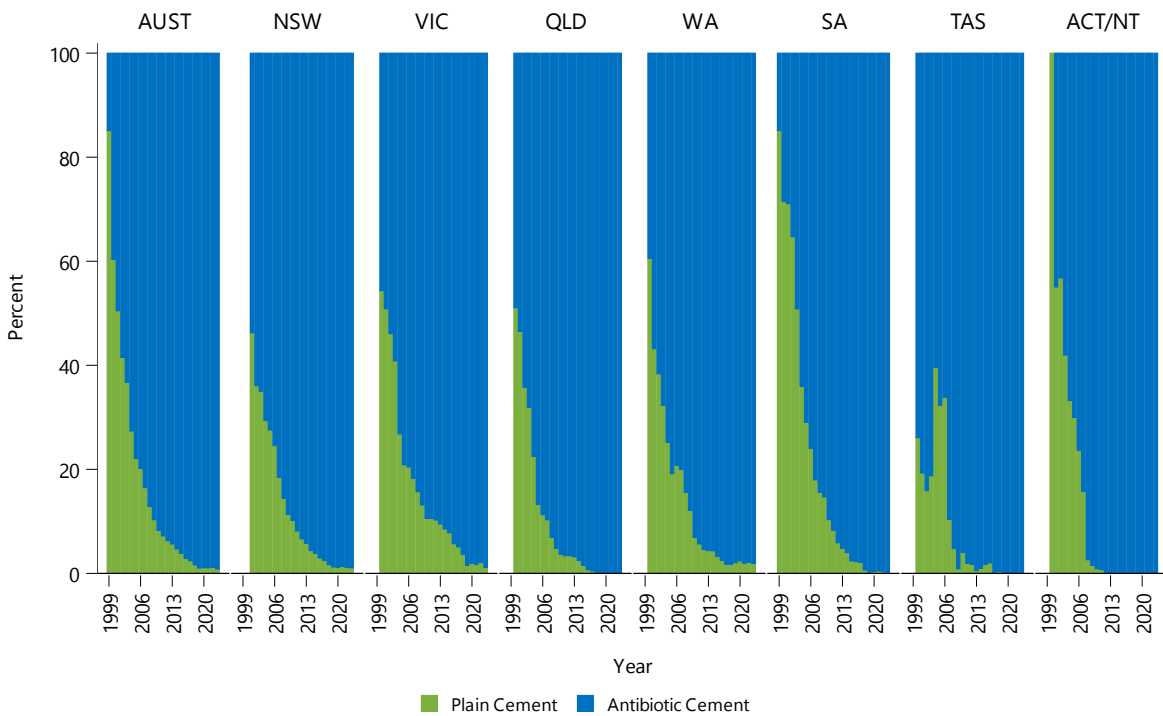


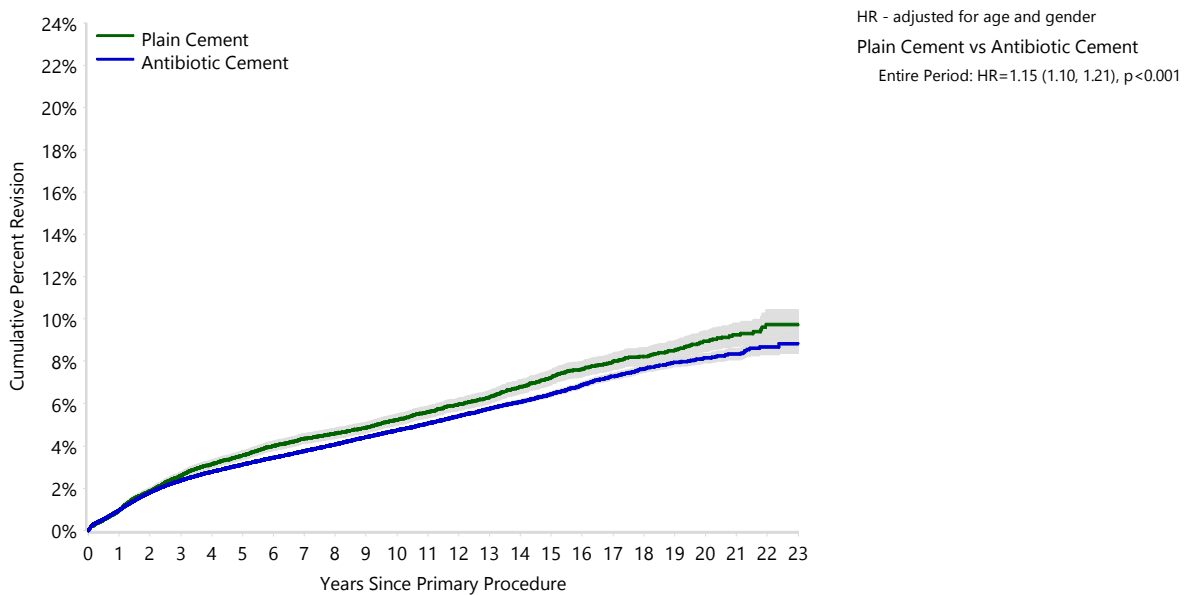
Table C15 Cumulative Percent Revision of Cemented Primary Total Knee Replacement by Cement Type and Location (Primary Diagnosis OA)

