

Australian Orthopaedic Association National Joint Replacement Registry

2022 Cement in Hip and Knee
Arthroplasty Supplementary Report



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2022 Cement in Hip and Knee Arthroplasty 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 2021, 100% of cemented total conventional hip replacements and 99.4% 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 6 months 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		2018		2019		2020		2021	
N	Model	N	Model	N	Model	N	Model	N	Model
3225	Simplex P	13720	Simplex Tobra*	14264	Simplex Tobra*	13212	Simplex Tobra*	13221	Simplex Tobra*
3061	Antibiotic Simplex*	2152	Palacos MV+G*	2380	Palacos R+G Pro*	2665	Palacos R+G Pro*	2998	Palacos R+G Pro*
2394	Simplex Tobra*	1730	Palacos R+G Pro*	2244	Palacos MV+G*	2197	Palacos MV+G*	2447	Palacos MV+G*
672	CMW 1 G*	1512	Palacos R+G*	1563	Palacos R+G*	1642	Palacos R+G*	1560	Palacos R+G*
583	CMW 1 Plain	453	Simplex P	276	Simplex P	330	Cemex System GENTA FAST*	461	Palacos MV+G Pro*
438	Palacos R*	203	Refobacin Plus*	222	Simplex HV*	235	Simplex P	344	Cemex System GENTA FAST*
369	CMW 3 G*	172	CMW 3 G*	176	Cemex System GENTA FAST*	229	Palacos MV+G Pro*	246	Simplex P
147	Palacos E*	106	Palacos Fast R+G*	176	Refobacin Plus*	212	Simplex HV*	190	Palacos Fast R+G*
139	Palamed G*	85	Cemex System GENTA FAST*	146	CMW 3 G*	182	Refobacin Plus*	187	Simplex HV*
132	CMW 3 Plain	72	Copal G+C*	108	Copal G+C*	181	Palacos Fast R+G*	143	Refobacin Plus*
10 Most Used									
11160	(10) 93.5%	20205	(10) 98.4%	21555	(10) 98.2%	21085	(10) 98.2%	21797	(10) 98.3%
Remainder									
771	(19) 6.5%	322	(15) 1.6%	397	(14) 1.8%	391	(18) 1.8%	383	(14) 1.7%
TOTAL									
11931	(29) 100.0%	20527	(25) 100.0%	21952	(24) 100.0%	21476	(28) 100.0%	22180	(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		2018		2019		2020		2021	
N	Model	N	Model	N	Model	N	Model	N	Model
470	Simplex Tobra*	551	Simplex Tobra*	591	Simplex Tobra*	456	Simplex Tobra*	391	Simplex Tobra*
409	CMW 1 Plain	297	Palacos R+G*	252	Palacos R+G*	209	Palacos R+G*	186	Palacos R+G*
315	Simplex P	92	CMW 2 G*	98	CMW 2 G*	111	Palacos Fast R+G*	108	Palacos Fast R+G*
275	Antibiotic Simplex*	68	Palacos MV+G*	94	Palacos Fast R+G*	69	CMW 2 G*	75	CMW 2 G*
265	CMW 1 G*	68	Simplex P	61	Palacos MV+G*	57	Palacos MV+G*	54	Palacos MV+G*
245	Palacos R*	47	Palacos Fast R+G*	35	Simplex HV*	17	Palacos R+G Pro*	37	Simplex HV*
183	CMW 2 G*	24	SmartSet GHV*	33	Palacos R+G Pro*	14	Copal G+V*	22	Copal G+V*
102	CMW 2 Plain	13	Copal G+V*	15	Copal G+V*	10	CMW 2	21	Palacos R+G Pro*
80	Palamed G*	12	Refobacin Plus*	15	SmartSet GHV*	10	Simplex HV*	7	CMW 2
33	Refobacin Plus*	11	Palacos R+G Pro*	13	CMW 3 G*	5	SmartSet GHV*	7	Copal G+C*
10 Most Used									
2377	(10) 97.1%	1183	(10) 97.1%	1207	(10) 97.4%	958	(10) 98.1%	908	(10) 98.9%
Remainder									
71	(11) 2.9%	35	(10) 2.9%	32	(6) 2.6%	19	(10) 1.9%	10	(5) 1.1%
TOTAL									
2448	(21) 100.0%	1218	(20) 100.0%	1239	(16) 100.0%	977	(20) 100.0%	918	(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		2018		2019		2020		2021	
N	Model	N	Model	N	Model	N	Model	N	Model
192	Simplex Tobra*	544	Simplex Tobra*	566	Simplex Tobra*	533	Simplex Tobra*	482	Simplex Tobra*
166	Antibiotic Simplex*	116	Palacos R+G*	119	Palacos R+G*	123	Copal G+V*	154	Copal G+V*
74	Simplex P	104	Copal G+V*	113	Copal G+V*	109	Palacos R+G*	98	Palacos R+G*
70	CMW 1 G*	85	Palacos MV+G*	77	Copal G+C*	78	Palacos MV+G*	74	Palacos R+G Pro*
37	Palacos R*	65	Copal G+C*	69	Palacos R+G Pro*	77	Palacos R+G Pro*	58	Palacos MV+G*
33	Palamed G*	57	Palacos R+G Pro*	67	Palacos MV+G*	60	Copal G+C*	46	Copal G+C*
21	CMW 3 G*	17	Palacos Fast R+G*	24	CMW 2 G*	30	Palacos Fast R+G*	21	Palacos Fast R+G*
17	CMW 1 Plain	16	CMW 2 G*	16	Palacos Fast R+G*	19	CMW 2 G*	15	CMW 2 G*
9	Refobacin Plus*	15	Refobacin Plus*	14	Palacos LV+G*	12	Palacos LV+G*	12	Palacos MV+G Pro*
8	Palacos E*	11	CMW 3 G*	12	CMW 3 G*	5	Refobacin Plus*	6	Simplex P
10 Most Used									
627	(10) 95.0%	1030	(10) 95.9%	1077	(10) 96.3%	1046	(10) 97.6%	966	(10) 97.6%
Remainder									
33	(11) 5.0%	44	(12) 4.1%	41	(11) 3.7%	26	(9) 2.4%	24	(10) 2.4%
TOTAL									
660	(21) 100.0%	1074	(22) 100.0%	1118	(21) 100.0%	1072	(19) 100.0%	990	(20) 100.0%

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

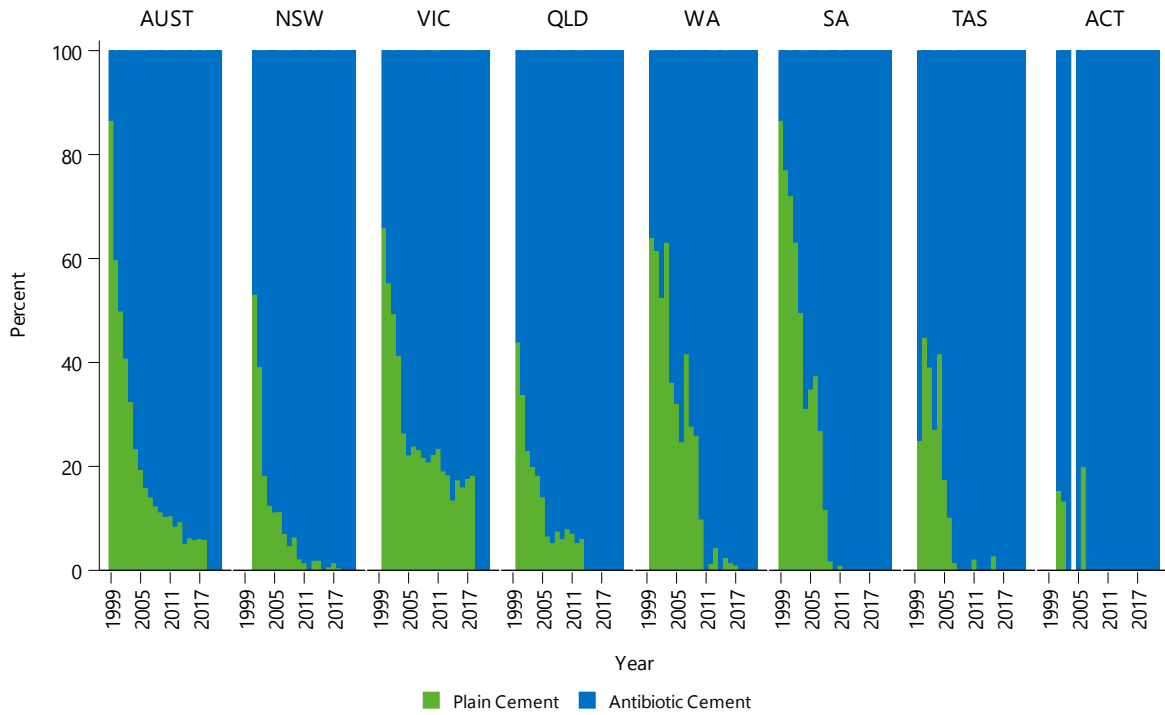
Table C4 10 Most Used Cement Types for Acetabular Prostheses in Revision Hip Replacement

