
Orthopride

Belgian Hip and Knee Arthroplasty Registry

Annual Report

2022

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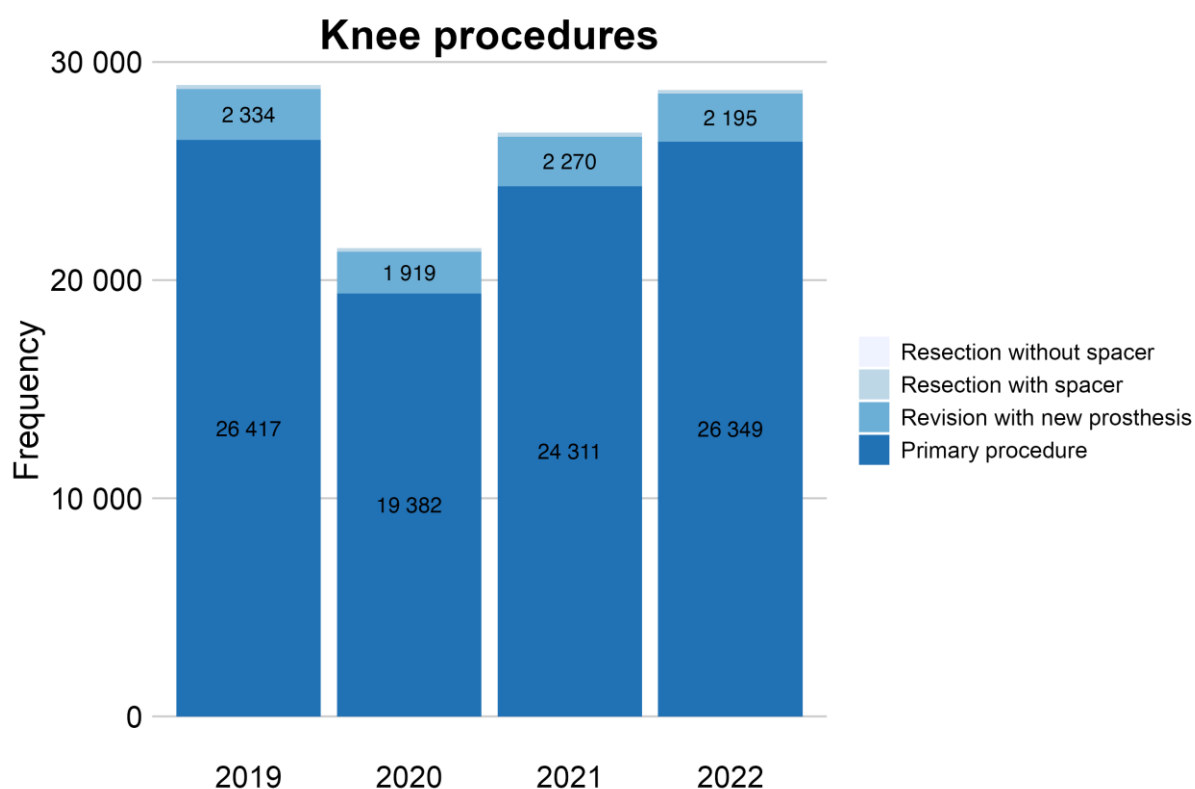
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1 GENERAL INTRODUCTION

Table 1.1 Total joint replacement procedures entered in Orthopride during 2022

	Knee procedures	Hip procedures
Primary procedure	26 349	32 474
Revision with new prosthesis	2 195	2 639
Resection with spacer	177	152
Resection without spacer	4	8
Total per joint	28 725	35 273

Figure 1.1 Total joint replacement procedures entered in Orthopride in 2019, 2020, 2021 and 2022



Hip procedures

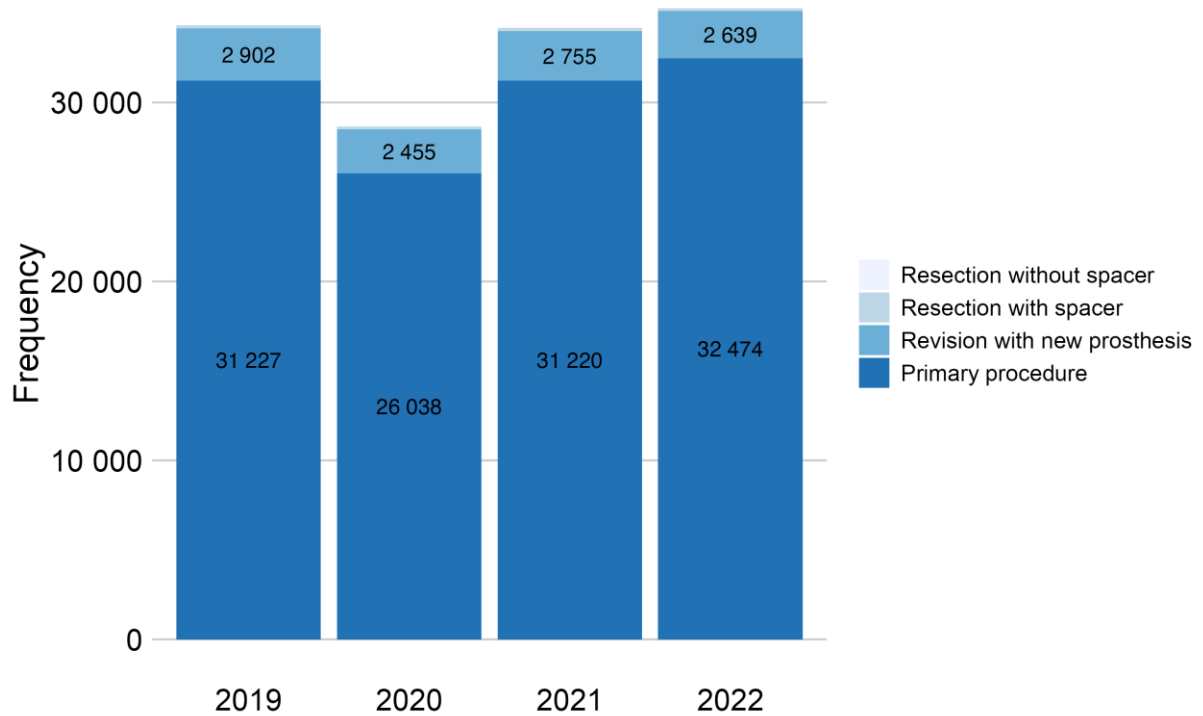


Table 1.2 Knee replacements according to patient's residence

	Frequency knee replacements	Percent on total amount	Procedures per 100.000 inhabitants	Percent of the inhabitants > 45 years*	Percent of the inhabitants >60 years*
Antwerp	4 302	15 %	228	45.1	25.1
Limburg	2 503	8.8 %	283	48.5	27.3
Liège	2 525	8.8 %	227	44.7	24.6
Namur	1 062	3.7 %	213	45	24.7
Luxembourg	574	2 %	197	42.9	22.6
Hainaut	3 353	11.7 %	248	44.9	24.4
West-Flanders	4 042	14.1 %	334	50.2	29.7
East-Flanders	4 799	16.8 %	311	45.8	25.4
Flemish Brabant	2 391	8.4 %	204	45.4	24.9
Walloon Brabant	957	3.3 %	234	45.8	25.1
Brussels	1 585	5.5 %	130	35.2	16.8
Other Country	512	1.8 %			
Total [Missing]	28 605 [120]	100%			

* Based on data provided on <https://bestat.economie.fgov.be>

Table 1.3 Knee revision burden and patient's age according to patient's residence

	Primary procedures			Revisions		
	Frequency	Row Percent	Age (mean $\pm$ SD)	Frequency	Row Percent	Age (mean $\pm$ SD)
Antwerp	3 985	92.6	68.2 +/- 9.2	317	7.4	66.7 +/- 10.3
Limburg	2 311	92.3	67.4 +/- 9.8	192	7.7	64.9 +/- 12.3
Liège	2 306	91.3	67.6 +/- 9.5	219	8.7	67 +/- 10.5
Namur	976	91.9	67.7 +/- 9.2	86	8.1	66.5 +/- 9.9
Luxembourg	520	90.6	67.4 +/- 10.2	54	9.4	65.3 +/- 11.6
Hainaut	3 074	91.7	67.5 +/- 9.5	279	8.3	66.2 +/- 10.5
West-Flanders	3 736	92.4	68.1 +/- 10	306	7.6	66.6 +/- 10.3
East-Flanders	4 295	89.5	67 +/- 10.7	504	10.5	64.5 +/- 11.7
Flemish Brabant	2 203	92.1	69 +/- 9.5	188	7.9	67.8 +/- 12.6
Walloon Brabant	906	94.7	68.7 +/- 9	51	5.3	68.4 +/- 9.6
Brussels	1 464	92.4	68.4 +/- 9.9	121	7.6	68.3 +/- 11
Other Country	466	91	66.8 +/- 10	46	9	67.1 +/- 10.4
Total	26 242	91.7	67.8 +/- 9.8	2363	8.3	66.2 +/- 11.1