Cement Femur	Cement Tibia	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	10 Yrs	15 Yrs	20 Yrs
Plain Cement	Plain Cement	1827	30310	0.9 (0.8, 1.1)	2.6 (2.4, 2.8)	3.6 (3.3, 3.8)	5.2 (5.0, 5.5)	7.2 (6.9, 7.6)	8.9 (8.5, 9.4)
	Antibiotic Cement	34	514	1.4 (0.7, 2.9)	3.1 (1.9, 5.0)	4.3 (2.8, 6.6)	6.1 (4.2, 9.0)	9.1 (6.2, 13.2)	
Antibiotic Cement	Plain Cement	37	662	0.8 (0.3, 1.8)	2.4 (1.4, 3.9)	3.3 (2.1, 5.1)	5.4 (3.8, 7.7)	7.0 (5.0, 9.8)	8.0 (5.7, 11.2)
	Antibiotic Cement	19013	522302	1.0 (0.9, 1.0)	2.4 (2.3, 2.4)	3.1 (3.1, 3.2)	4.7 (4.7, 4.8)	6.4 (6.3, 6.6)	8.1 (7.9, 8.4)
TOTAL		20911	553788						

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	1827	30310	0.9 (0.8, 1.1)	2.6 (2.4, 2.8)	3.6 (3.3, 3.8)	5.2 (5.0, 5.5)	7.2 (6.9, 7.6)	8.9 (8.5, 9.4)
Antibiotic Cement	19084	523478	1.0 (0.9, 1.0)	2.4 (2.3, 2.4)	3.1 (3.1, 3.2)	4.7 (4.7, 4.8)	6.4 (6.3, 6.6)	8.2 (7.9, 8.4)
TOTAL	20911	553788						

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	30310	29585	27759	25813	17926	9252	2535
Antibiotic Cement	523478	474452	389544	305317	128719	38688	4761

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	398	0.4 (0.3, 0.5)	0.8 (0.7, 0.9)	1.0 (0.9, 1.1)	1.2 (1.1, 1.3)	1.3 (1.2, 1.5)	1.4 (1.3, 1.6)
Plain Cement	Loosening	547	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, 2.1)	2.1 (1.9, 2.2)
Plain Cement	Instability	122	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, 0.6)
Plain Cement	Pain	140	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 (0.4, 0.6)
Plain Cement	Patellofemoral Pain	147	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	473	0.2 (0.2, 0.3)	0.5 (0.5, 0.6)	0.7 (0.6, 0.8)	1.1 (1.0, 1.2)	1.5 (1.4, 1.7)	1.9 (1.7, 2.1)
Plain Cement	Deceased	14044	0.9 (0.8, 1.0)	3.8 (3.6, 4.0)	8.0 (7.7, 8.3)	24.0 (23.5, 24.5)	43.9 (43.3, 44.5)	62.4 (61.6, 63.1)
Plain Cement	All Revision	1827	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, 6.4)	6.9 (6.6, 7.2)
Antibiotic Cement	Infection	5580	0.5 (0.5, 0.5)	0.8 (0.8, 0.8)	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	4336	0.1 (0.1, 0.1)	0.4 (0.4, 0.4)	0.6 (0.6, 0.6)	1.1 (1.0, 1.1)	1.4 (1.4, 1.5)	1.7 (1.7, 1.8)
Antibiotic Cement	Instability	1788	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)	0.6 (0.5, 0.6)
Antibiotic Cement	Pain	1408	0.0 (0.0, 0.0)	0.2 (0.2, 0.2)	0.2 (0.2, 0.3)	0.3 (0.3, 0.4)	0.4 (0.4, 0.4)	0.4 (0.4, 0.4)
Antibiotic Cement	Patellofemoral Pain	1198	0.0 (0.0, 0.0)	0.2 (0.1, 0.2)	0.2 (0.2, 0.2)	0.3 (0.3, 0.3)	0.3 (0.3, 0.3)	0.4 (0.3, 0.4)
Antibiotic Cement	Other	4774	0.2 (0.2, 0.2)	0.5 (0.5, 0.5)	0.7 (0.7, 0.7)	1.1 (1.1, 1.1)	1.6 (1.5, 1.6)	1.9 (1.8, 1.9)
Antibiotic Cement	Deceased	90677	0.7 (0.6, 0.7)	2.9 (2.9, 3.0)	6.4 (6.4, 6.5)	20.4 (20.3, 20.6)	39.6 (39.4, 39.9)	58.9 (58.5, 59.4)
Antibiotic Cement	All Revision	19084	1.0 (0.9, 1.0)	2.3 (2.3, 2.4)	3.1 (3.0, 3.1)	4.5 (4.4, 4.5)	5.6 (5.5, 5.7)	6.5 (6.3, 6.6)