2003		2018		2019		2020		2021	
N	Model	N	Model	N	Model	N	Model	N	Model
197	CMW 1 G*	148	Palacos R+G*	155	Palacos R+G*	136	Palacos R+G*	144	Copal G+V*
144	Simplex Tobra*	146	Simplex Tobra*	128	Simplex Tobra*	118	Simplex Tobra*	131	Palacos R+G*
115	Antibiotic Simplex*	88	Copal G+V*	97	Copal G+V*	93	Copal G+V*	93	Simplex Tobra*
85	Palacos R*	75	CMW 2 G*	86	CMW 2 G*	74	CMW 2 G*	69	Palacos Fast R+G*
51	CMW 2 G*	64	Copal G+C*	58	Copal G+C*	62	Palacos Fast R+G*	56	CMW 2 G*
48	CMW 1 Plain	55	Palacos MV+G*	56	Palacos Fast R+G*	45	Copal G+C*	46	Copal G+C*
44	Palamed G*	41	Palacos Fast R+G*	32	Palacos MV+G*	38	Palacos MV+G*	28	Palacos MV+G*
40	Simplex P	9	SmartSet GHV*	12	SmartSet GHV*	10	Palacos R+G Pro*	12	Simplex HV*
20	CMW 2 Plain	7	CMW 1 G*	10	Palacos R+G Pro*	7	Simplex HV*	7	Palacos R+G Pro*
15	Refobacin Plus*	7	Palacos R+G Pro*	10	Refobacin Plus*	4	Optipac*	3	Simplex P
10 Most Used									
759	(10) 97.9%	640	(10) 97.4%	644	(10) 96.6%	587	(10) 97.7%	589	(10) 98.5%
Remainder									
16	(8) 2.1%	17	(7) 2.6%	23	(7) 3.4%	14	(5) 2.3%	9	(6) 1.5%
TOTAL									
775	(18) 100.0%	657	(17) 100.0%	667	(17) 100.0%	601	(15) 100.0%	598	(16) 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

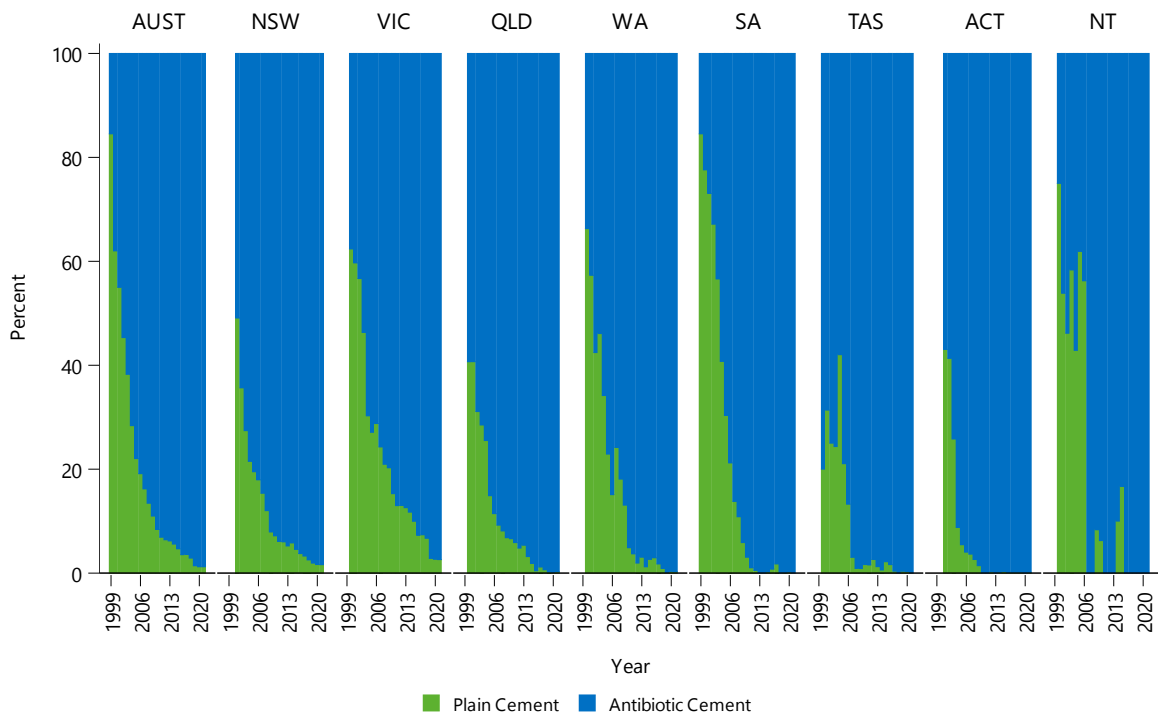


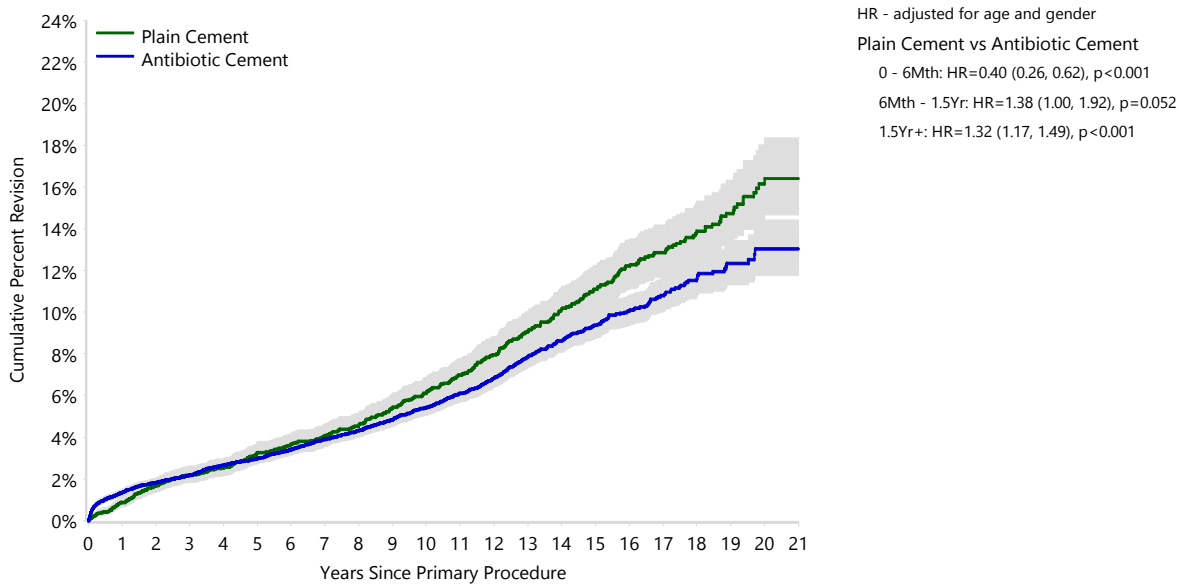
Table C5 Cumulative Percent Revision of Cemented Primary Total Conventional Hip Replacement by Cement Type and Location (Primary Diagnosis OA)