Table 1.4 Hip replacements according to patient's residence

	Frequency hip replacements	Percent on total amount	Procedures per 100.000 inhabitants	Percent of the inhabitants > 45 years*	Percent of the inhabitants >60 years*
Antwerp	5 523	15.7 %	293	45.1	25.1
Limburg	2 922	8.3 %	330	48.5	27.3
Liège	3 208	9.1 %	289	44.7	24.6
Namur	1 511	4.3 %	303	45	24.7
Luxembourg	749	2.1 %	257	42.9	22.6
Hainaut	4 087	11.6 %	302	44.9	24.4
West-Flanders	4 980	14.2 %	412	50.2	29.7
East-Flanders	5 066	14.4 %	328	45.8	25.4
Flemish Brabant	3 360	9.6 %	286	45.4	24.9
Walloon Brabant	1 221	3.5 %	298	45.8	25.1
Brussels	1 879	5.4 %	154	35.2	16.8
Other Country	584	1.7 %			
Total [Missing]	35 090 [183]	100%			

* Based on data provided on <https://bestat.economie.fgov.be>

Table 1.5 Hip revision burden and patient's age according to patient's residence

	Primary procedures			Revisions		
	Frequency	Row Percent	Age (mean $\pm$ SD)	Frequency	Row Percent	Age (mean $\pm$ SD)
Antwerp	5 121	92.7	71.3 +/- 12.5	402	7.3	73.4 +/- 12.4
Limburg	2 730	93.4	70.1 +/- 12.6	192	6.6	70.4 +/- 13.4
Liège	2 923	91.1	70.2 +/- 12.9	285	8.9	72.1 +/- 12.5
Namur	1 373	90.9	70.2 +/- 12.1	138	9.1	72.6 +/- 13.6
Luxembourg	676	90.3	70.4 +/- 12.8	73	9.7	71.7 +/- 14.2
Hainaut	3 713	90.8	69.4 +/- 12.6	374	9.2	70.3 +/- 12.9
West-Flanders	4 621	92.8	70.8 +/- 12.4	359	7.2	73.3 +/- 11.7
East-Flanders	4 652	91.8	70.7 +/- 12.8	414	8.2	71.4 +/- 13.8
Flemish Brabant	3 114	92.7	71.5 +/- 12.2	246	7.3	72.5 +/- 11.9
Walloon Brabant	1 119	91.6	70.8 +/- 12.3	102	8.4	74.8 +/- 11.9
Brussels	1 725	91.8	72.1 +/- 13.6	154	8.2	74.1 +/- 13.9
Other Country	538	92.1	67.4 +/- 13.2	46	7.9	69.5 +/- 10.5
Total	32 305	92.1	70.6 +/- 12.6	2 785	7.9	72.2 +/- 12.8

2 KNEE REPLACEMENT

2.1 PRIMARY KNEE REPLACEMENT

2.1.1 Demographics

Table 2.1 Age, gender and indications for primary knee replacement patients

N=26 349		
	Mean	SD
Age (yrs)	67.8	9.8
	Count	N %
Age categories		
<45	286	1.1%
45-59	5 215	19.8%
60-69	8 629	32.8%
70-79	9 332	35.4%
>=80	2 886	11.0%
Gender		
Female	15 532	58.9%
Male	10 652	40.4%
Undefined	165	0.6%
Indication		
Osteoarthritis	25 299	96.0%
Avascular necrosis	246	0.9%
Fracture	82	0.3%
Inflammatory arthropathy	101	0.4%
Trauma	395	1.5%
Previous infection	17	0.1%
Indication other	209	0.8%