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

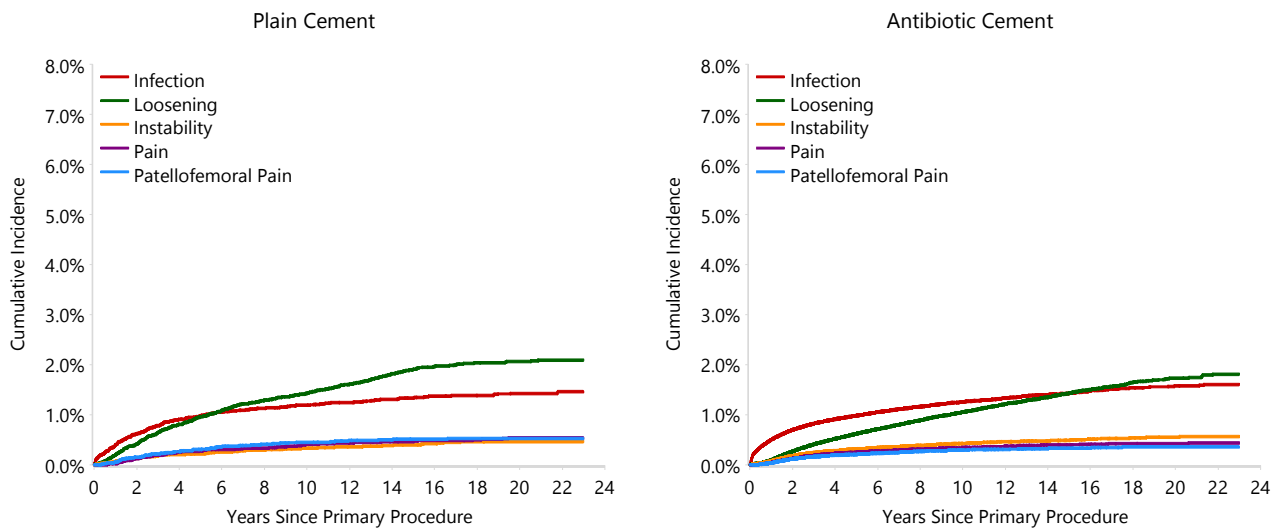


Figure C11 Cumulative Incidence Revision Diagnosis of Cemented Primary Total Knee Replacement by Year of Implant and Cement Type (Primary Diagnosis OA)