Cement Femur	Cement Acetabular	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	10 Yrs	15 Yrs	20 Yrs
Plain Cement	Plain Cement	463	5639	0.9 (0.7, 1.2)	2.2 (1.8, 2.6)	3.3 (2.8, 3.8)	6.1 (5.5, 6.8)	11.1 (10.0, 12.2)	16.2 (14.5, 18.0)
	Antibiotic Cement	65	855	0.9 (0.5, 1.9)	2.2 (1.4, 3.4)	3.1 (2.1, 4.5)	6.3 (4.8, 8.4)	11.1 (8.5, 14.4)	
Antibiotic Cement	Plain Cement	28	339	2.4 (1.2, 4.8)	3.4 (1.9, 6.0)	3.7 (2.1, 6.5)	8.0 (5.2, 12.1)	12.8 (8.4, 19.1)	
	Antibiotic Cement	991	18847	1.3 (1.2, 1.5)	2.2 (1.9, 2.4)	3.0 (2.7, 3.2)	5.3 (4.9, 5.7)	9.2 (8.5, 9.9)	13.0 (11.6, 14.4)
TOTAL		1547	25680						

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	463	5639	0.9 (0.7, 1.2)	2.2 (1.8, 2.6)	3.3 (2.8, 3.8)	6.1 (5.5, 6.8)	11.1 (10.0, 12.2)	16.2 (14.5, 18.0)
Antibiotic Cement	1084	20041	1.3 (1.2, 1.5)	2.2 (2.0, 2.4)	3.0 (2.7, 3.2)	5.4 (5.0, 5.8)	9.4 (8.7, 10.0)	13.0 (11.8, 14.4)
TOTAL	1547	25680						

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	5639	5486	5138	4624	3081	1579	338
Antibiotic Cement	20041	18820	16467	14063	7618	2907	265

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	261	0.2 (0.1, 0.4)	0.6 (0.5, 0.9)	1.2 (0.9, 1.5)	2.7 (2.3, 3.2)	4.3 (3.8, 4.9)	5.6 (4.9, 6.3)
Plain Cement	Prosthesis Dislocation/Instability	67	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	61	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, 1.4)	1.2 (0.9, 1.6)
Plain Cement	Fracture	52	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, 1.2)	1.0 (0.8, 1.4)
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)	0.2 (0.1, 0.3)
Plain Cement	Other	15	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	3297	1.8 (1.5, 2.2)	6.8 (6.1, 7.4)	12.9 (12.0, 13.8)	33.6 (32.3, 34.8)	54.2 (52.8, 55.6)	69.1 (67.6, 70.6)
Plain Cement	All Revision	463	0.9 (0.7, 1.1)	2.1 (1.8, 2.5)	3.1 (2.7, 3.6)	5.2 (4.7, 5.8)	7.9 (7.2, 8.6)	9.5 (8.7, 10.4)
Antibiotic Cement	Loosening	443	0.2 (0.1, 0.2)	0.4 (0.3, 0.5)	0.7 (0.6, 0.8)	1.7 (1.5, 1.9)	3.0 (2.7, 3.3)	3.8 (3.4, 4.2)
Antibiotic Cement	Prosthesis Dislocation/Instability	217	0.5 (0.5, 0.7)	0.7 (0.6, 0.8)	0.8 (0.7, 1.0)	1.1 (0.9, 1.2)	1.3 (1.1, 1.4)	1.3 (1.1, 1.5)
Antibiotic Cement	Infection	178	0.4 (0.3, 0.5)	0.6 (0.5, 0.7)	0.7 (0.6, 0.8)	0.9 (0.7, 1.0)	1.0 (0.8, 1.1)	1.1 (0.9, 1.3)
Antibiotic Cement	Fracture	185	0.2 (0.1, 0.2)	0.3 (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, 1.5)
Antibiotic Cement	Lysis	18	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, 0.2)
Antibiotic Cement	Other	43	0.0 (0.0, 0.1)	0.1 (0.0, 0.1)	0.1 (0.1, 0.1)	0.2 (0.1, 0.3)	0.3 (0.2, 0.4)	0.3 (0.2, 0.5)
Antibiotic Cement	Deceased	8545	2.1 (1.9, 2.3)	7.6 (7.3, 8.0)	14.1 (13.6, 14.7)	35.2 (34.4, 35.9)	55.4 (54.5, 56.3)	70.2 (69.0, 71.4)
Antibiotic Cement	All Revision	1084	1.3 (1.2, 1.5)	2.1 (1.9, 2.3)	2.8 (2.6, 3.1)	4.7 (4.3, 5.0)	6.7 (6.3, 7.1)	7.9 (7.4, 8.5)

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

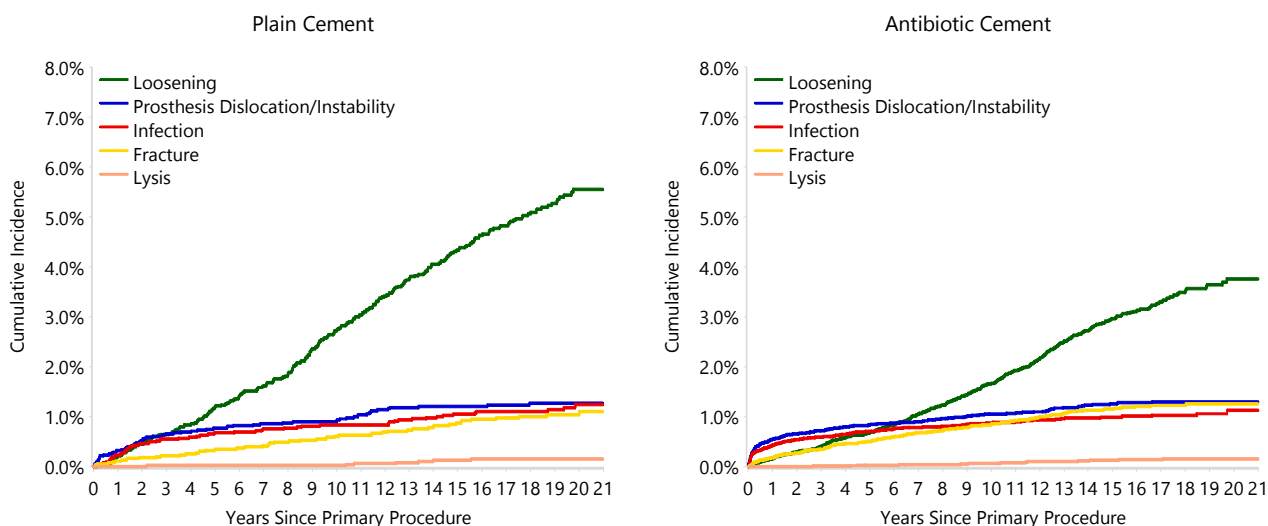


Figure C5 Cumulative Incidence Revision Diagnosis of Cemented Primary Total Conventional Hip Replacement by Year of Implant and Cement Type (Primary Diagnosis OA)