Figure 2.1 Age distribution by gender for primary knee replacement patients

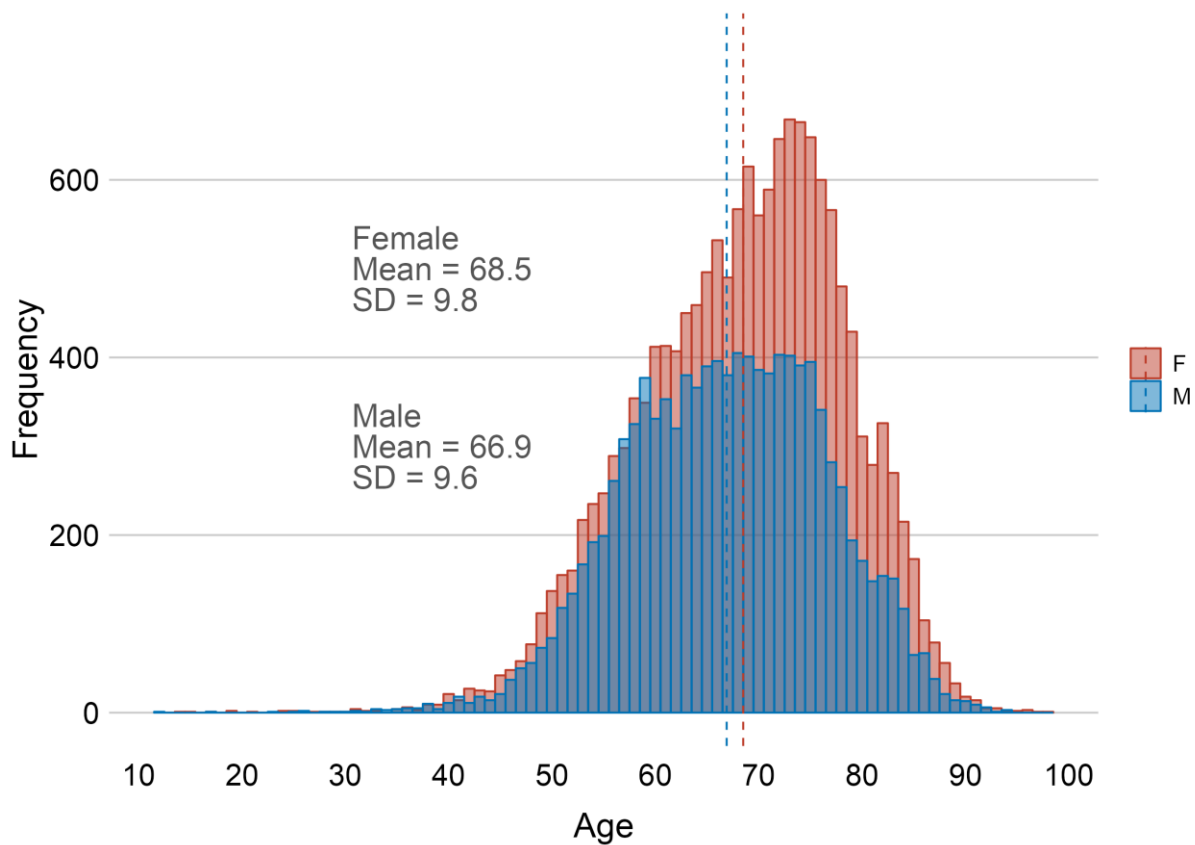


Figure 2.2 Age distribution by indication for primary knee replacement patients

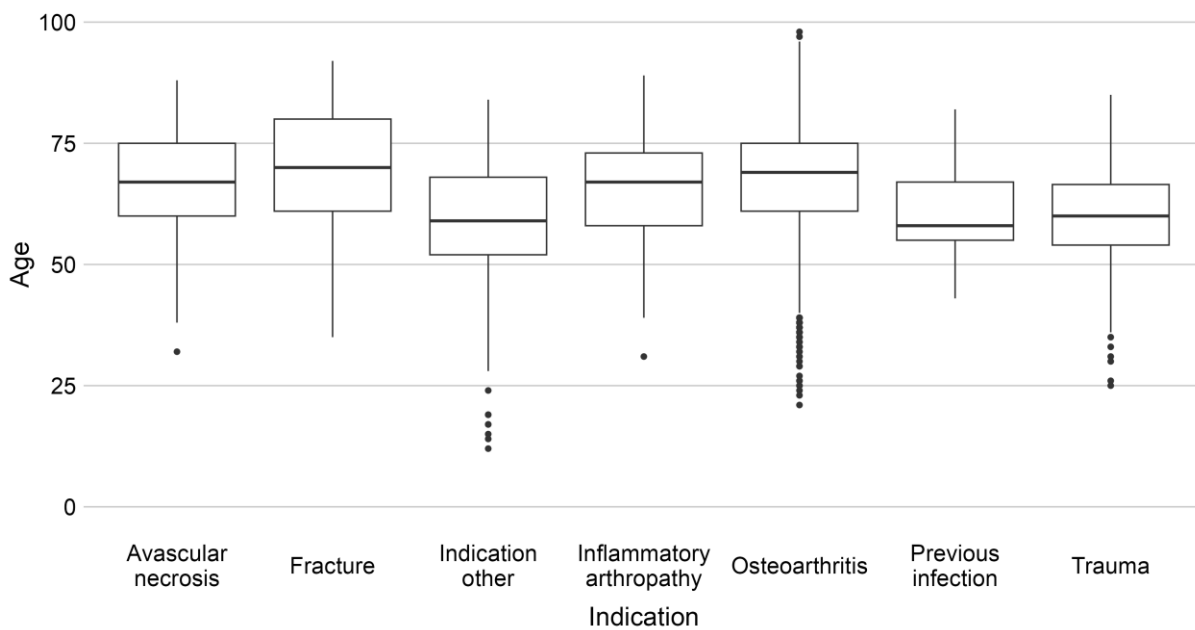


Table 2.2 Indications for primary knee replacements based on gender

	Male	Female
	N= 10 652	N= 15 532
	N (%)	N (%)
Osteoarthritis	10 133 (95.1)	15 005 (96.6)
Post trauma	233 (2.2)	160 (1)
Avascular necrosis	94 (0.9)	151 (1)
Fracture	25 (0.2)	56 (0.4)
Inflammatory arthropathy	40 (0.4)	61 (0.4)
Previous infection	9 (0.1)	8 (0.1)
Indication other	118 (1.1)	91 (0.6)

Table 2.3 Medical history of primary knee replacement patients

	Count	Percentage of total
No pre-operative surgeries	19 885	75.5 %
Pre-op Osteosynthesis of the tibia	219	0.8 %
Pre-op Osteosynthesis of the femur	63	0.2 %
Pre-op Osteotomy	277	1.1 %
Pre-op Synovectomy	39	0.1 %
Pre-op Meniscectomy	4 814	18.3 %
Pre-op ACL reconstruction	502	1.9 %
Pre-op Other	1 201	4.6 %

Table 2.4 Pre-operative alignment of primary knee replacement patients

	Count	Percentage of total
Normal	6 994	26.5%
Valgus	5 162	19.6%
Varus	14 193	53.9%

2.1.2 Surgical technique and implant characteristics

Table 2.5 Numbers and percentages of primary knee replacement types

	Number	Percentage of total
Total knee replacement	22 170	84.1 %
Unicompartmental replacement	3 381	12.8 %
Patellofemoral replacement	395	1.5 %
Bicompartmental replacement	377	1.4 %
Partial resurfacing femoral condyle	26	0.1 %
Total	26 349	100 %

Figure 2.3 Distribution of primary total knee prosthesis types

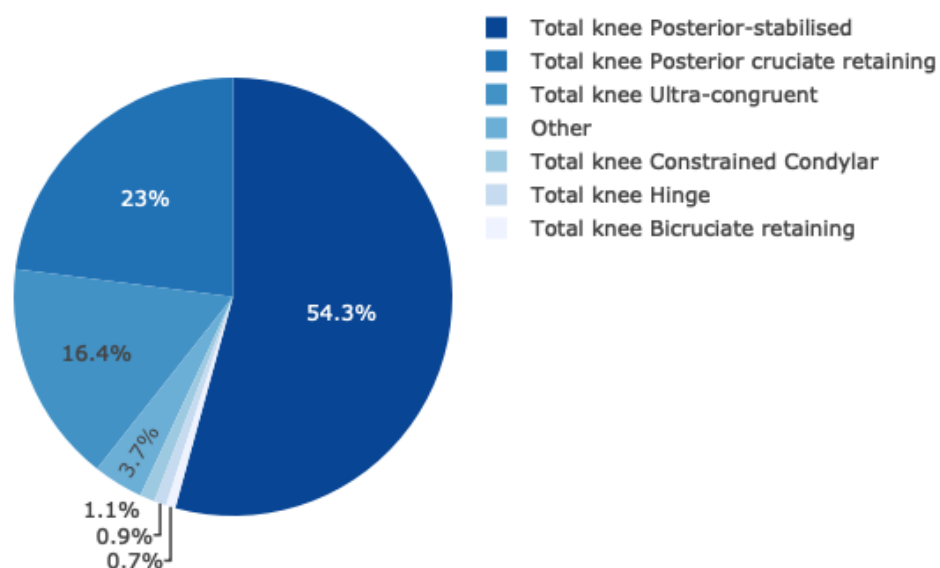


Table 2.6 Age and gender of primary knee replacement patients by type of replacement

	Total knee replacement	Unicompartmental replacement	Bicompartmental replacement	Patellofemoral replacement	Partial Resurfacing femoral condyle
	N=22 170	N=3 381	N=377	N=395	N=26
Mean age (years) (SD)	68.7 (9.4)	63.9 (9.9)	67.7 (9.8)	55.2 (11.9)	46.4 (11)
Age groups	% (N)	% (N)	% (N)	% (N)	% (N)
<45	146 (0.7 %)	61 (1.8 %)	3 (0.8 %)	62 (15.7 %)	14 (53.8 %)
45-59	3 760 (17 %)	1 167 (34.5 %)	75 (19.9 %)	204 (51.6 %)	9 (34.6 %)
60-69	7 265 (32.8 %)	1 160 (34.3 %)	119 (31.6 %)	82 (20.8 %)	3 (11.5 %)
70-79	8 378 (37.8 %)	773 (22.9 %)	147 (39 %)	34 (8.6 %)	0 (0 %)
>=80	2 620 (11.8 %)	220 (6.5 %)	33 (8.8 %)	13 (3.3 %)	0 (0 %)
Gender	% (N)	% (N)	% (N)	% (N)	% (N)
Female	13 481 (61.2 %)	1 497 (44.6 %)	230 (61.7 %)	312 (79.6 %)	12 (46.2 %)
Male	8 554 (38.8 %)	1 861 (55.4 %)	143 (38.3 %)	80 (20.4 %)	14 (53.8 %)

Figure 2.4 Age distribution by implant type for primary knee replacement patients

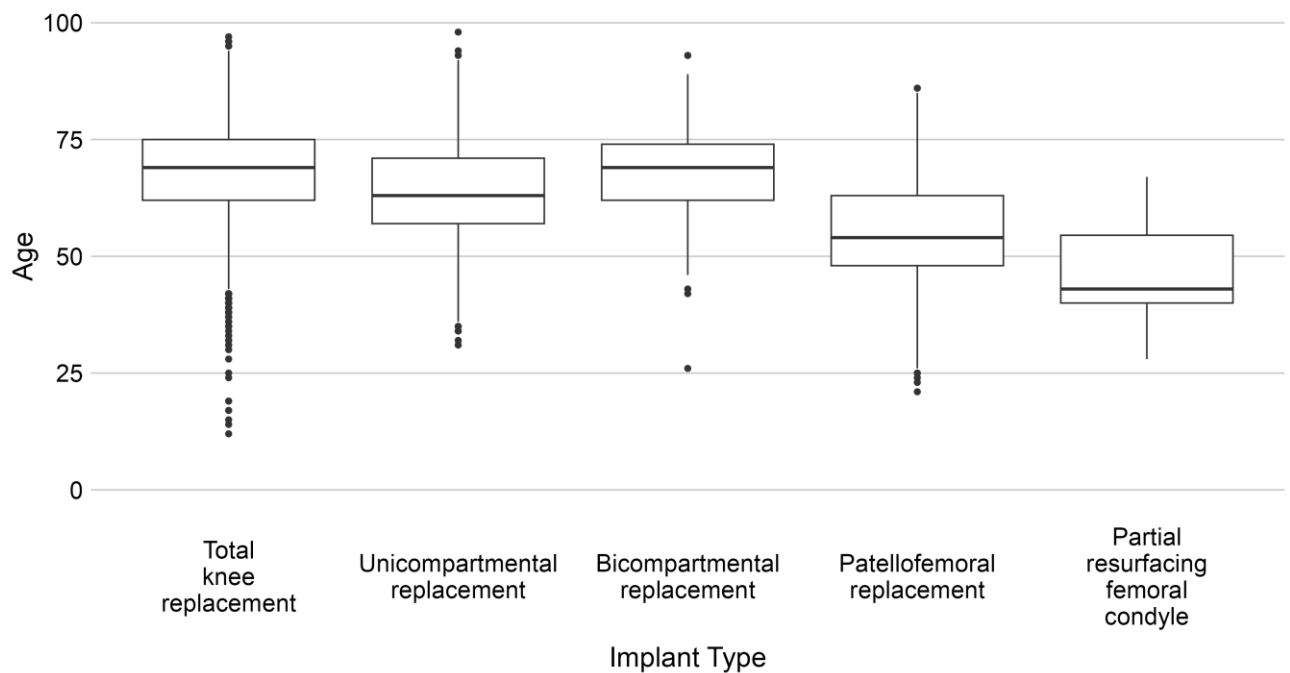


Table 2.7 Numbers and percentages of primary knee prosthesis fixation by type of prosthesis