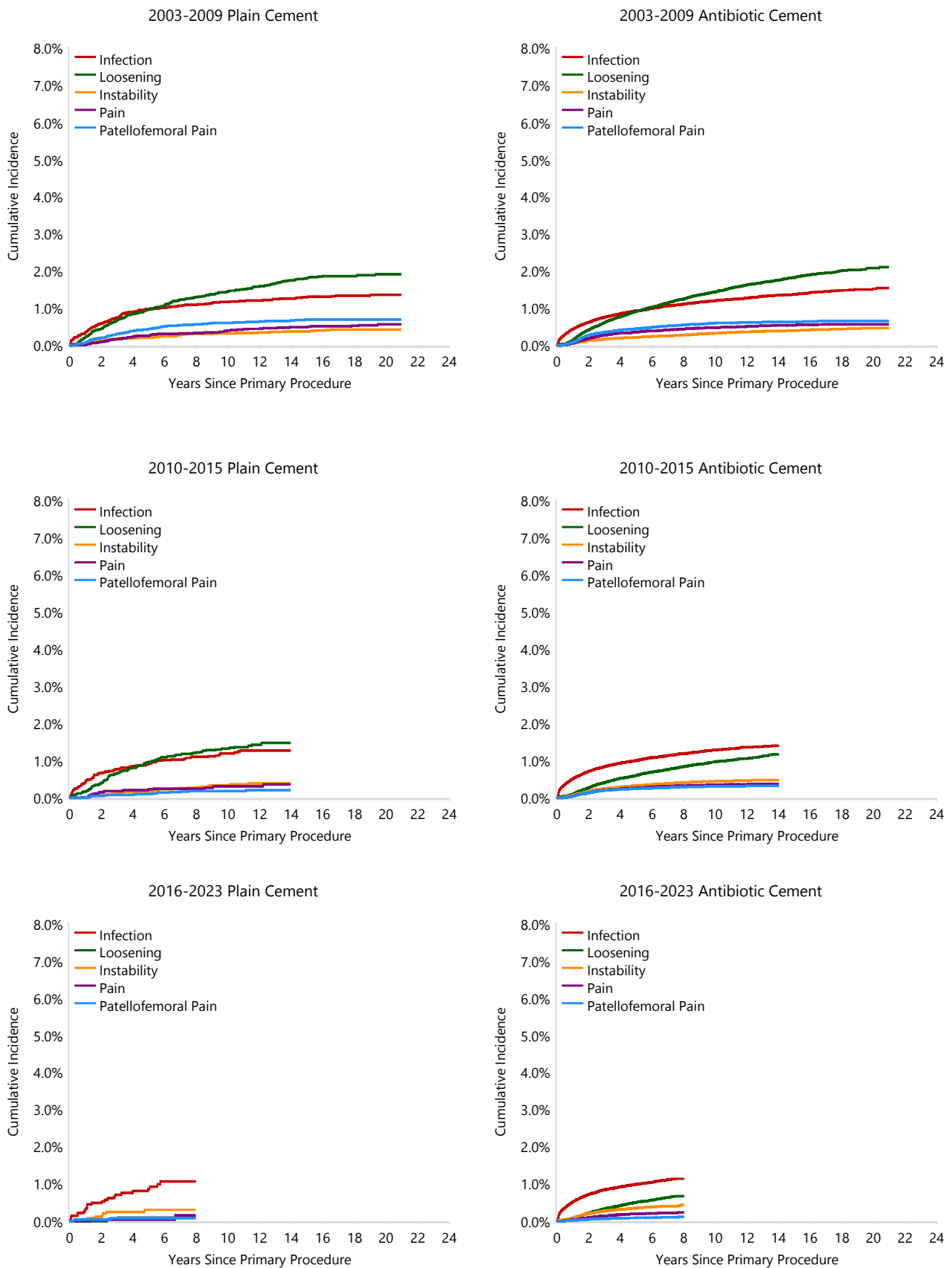
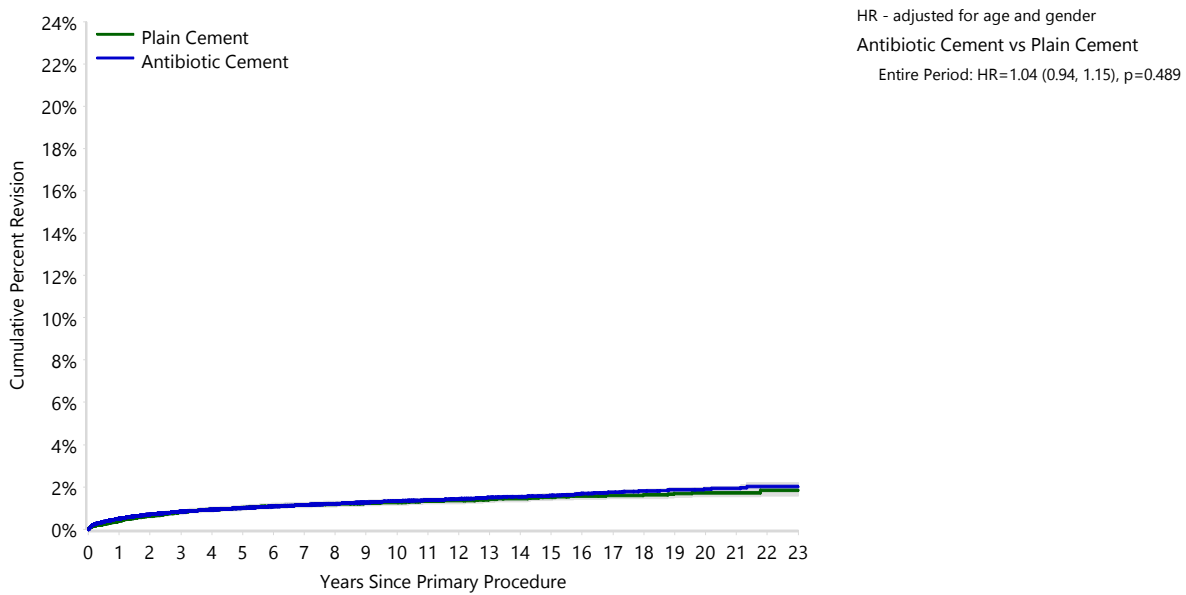


Table C18 Cumulative Percent Revision of Cemented Primary Total Knee Replacement by Cement Type (Primary Diagnosis OA, Revision for Infection)

Antibiotic Status	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	10 Yrs	15 Yrs	20 Yrs
Plain Cement	398	30310	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)	1.7 (1.5, 1.9)
Antibiotic Cement	5580	523478	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	5978	553788						

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	30310	29585	27759	25813	17926	9252	2535
Antibiotic Cement	523478	474452	389544	305317	128719	38688	4761

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