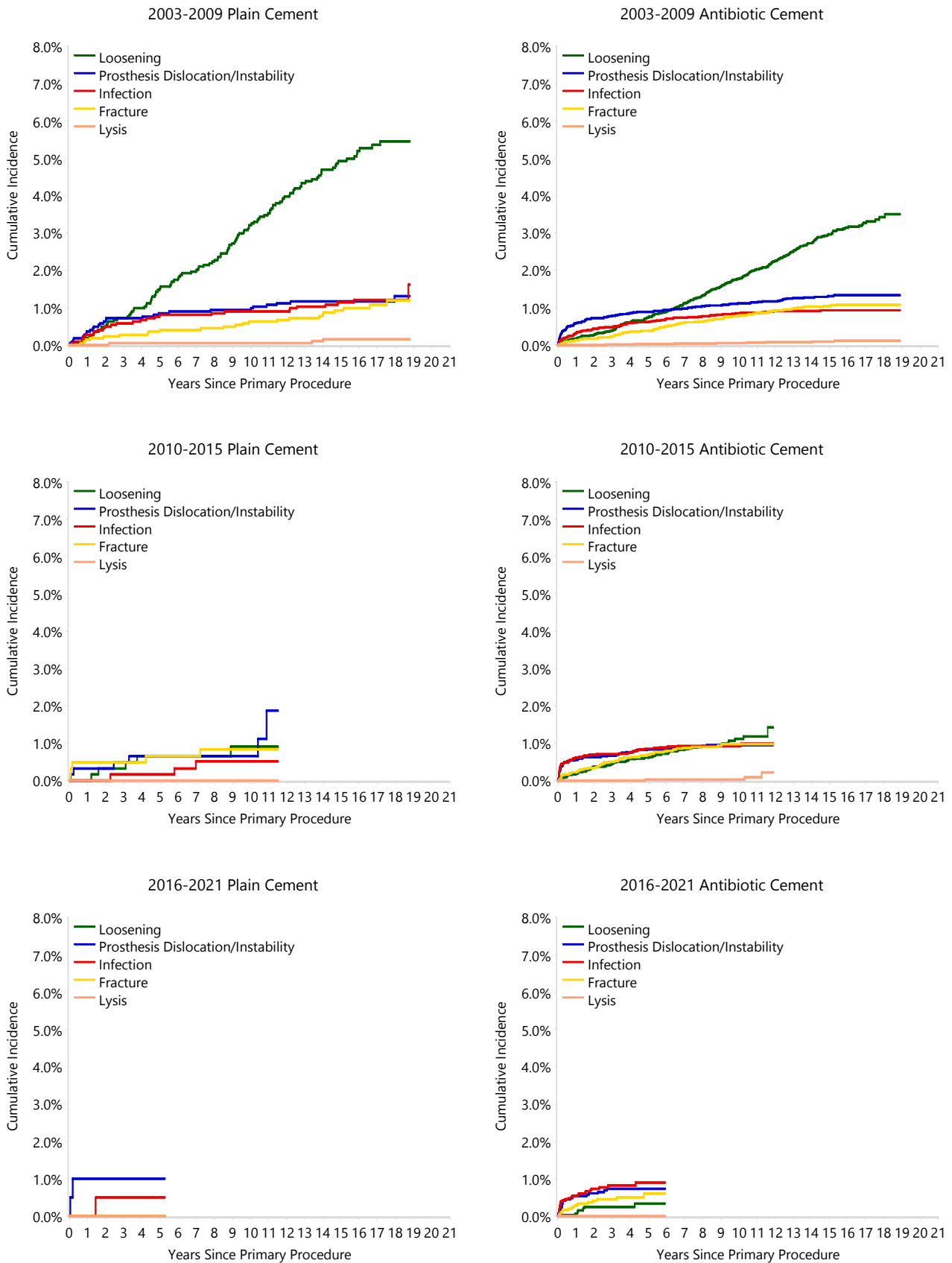
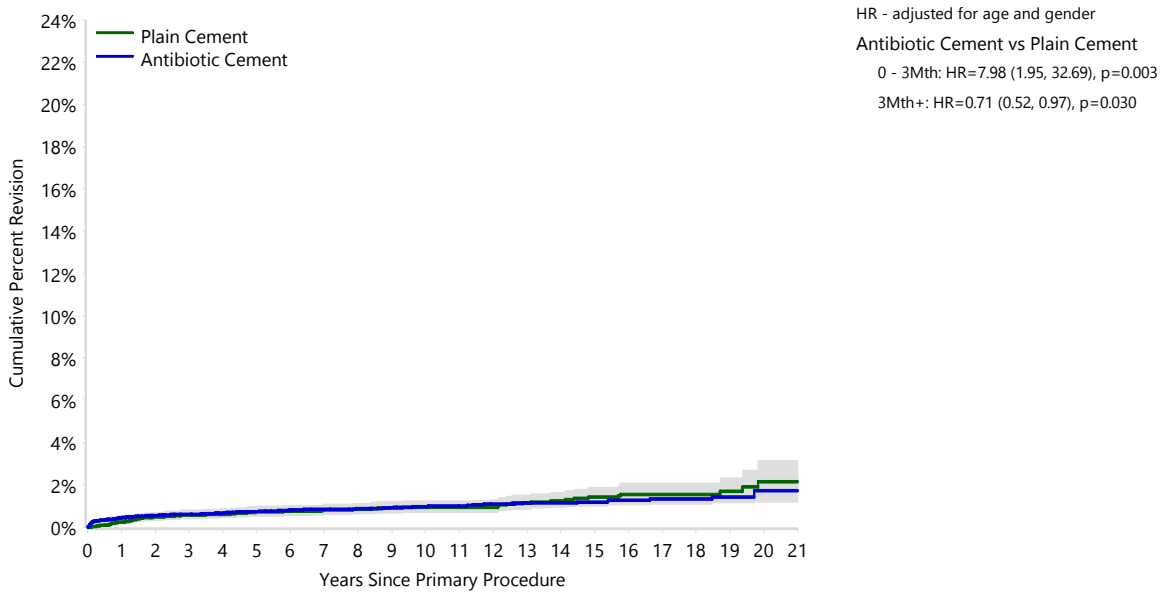


Table C8 Cumulative Percent Revision of Cemented Primary Total Conventional Hip Replacement by Cement Type (Primary Diagnosis OA, Revision for Infection)

Antibiotic Status	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	10 Yrs	15 Yrs	20 Yrs
Plain Cement	61	5639	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, 1.9)	2.1 (1.5, 3.2)
Antibiotic Cement	178	20041	0.4 (0.3, 0.5)	0.6 (0.5, 0.7)	0.7 (0.6, 0.9)	1.0 (0.8, 1.1)	1.2 (1.0, 1.4)	1.7 (1.2, 2.5)
TOTAL	239	25680						

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	5639	5486	5138	4624	3081	1579	338
Antibiotic Cement	20041	18820	16467	14063	7618	2907	265

Knee Replacement

CEMENT TRENDS IN KNEE REPLACEMENT

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

2003		2018		2019		2020		2021	
N	Model	N	Model	N	Model	N	Model	N	Model
2215	CMW 1 G*	16255	Palacos R+G*	15548	Palacos R+G*	14598	Palacos R+G*	14466	Palacos R+G*
1744	Simplex P	6919	Palacos R+G Pro*	8324	Palacos R+G Pro*	8536	Palacos R+G Pro*	9714	Palacos R+G Pro*
1733	CMW 1 Plain	5202	Simplex Tobra*	4772	Simplex Tobra*	3864	Simplex Tobra*	3778	Simplex Tobra*
1686	Antibiotic Simplex*	3765	Palacos MV+G*	3464	Palacos MV+G*	3121	Palacos MV+G*	3553	Palacos Fast R+G*
1469	Simplex Tobra*	2378	CMW 2 G*	2800	Palacos Fast R+G*	2872	Palacos Fast R+G*	3164	Palacos MV+G*
1352	Palacos R*	2114	Palacos Fast R+G*	2168	CMW 2 G*	1922	CMW 2 G*	1835	CMW 2 G*
997	CMW 2 Plain	1600	Copal G+C*	1612	Copal G+C*	1023	Copal G+C*	837	Copal G+C*
936	CMW 2 G*	931	SmartSet GHV*	739	Optipac*	488	Palacos MV+G Pro*	667	Palacos MV+G Pro*
935	Palamed G*	781	Refobacin Plus*	671	SmartSet GHV*	467	Simplex HV*	551	SmartSet GHV*
296	Refobacin Plus*	518	Simplex HV*	603	Simplex HV*	415	Cemex System GENTA FAST*	428	Simplex HV*
10 Most Used									
13363	(10) 97.0%	40463	(10) 96.0%	40701	(10) 95.9%	37306	(10) 94.9%	38993	(10) 96.0%
Remainder									
417	(18) 3.0%	1682	(19) 4.0%	1741	(17) 4.1%	2008	(13) 5.1%	1626	(16) 4.0%
TOTAL									
13780	(28) 100.0%	42145	(29) 100.0%	42442	(27) 100.0%	39314	(23) 100.0%	40619	(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 Prostheses in Primary Knee Replacement