	Total knee replacement	Unicompartmental replacement	Bicompartmental replacement	Patellofemoral replacement
	N=22 178	N=3 381	N=377	N=395
	N (%)	N (%)	N (%)	N (%)
Cemented	18 785 (84.7%)	2 210 (65.4%)	235 (62.3%)	361 (91.4%)
Revers hybrid	33 (0.1%)	49 (1.4%)	2 (0.5%)	0 (0%)
Hybrid	1 870 (8.4%)	109 (3.2%)	0 (0%)	0 (0%)
Uncemented	1 482 (6.7%)	1 013 (30%)	140 (37.1%)	34 (8.6%)

Figure 2.5 Method of fixation by primary knee prosthesis type

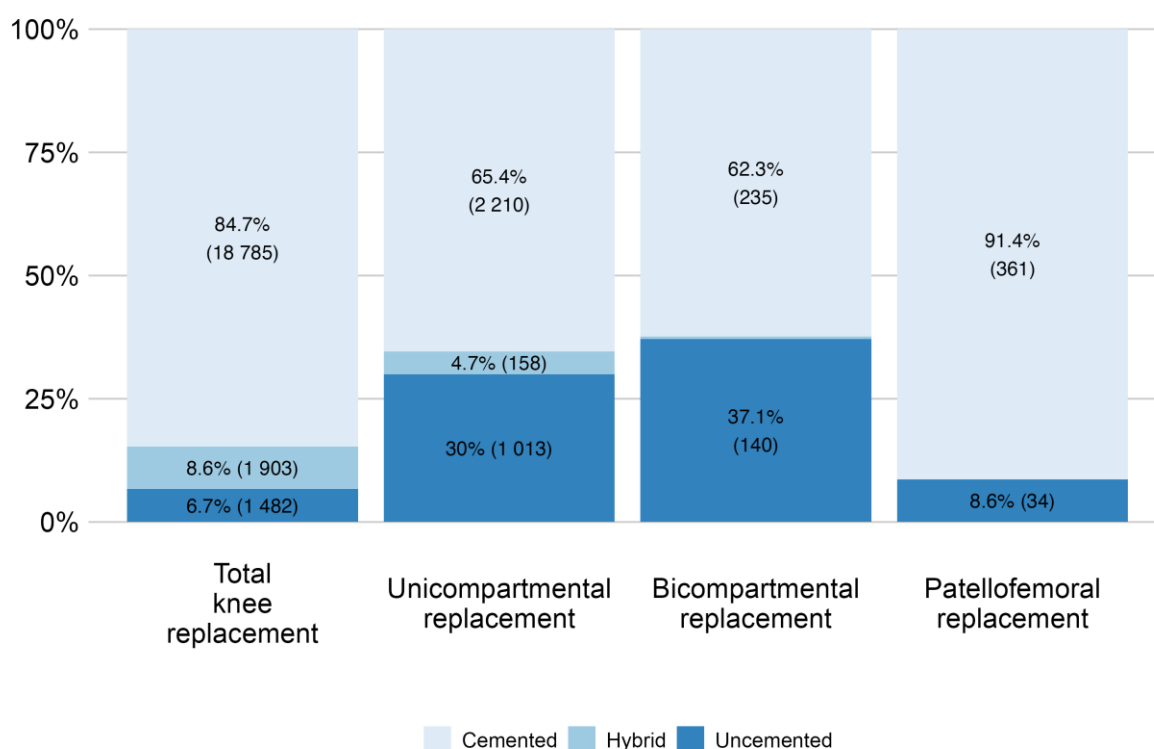
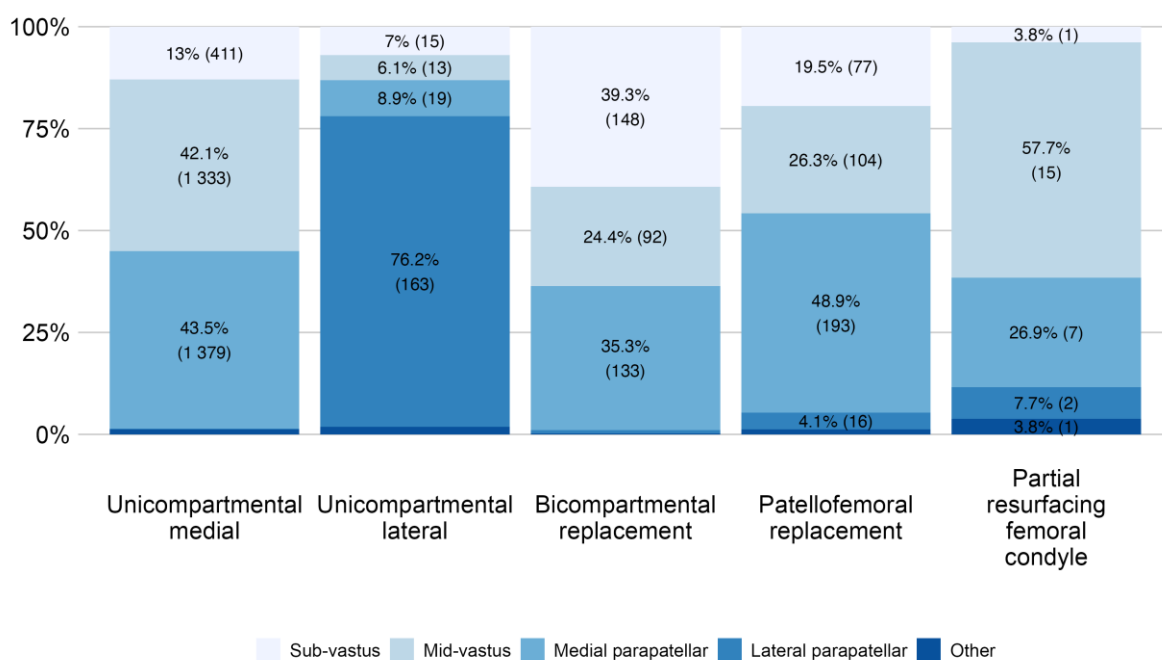
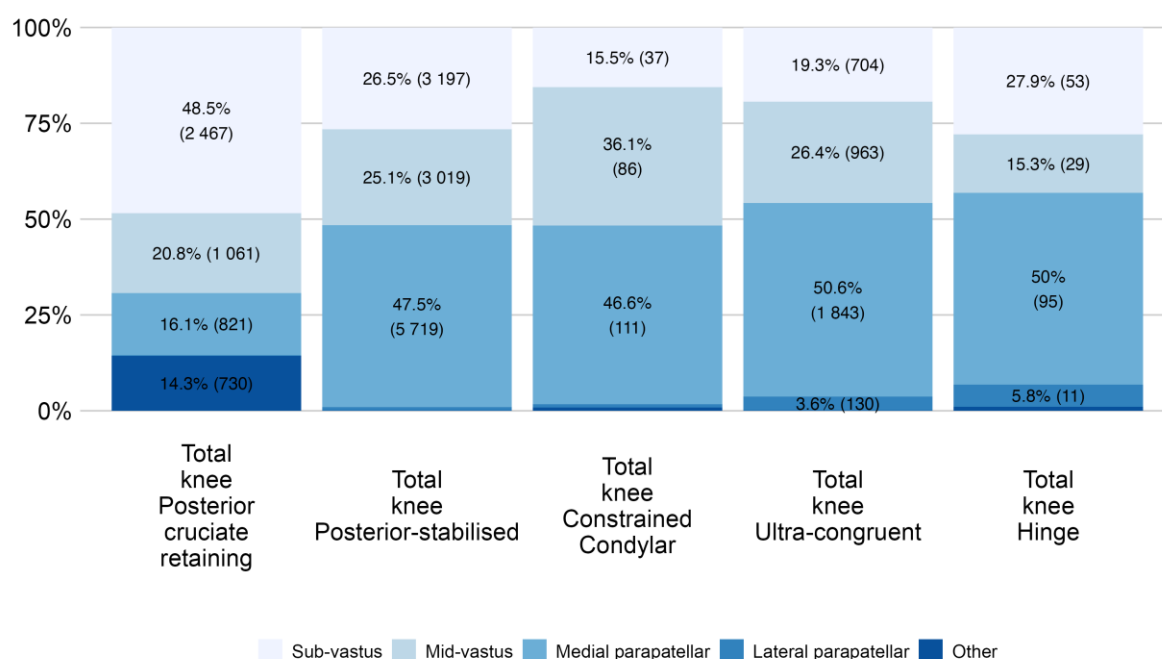


Figure 2.6 Approach used during primary partial knee replacements



Note: For readability of the figure, labels with percentages smaller than 2% are not displayed.

Figure 2.7 Approach used during primary total knee replacements



Note: For readability of the figure, labels with percentages smaller than 2% are not displayed.

Table 2.8 Usage of computer assisted navigation and custom made guides

	Computer assisted navigation	Custom made guides
Count (% of total procedures)	6 470 (24.6%)	1 155 (4.4%)
Amount of hospitals (% of all hospitals)	51/100 (51.0%)	36/100 (36.0%)

Figure 2.8 Usage of computer assisted navigation and custom made guides according to implant type

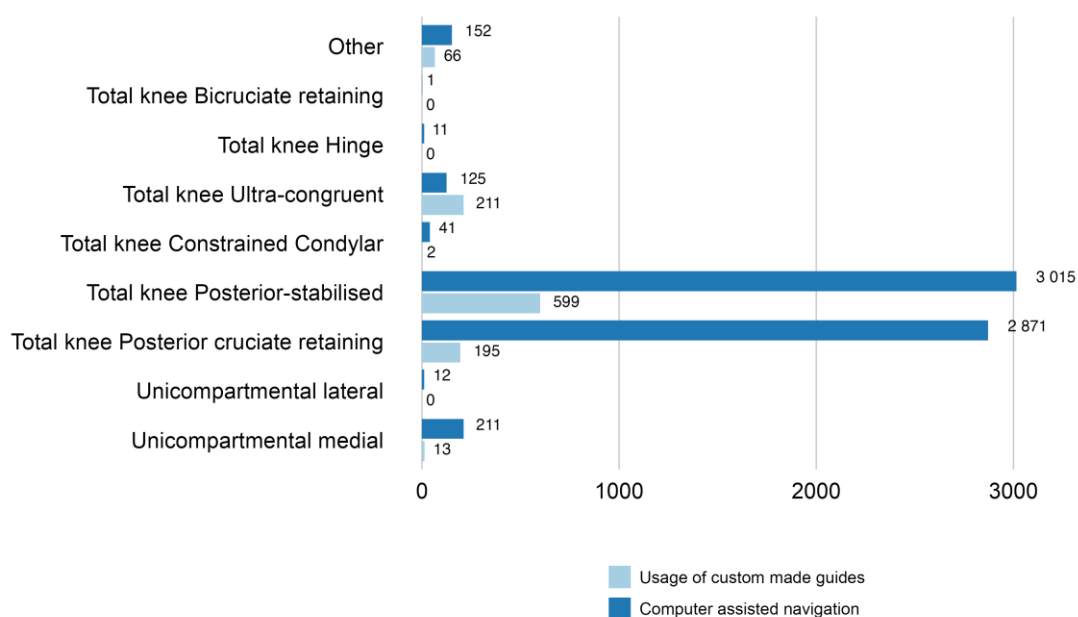
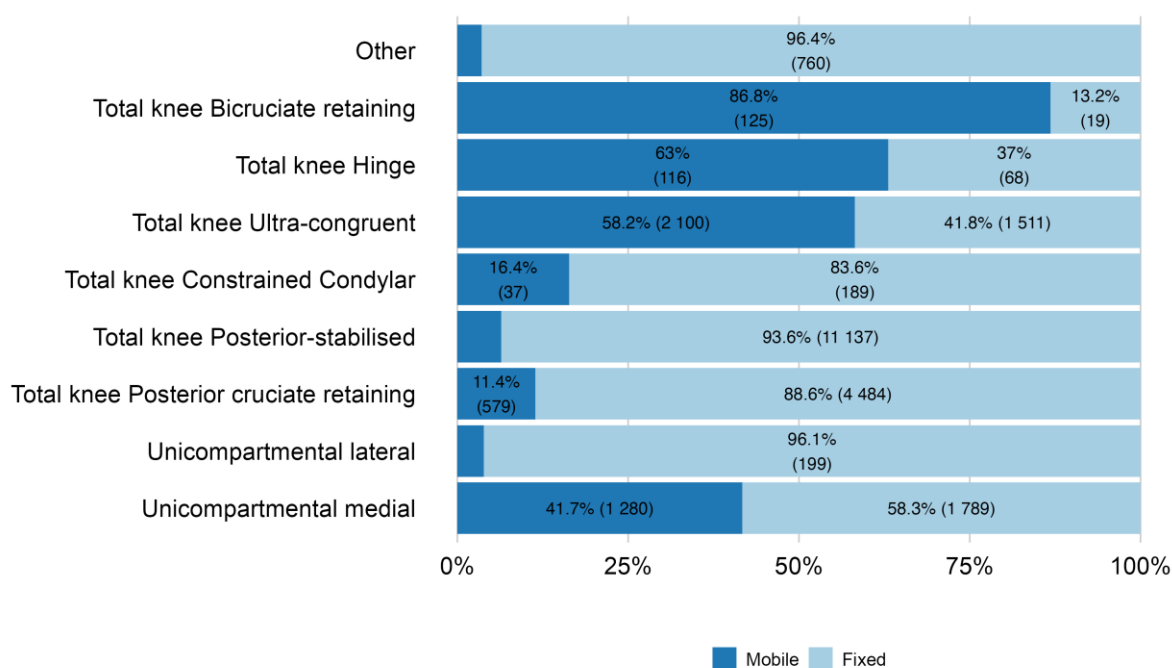


Figure 2.9 Insert type according to primary knee replacement type



2.2 REVISIONS AFTER PRIMARY KNEE REPLACEMENT

2.2.1 Demographics

Table 2.9 Age, gender and indications for knee revision procedures

N=2 376		
	Mean	SD
Age (yrs)	66.2	11.1
	Count	N %
Age categories		
<45	61	2.6%
45-59	612	25.8%
60-69	709	29.8%
70-79	749	31.5%
>=80	245	10.3%
Gender		
Female	1 354	57.0%
Male	1 012	42.6%
Undefined	10	0.4%
Indication		
Aseptic loosening	560	23.6%
Wear of polyethylene component	120	5.1%
Instability	450	18.9%
Infection	606	25.5%
Periprosthetic fracture	118	5.0%
Pain	419	17.6%
Stiffness	104	4.4%
Malalignment	104	4.4%
Implant fracture	53	2.2%
Progressive osteoarthritis in non-replaced component	297	12.5%
Indication other	214	9.0%