2003		2018		2019		2020		2021	
N	Model	N	Model	N	Model	N	Model	N	Model
3020	CMW 1 G*	19263	Palacos R+G*	18445	Palacos R+G*	16895	Palacos R+G*	16827	Palacos R+G*
2661	CMW 1 Plain	8109	Palacos R+G Pro*	9337	Palacos R+G Pro*	9241	Palacos R+G Pro*	10270	Palacos R+G Pro*
2658	Simplex P	6355	Simplex Tobra*	5776	Simplex Tobra*	4635	Simplex Tobra*	5435	Palacos Fast R+G*
2270	Antibiotic Simplex*	4436	Palacos MV+G*	4911	Palacos Fast R+G*	4566	Palacos Fast R+G*	4746	Simplex Tobra*
1983	Simplex Tobra*	4145	Palacos Fast R+G*	4089	Palacos MV+G*	3645	Palacos MV+G*	3904	Palacos MV+G*
1871	CMW 2 Plain	4031	CMW 2 G*	3629	CMW 2 G*	3128	CMW 2 G*	3009	CMW 2 G*
1672	Palacos R*	1819	Copal G+C*	1839	Copal G+C*	1228	Copal G+C*	1374	Copal G+C*
1411	CMW 2 G*	1155	SmartSet GHV*	952	Optipac*	758	Optipac*	694	Palacos MV+G Pro*
1126	Palamed G*	1020	Refobacin Plus*	913	Simplex HV*	642	Cemex System GENTA FAST*	680	Optipac*
350	Refobacin Plus*	861	Simplex HV*	752	SmartSet GHV*	621	Simplex HV*	620	Simplex HV*
10 Most Used									
19022	(10) 96.8%	51194	(10) 95.9%	50643	(10) 95.9%	45359	(10) 94.8%	47559	(10) 95.4%
Remainder									
628	(19) 3.2%	2200	(18) 4.1%	2164	(19) 4.1%	2510	(15) 5.2%	2280	(18) 4.6%
TOTAL									
19650	(29) 100.0%	53394	(28) 100.0%	52807	(29) 100.0%	47869	(25) 100.0%	49839	(28) 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		2018		2019		2020		2021	
N	Model	N	Model	N	Model	N	Model	N	Model
1305	Antibiotic Simplex*	12770	Palacos R+G*	12496	Palacos R+G*	12271	Palacos R+G*	12809	Palacos R+G*
1172	CMW 1 G*	6064	Palacos R+G Pro*	7311	Palacos R+G Pro*	7485	Palacos R+G Pro*	8595	Palacos R+G Pro*
1059	CMW 1 Plain	4168	Simplex Tobra*	4858	Palacos Fast R+G*	5540	Palacos Fast R+G*	6819	Palacos Fast R+G*
1053	CMW 2 Plain	4022	CMW 2 G*	3988	CMW 2 G*	4074	CMW 2 G*	4793	CMW 2 G*
1002	Simplex P	3332	Palacos Fast R+G*	3974	Simplex Tobra*	3299	Simplex Tobra*	3575	Simplex Tobra*
983	Simplex Tobra*	2768	Palacos MV+G*	2658	Palacos MV+G*	2487	Palacos MV+G*	2826	Palacos MV+G*
694	Palacos R*	1559	Copal G+C*	1659	Copal G+C*	1141	Copal G+C*	1058	Copal G+C*
630	Palamed G*	825	SmartSet GHV*	849	Simplex HV*	743	CMW 2	760	Simplex HV*
591	CMW 2 G*	748	Simplex HV*	723	Optipac*	659	Simplex HV*	743	CMW 2
188	Refobacin Plus*	597	CMW 2	714	CMW 2	630	Optipac*	609	Palacos MV+G Pro*
10 Most Used									
8677	(10) 96.8%	36853	(10) 94.9%	39230	(10) 95.3%	38329	(10) 94.8%	42587	(10) 95.5%
Remainder									
290	(14) 3.2%	1995	(17) 5.1%	1945	(17) 4.7%	2121	(15) 5.2%	1992	(16) 4.5%
TOTAL									
8967	(24) 100.0%	38848	(27) 100.0%	41175	(27) 100.0%	40450	(25) 100.0%	44579	(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		2018		2019		2020		2021	
N	Model	N	Model	N	Model	N	Model	N	Model
254	CMW 1 G*	861	Palacos R+G*	807	Palacos R+G*	644	Palacos R+G*	653	Palacos R+G*
187	Antibiotic Simplex*	335	Simplex Tobra*	413	Copal G+V*	416	Copal G+V*	547	Copal G+V*
152	Simplex Tobra*	318	Palacos R+G Pro*	371	Palacos R+G Pro*	362	Palacos R+G Pro*	356	Palacos R+G Pro*
134	Palacos R*	285	Copal G+V*	358	Simplex Tobra*	293	Simplex Tobra*	254	Copal G+C*
100	CMW 2 G*	183	Palacos MV+G*	233	Copal G+C*	206	Copal G+C*	251	Simplex Tobra*
81	Palamed G*	170	CMW 2 G*	205	Palacos Fast R+G*	178	Palacos Fast R+G*	213	Palacos Fast R+G*
68	Simplex P	158	Palacos Fast R+G*	184	CMW 2 G*	148	Palacos MV+G*	161	Palacos MV+G*
50	CMW 1 Plain	156	Copal G+C*	184	Palacos MV+G*	116	CMW 2 G*	108	CMW 2 G*
41	CMW 2 Plain	70	SmartSet GHV*	51	SmartSet GHV*	35	SmartSet GHV*	31	SmartSet GHV*
38	Refobacin Plus*	48	Refobacin Plus*	39	Optipac*	27	Refobacin Plus*	21	Palacos MV+G Pro*
10 Most Used									
1105	(10) 96.3%	2584	(10) 96.4%	2845	(10) 96.3%	2425	(10) 95.9%	2595	(10) 97.0%
Remainder									
42	(9) 3.7%	97	(13) 3.6%	108	(13) 3.7%	103	(14) 4.1%	80	(14) 3.0%
TOTAL									
1147	(19) 100.0%	2681	(23) 100.0%	2953	(23) 100.0%	2528	(24) 100.0%	2675	(24) 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 Prosthesis in Revision Knee Replacement

2003		2018		2019		2020		2021	
N	Model	N	Model	N	Model	N	Model	N	Model
307	CMW 1 G*	902	Palacos R+G*	859	Palacos R+G*	666	Palacos R+G*	691	Palacos R+G*
215	Antibiotic Simplex*	334	Palacos R+G Pro*	416	Copal G+V*	407	Copal G+V*	532	Copal G+V*
165	Simplex Tobra*	331	Simplex Tobra*	379	Palacos R+G Pro*	377	Palacos R+G Pro*	354	Palacos R+G Pro*
145	Palacos R*	290	Copal G+V*	363	Simplex Tobra*	269	Simplex Tobra*	271	Copal G+C*
126	CMW 2 G*	195	Palacos MV+G*	236	Copal G+C*	216	Copal G+C*	258	Simplex Tobra*
97	Palamed G*	188	CMW 2 G*	235	Palacos Fast R+G*	204	Palacos Fast R+G*	222	Palacos Fast R+G*
74	CMW 1 Plain	180	Palacos Fast R+G*	205	CMW 2 G*	147	Palacos MV+G*	160	Palacos MV+G*
73	Simplex P	156	Copal G+C*	189	Palacos MV+G*	134	CMW 2 G*	126	CMW 2 G*
71	CMW 2 Plain	74	SmartSet GHV*	57	SmartSet GHV*	32	SmartSet GHV*	34	SmartSet GHV*
29	Refobacin Plus*	56	Refobacin Plus*	39	Optipac*	30	Simplex HV*	25	Simplex HV*
10 Most Used									
1302	(10) 95.9%	2706	(10) 96.1%	2978	(10) 95.9%	2482	(10) 95.6%	2673	(10) 96.7%
Remainder									
56	(11) 4.1%	110	(13) 3.9%	126	(15) 4.1%	115	(16) 4.4%	92	(13) 3.3%
TOTAL									
1358	(21) 100.0%	2816	(23) 100.0%	3104	(25) 100.0%	2597	(26) 100.0%	2765	(23) 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 Prosthesis in Revision Knee Replacement