Figure 2.10 Knee revision burden according to age category

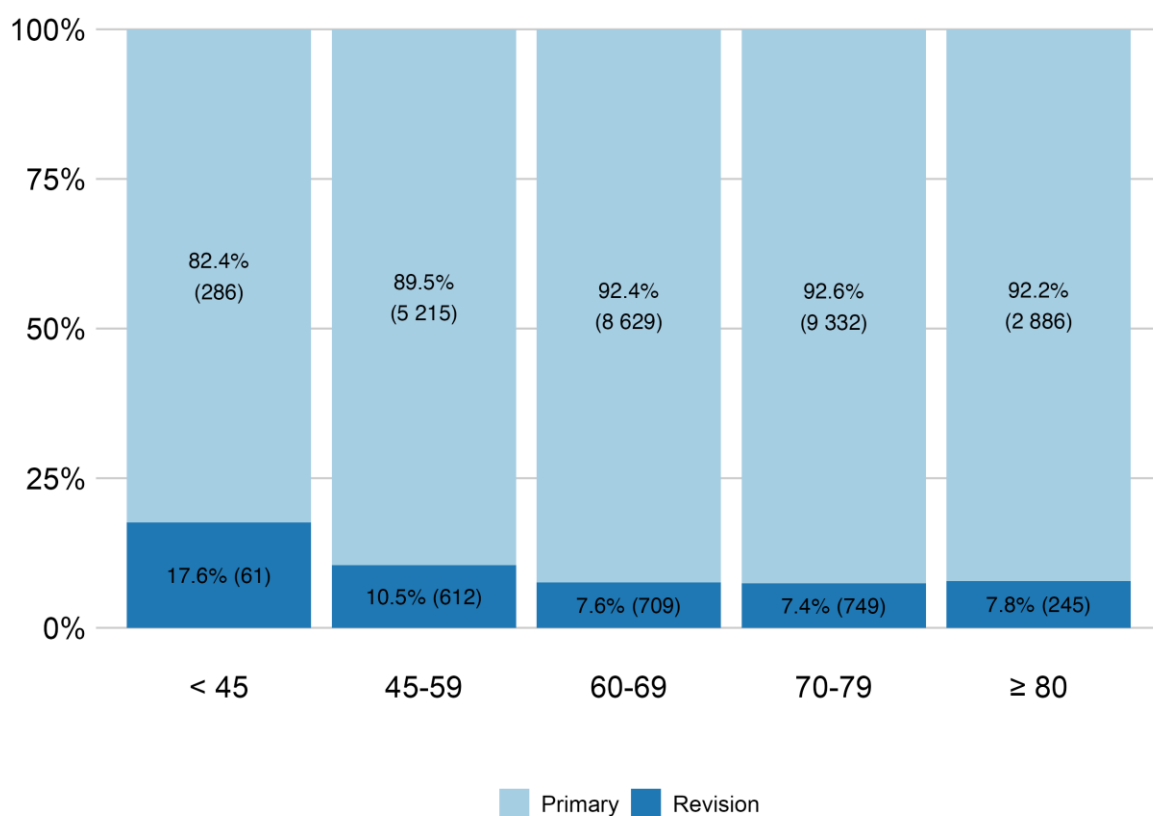


Figure 2.11 Age and gender by number of knee revision procedures

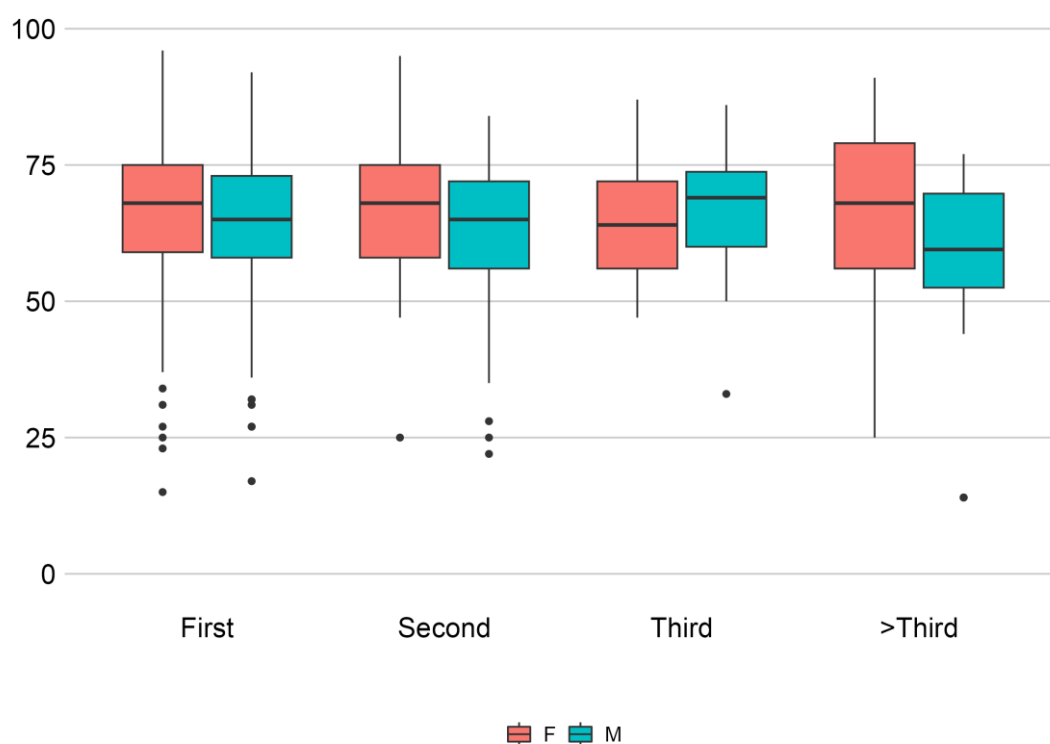
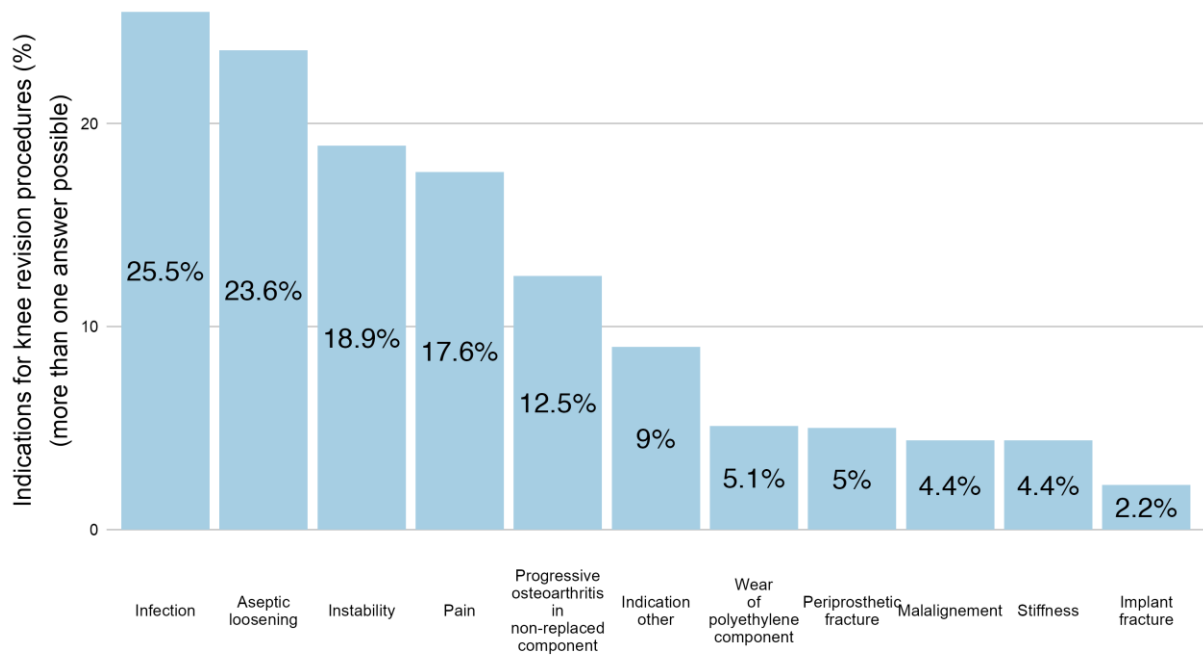


Figure 2.12 Indications for knee revision procedures



2.2.2 Surgical technique and implant characteristics

Table 2.10 Components removed during knee revision procedures

	Number	Proportion (%) ¹
Tibia	1 371	62.5%
Femur	1 369	62.4%
Patella	872	39.7%
Insert	1 941	88.4%
Total number of procedures	2 195	

¹More than one component can be exchanged during a revision procedure.

Table 2.11 Combinations of removed components during knee revision procedures

	Number	Percentage of total (%)
All components	1 283	58.5%
Tibia and Insert	79	3.6%
Patella and insert	48	2.2%
Femur and insert	36	1.6%
Insert only	476	21.7%
Patella only	214	9.7%
Femur only	34	1.5%
Other combination	25	1.1%
Total number of procedures	2195	100.0%

Table 2.12 Numbers and percentages of implanted knee types during knee revision procedures

	Number	Percentage of total (%)
Total knee replacement	1 644	95.6%
Unicompartmental	11	0.6%
Bicompartmental replacement	26	1.5%
Patellofemoral replacement	38	2.2%
Total number of procedures	1 719	100%

Figure 2.13 Distribution of implanted total knee prosthesis types during revision procedures

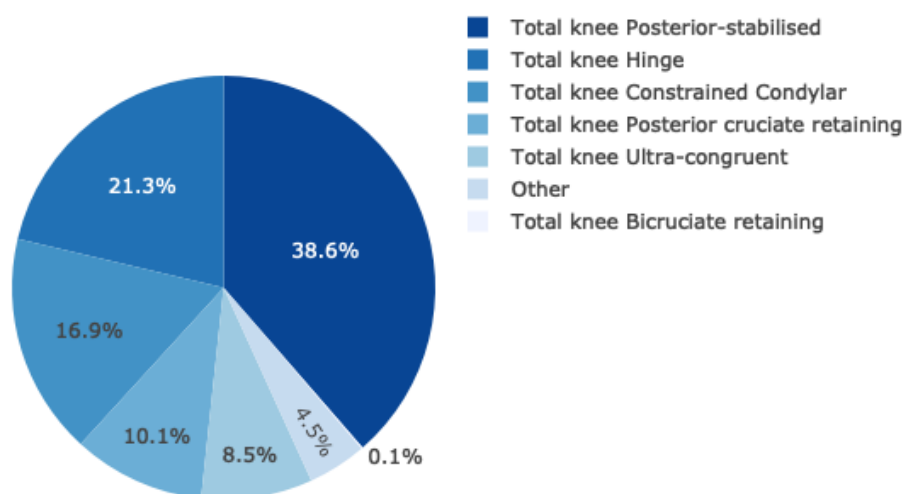
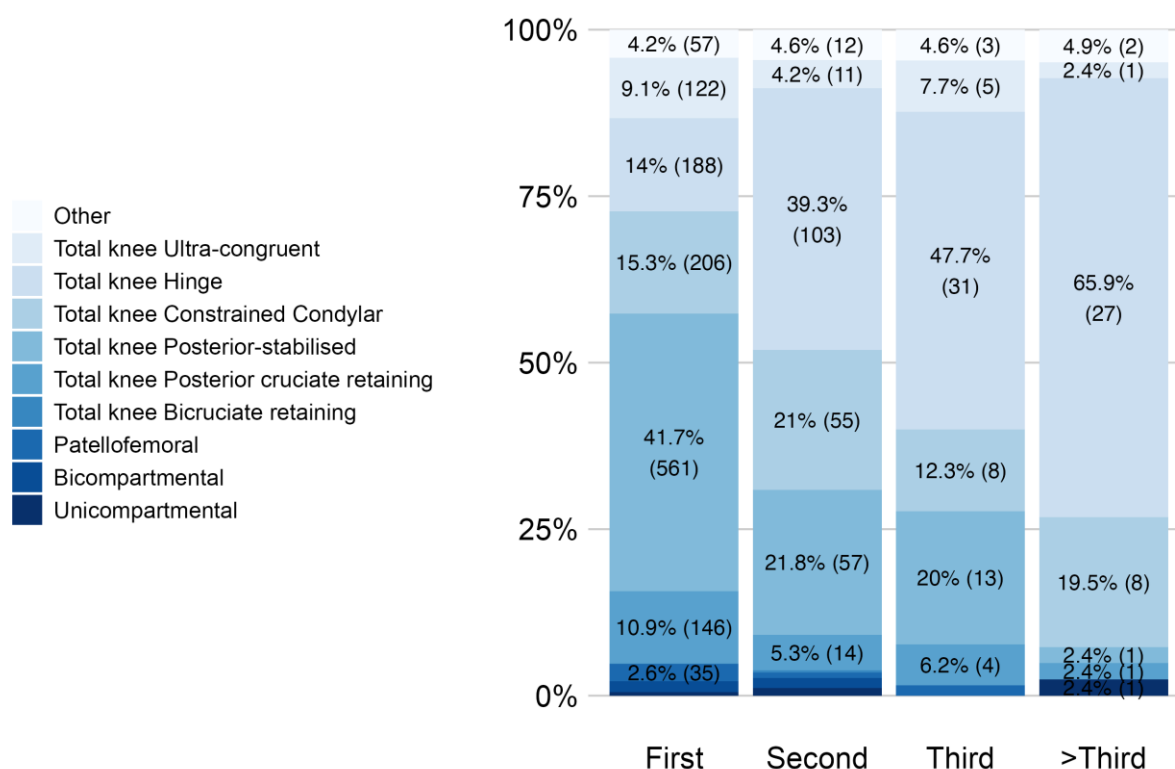


Figure 2.14 Type of implanted knee prosthesis during revision procedures according to the number of revisions



	1st revision	2nd revision	3rd revision	>3rd revision
	N (%)	N (%)	N (%)	N (%)
Total knee Other	57 (4.2%)	12 (4.6%)	3 (4.6%)	2 (4.9%)
Total knee Ultra-congruent	122 (9.1%)	11 (4.2%)	5 (7.7%)	1 (2.4%)
Total knee Hinge	188 (14.0%)	103 (39.3%)	31 (47.7%)	27 (65.9%)
Total knee Constrained condylar	206 (15.3%)	55 (21.0%)	8 (12.3%)	8 (19.5%)
Total knee Posterior-stabilised	561 (41.7%)	57 (21.8%)	13 (20.0%)	1 (2.4%)
Total knee Posterior cruciate retaining	146 (10.8%)	14 (5.3%)	4 (6.1%)	1 (2.4%)
Total knee bicruciate retaining	1 (0.1%)	1 (0.4%)	0 (0%)	0 (0%)
Patellofemoral replacement	35 (2.6%)	2 (0.8%)	1 (1.5%)	0 (0%)
Bicompartamental replacement	22 (1.6%)	4 (1.5%)	0 (0%)	0 (0%)
Unicompartmental	7 (0.5%)	3 (1.1%)	0 (0%)	1 (2.4%)
Total amount	1 345 (100 %)	262 (100 %)	65 (100 %)	41 (100 %)

Figure 2.15 Approach during knee revision procedures

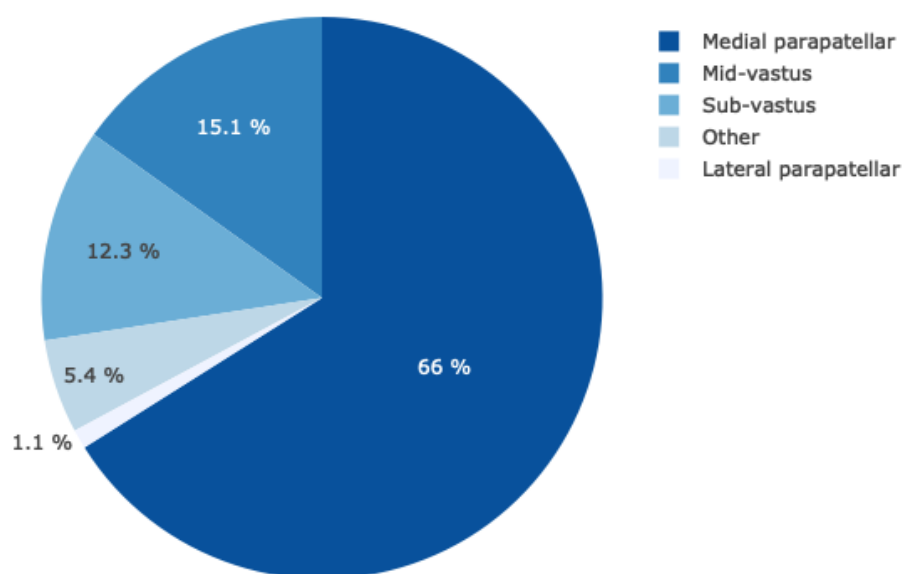


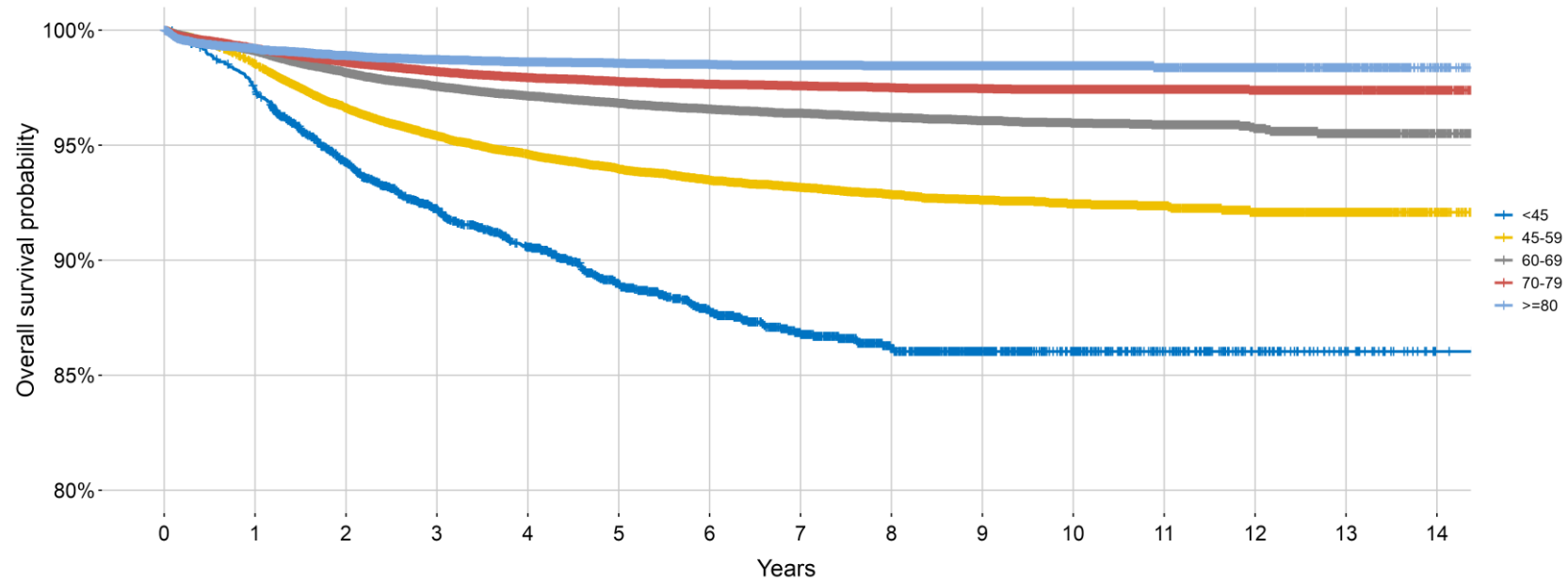
Table 2.13 Numbers and percentages of knee revisions by fixation