2003		2018		2019		2020		2021	
N	Model	N	Model	N	Model	N	Model	N	Model
179	CMW 1 G*	617	Palacos R+G*	607	Palacos R+G*	497	Palacos R+G*	533	Palacos Fast R+G*
150	CMW 2 Plain	336	Palacos Fast R+G*	455	Palacos Fast R+G*	425	Palacos Fast R+G*	511	Palacos R+G*
130	Antibiotic Simplex*	333	CMW 2 G*	367	CMW 2 G*	251	CMW 2 G*	325	CMW 2 G*
114	CMW 2 G*	187	Simplex Tobra*	209	Palacos R+G Pro*	189	Palacos R+G Pro*	186	Copal G+V*
113	Simplex Tobra*	181	Palacos R+G Pro*	174	Simplex Tobra*	150	Simplex Tobra*	184	Palacos R+G Pro*
85	Simplex P	136	Palacos MV+G*	157	Copal G+V*	146	Copal G+V*	137	Simplex Tobra*
78	Palacos R*	105	Copal G+V*	107	Palacos MV+G*	89	Copal G+C*	112	Copal G+C*
59	Palamed G*	81	Copal G+C*	102	Copal G+C*	88	Palacos MV+G*	106	Palacos MV+G*
56	CMW 1 Plain	50	SmartSet GHV*	34	SmartSet GHV*	34	CMW 2	28	CMW 2
17	Refobacin Plus*	31	CMW 2	28	Optipac*	20	Simplex HV*	20	SmartSet GHV*
10 Most Used									
981	(10) 96.1%	2057	(10) 95.5%	2240	(10) 96.2%	1889	(10) 95.5%	2142	(10) 96.5%
Remainder									
40	(10) 3.9%	97	(12) 4.5%	88	(11) 3.8%	88	(13) 4.5%	78	(11) 3.5%
TOTAL									
1021	(20) 100.0%	2154	(22) 100.0%	2328	(21) 100.0%	1977	(23) 100.0%	2220	(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

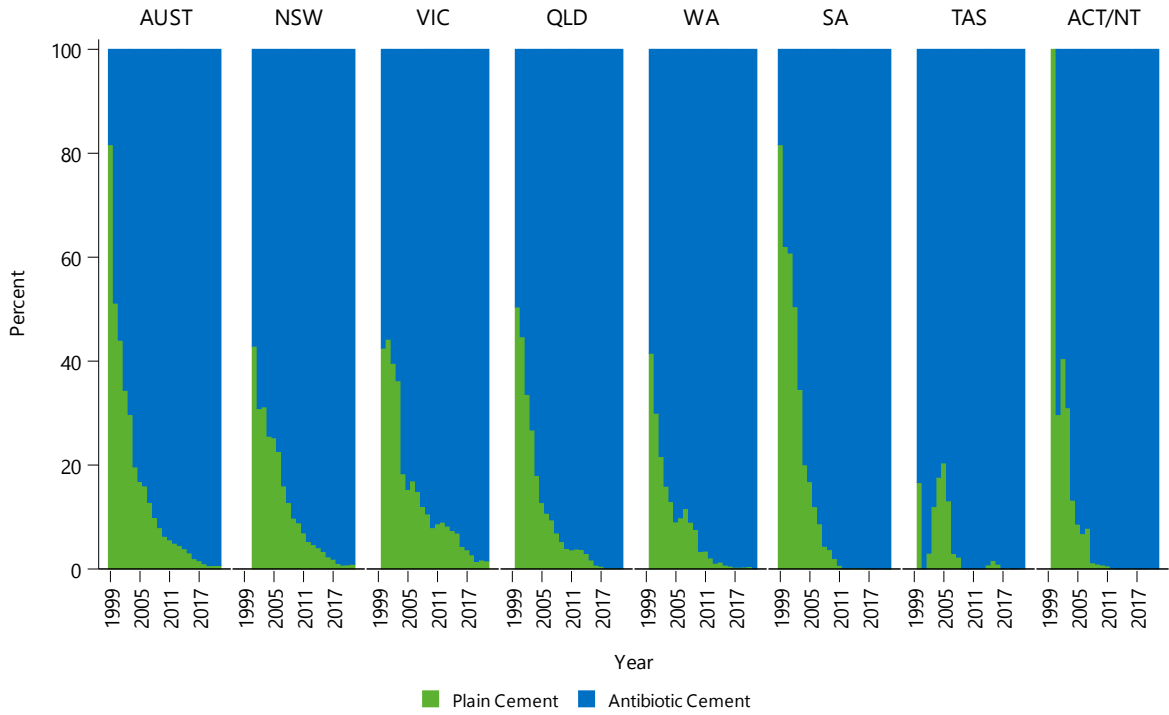


Figure C8 Trends in Usage of Tibia Cemented Primary Total Knee Replacement by State/Territory and Year

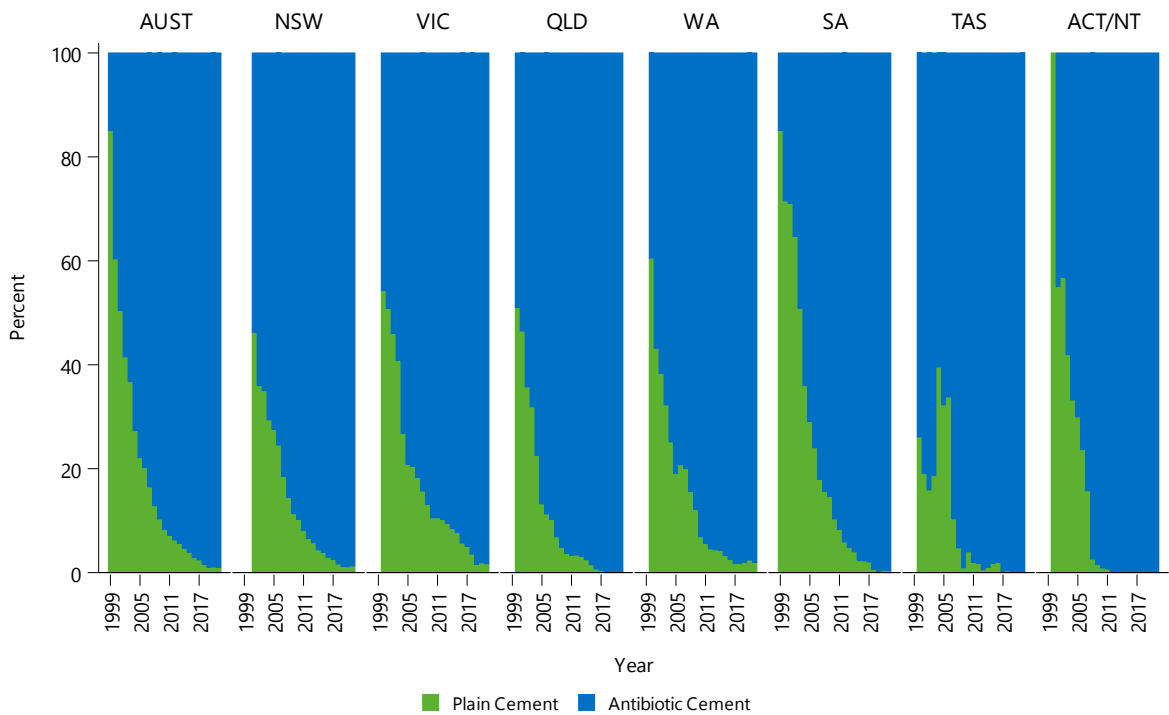


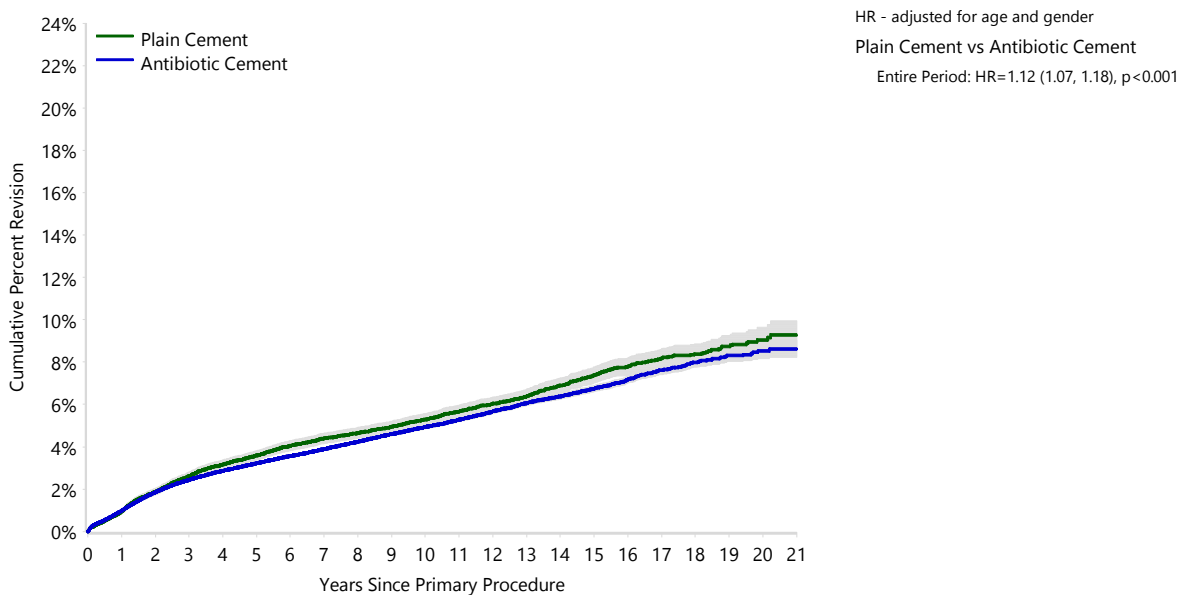
Table C15 Cumulative Percent Revision of Cemented Primary Total Knee Replacement by Cement Type and Location (Primary Diagnosis OA)

Cement Femur	Cement Tibia	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	10 Yrs	15 Yrs	20 Yrs
Plain Cement	Plain Cement	1733	29886	0.9 (0.8, 1.1)	2.6 (2.4, 2.8)	3.6 (3.4, 3.8)	5.3 (5.0, 5.6)	7.4 (7.0, 7.8)	9.0 (8.5, 9.6)
	Antibiotic Cement	32	475	1.5 (0.7, 3.1)	3.3 (2.0, 5.5)	4.6 (3.0, 7.0)	6.0 (4.0, 8.8)	9.5 (6.3, 14.1)	
Antibiotic Cement	Plain Cement	33	631	0.5 (0.2, 1.5)	2.2 (1.3, 3.8)	3.1 (2.0, 4.9)	5.4 (3.7, 7.7)	6.7 (4.7, 9.5)	
	Antibiotic Cement	15940	446386	1.0 (1.0, 1.0)	2.4 (2.4, 2.5)	3.2 (3.2, 3.3)	4.9 (4.8, 5.0)	6.7 (6.6, 6.9)	8.5 (8.2, 8.9)
TOTAL		17738	477378						

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	1733	29886	0.9 (0.8, 1.1)	2.6 (2.4, 2.8)	3.6 (3.4, 3.8)	5.3 (5.0, 5.6)	7.4 (7.0, 7.8)	9.0 (8.5, 9.6)
Antibiotic Cement	16005	447492	1.0 (1.0, 1.0)	2.4 (2.4, 2.5)	3.2 (3.2, 3.3)	4.9 (4.8, 5.0)	6.7 (6.6, 6.9)	8.5 (8.2, 8.9)
TOTAL	17738	477378						

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	29886	29086	27292	24915	16262	7378	949
Antibiotic Cement	447492	404781	319776	238308	95061	23641	1231

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	386	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)	1.5 (1.3, 1.6)
	Loosening	533	0.2 (0.2, 0.3)	0.7 (0.6, 0.8)	1.0 (0.9, 1.1)	1.5 (1.3, 1.6)	2.0 (1.8, 2.2)	2.1 (2.0, 2.3)
	Instability	118	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)
	Pain	130	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)
	Patellofemoral Pain	143	0.1 (0.0, 0.1)	0.2 (0.2, 0.3)	0.3 (0.2, 0.4)	0.5 (0.4, 0.5)	0.5 (0.4, 0.6)	0.5 (0.4, 0.6)
	Other	423	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)
	Deceased	12033	0.9 (0.8, 1.1)	3.8 (3.6, 4.0)	8.0 (7.7, 8.3)	24.1 (23.6, 24.6)	44.0 (43.4, 44.7)	62.1 (61.2, 63.1)
	All Revision	1733	0.9 (0.8, 1.1)	2.6 (2.4, 2.8)	3.5 (3.3, 3.7)	4.9 (4.7, 5.2)	6.3 (6.0, 6.6)	7.0 (6.7, 7.4)
Antibiotic Cement	Infection	4629	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)
	Loosening	3635	0.1 (0.1, 0.1)	0.4 (0.4, 0.4)	0.6 (0.6, 0.7)	1.1 (1.1, 1.2)	1.5 (1.5, 1.6)	1.9 (1.8, 2.0)
	Instability	1474	0.1 (0.1, 0.1)	0.2 (0.2, 0.3)	0.3 (0.3, 0.3)	0.4 (0.4, 0.5)	0.5 (0.5, 0.5)	0.6 (0.5, 0.6)
	Pain	1261	0.0 (0.0, 0.1)	0.2 (0.2, 0.2)	0.3 (0.3, 0.3)	0.4 (0.4, 0.4)	0.4 (0.4, 0.5)	0.5 (0.4, 0.5)
	Patellofemoral Pain	1131	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)
	Other	3875	0.2 (0.2, 0.2)	0.5 (0.5, 0.6)	0.7 (0.7, 0.7)	1.1 (1.1, 1.2)	1.6 (1.5, 1.7)	1.9 (1.8, 2.0)
	Deceased	67750	0.7 (0.7, 0.7)	3.0 (3.0, 3.1)	6.5 (6.5, 6.6)	20.8 (20.6, 20.9)	40.0 (39.7, 40.3)	58.9 (58.2, 59.6)
	All Revision	16005	1.0 (0.9, 1.0)	2.4 (2.4, 2.5)	3.2 (3.1, 3.2)	4.6 (4.6, 4.7)	5.9 (5.8, 6.0)	6.7 (6.6, 6.9)

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

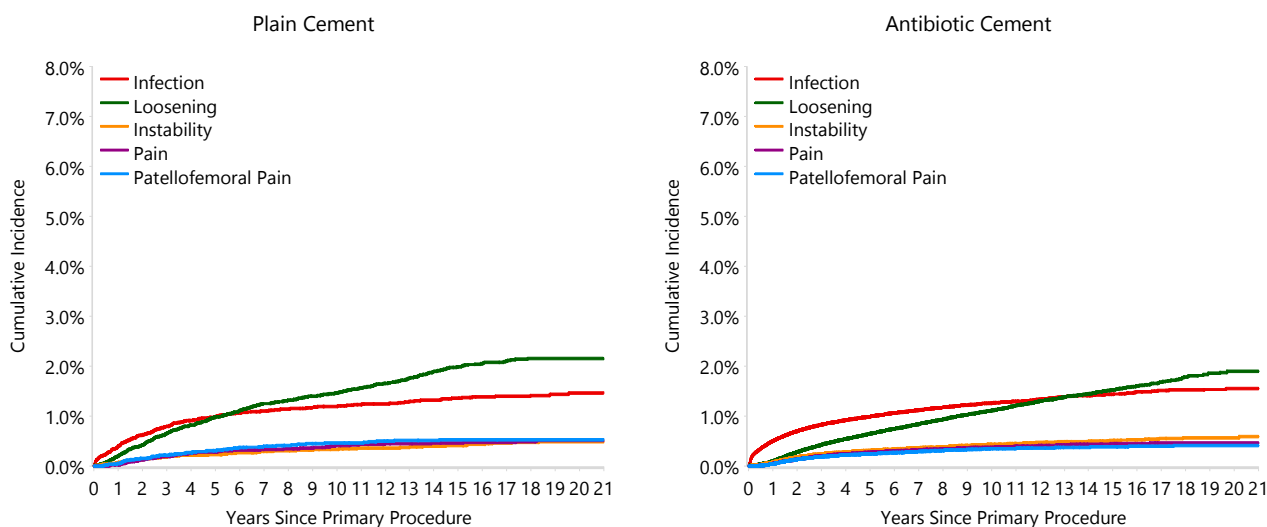


Figure C11 Cumulative Incidence Revision Diagnosis of Cemented Primary Total Knee Replacement by Year of Implant and Cement Type (Primary Diagnosis OA)

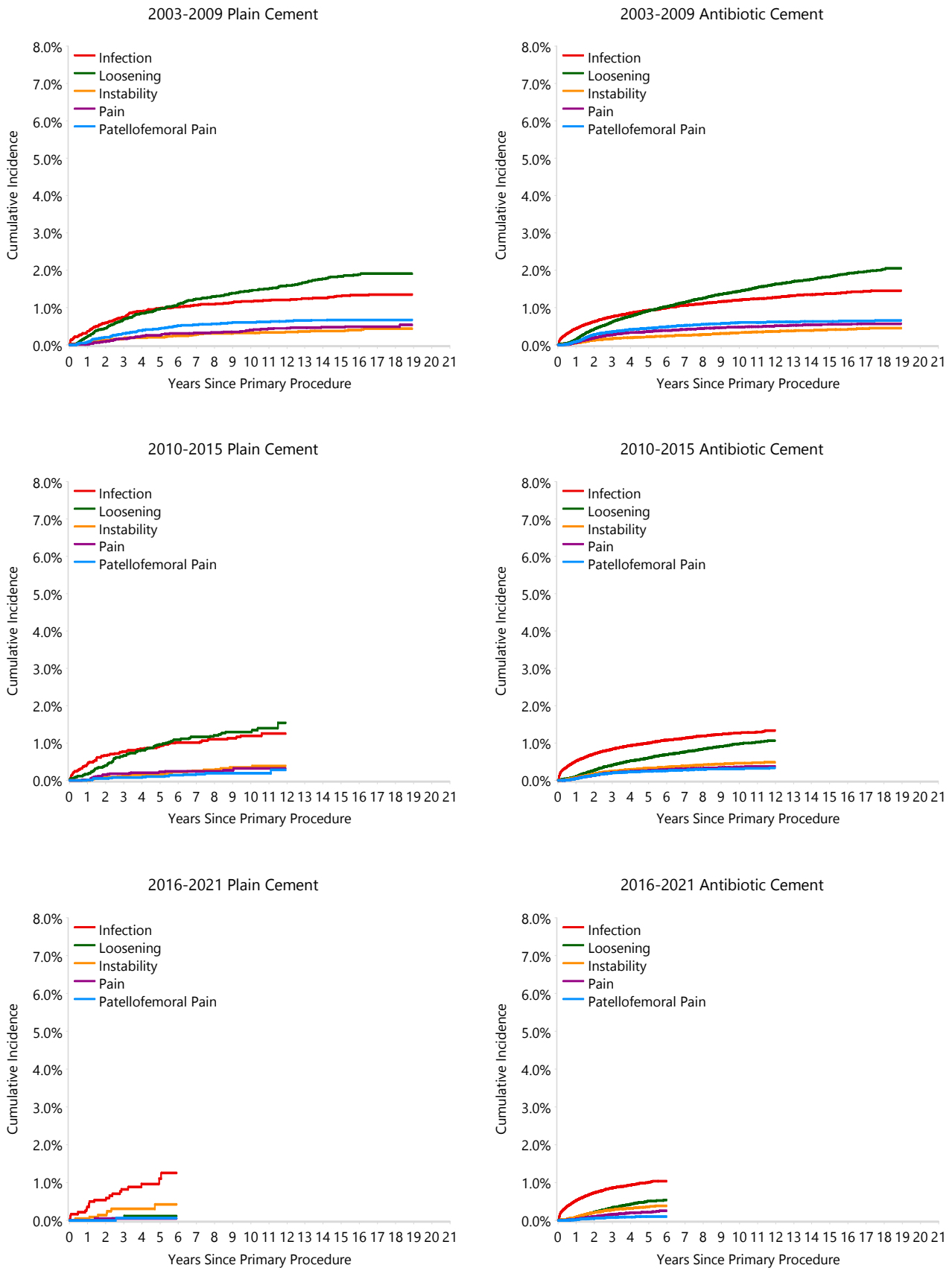
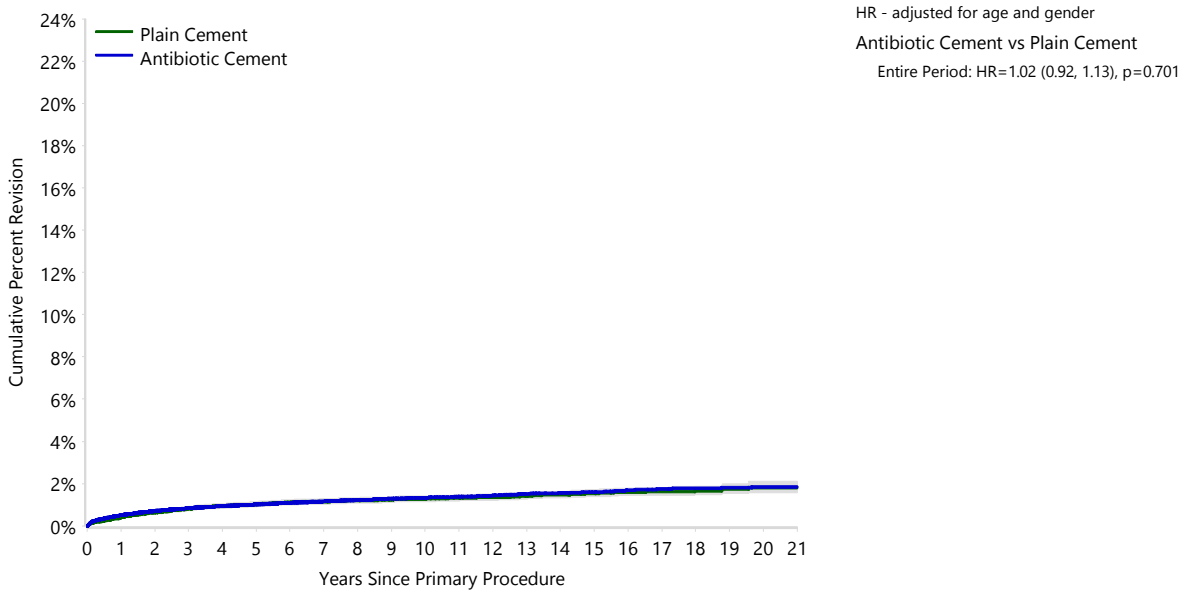


Table C18 Cumulative Percent Revision of Revision Diagnosis of Cemented Primary Total Knee Replacement by Cement Type (Primary Diagnosis OA, Revision for Infection)

Antibiotic Status	N Revised	N Total	1 Yr	3 Yrs	5 Yrs	10 Yrs	15 Yrs	20 Yrs
Plain Cement	386	29886	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, 2.1)
Antibiotic Cement	4629	447492	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, 1.7)	1.8 (1.7, 2.0)
TOTAL	5015	477378						

Figure C12 Cumulative Percent Revision of Revision Diagnosis 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	29886	29086	27292	24915	16262	7378	949
Antibiotic Cement	447492	404781	319776	238308	95061	23641	1231

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