	Number	Percentage of total
Cemented	1 370	95.8%
Reverse hybrid	3	0.2%
Hybrid	24	1.7%
Uncemented	33	2.3%
Total number of procedures	1 430	100%

Note: Only replacements during which the femoral and/or tibial component were replaced were taken into account.

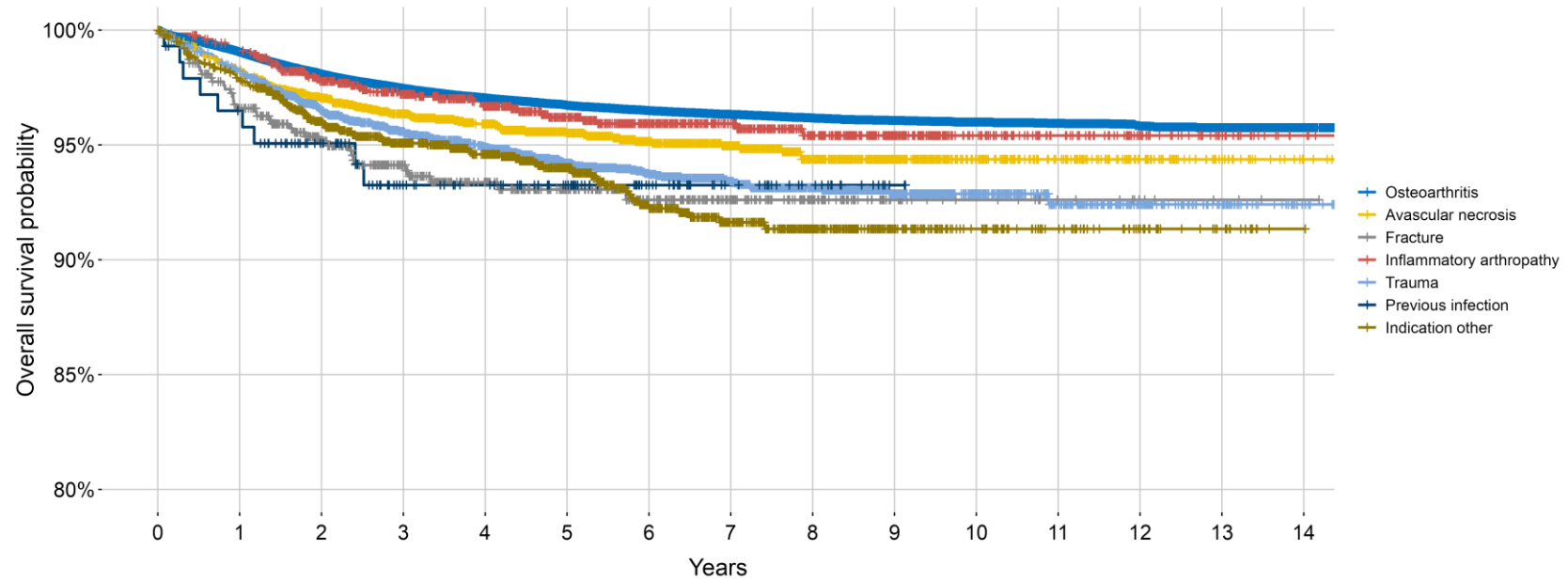
2.2.3 Implant survival after primary procedures

Figure 2.16 Kaplan-Meier curve for age at primary knee replacement



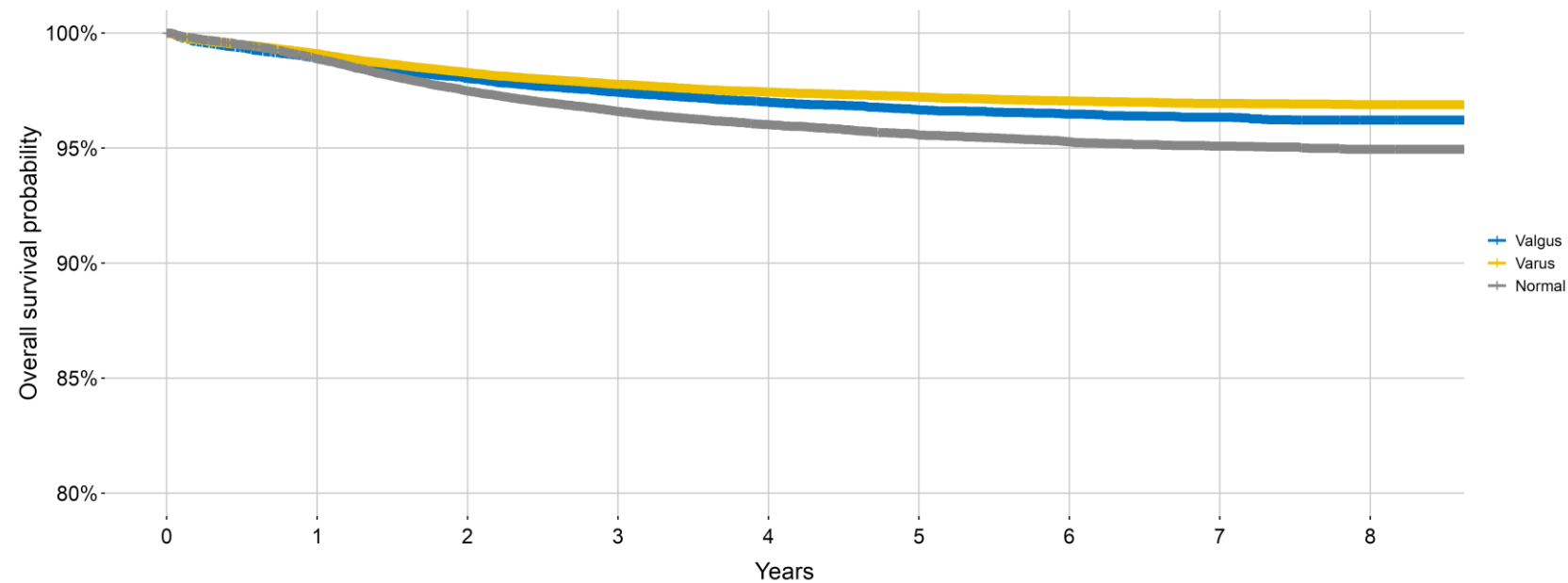
Number of events/Number at risk														
	0	1	2	3	4	5	6	7	8	9	10	11	12	13
<45	82/3128	94/3038	55/2692	41/2372	33/2088	21/1712	14/1394	6/1064	1/707	0/395	0/229	0/151	0/80	0/37
45-59	655/4451 9	815/4376 9	454/3865 4	262/3310 7	176/2873 2	107/2341 8	54/18303	36/13551	19/9056	6/5147	2/2622	4/1699	0/969	0/427
60-69	647/7132 3	643/7042 3	355/6246 2	212/5392 7	141/4742 2	92/38900	50/30683	36/22888	17/15517	7/9116	3/4878	3/3170	3/1731	0/739
70-79	585/7352 1	411/7234 4	248/6360 3	134/5459 9	78/47914	39/38711	18/30248	17/22382	5/15375	2/9612	0/5418	1/3614	0/2060	0/891
80+	201/2523 3	71/24528	36/21546	17/18215	9/15768	6/12427	2/9404	2/6894	0/4789	0/3299	1/1879	0/1215	0/627	0/234

Figure 2.17 Kaplan-Meier curve for indication at primary knee replacement



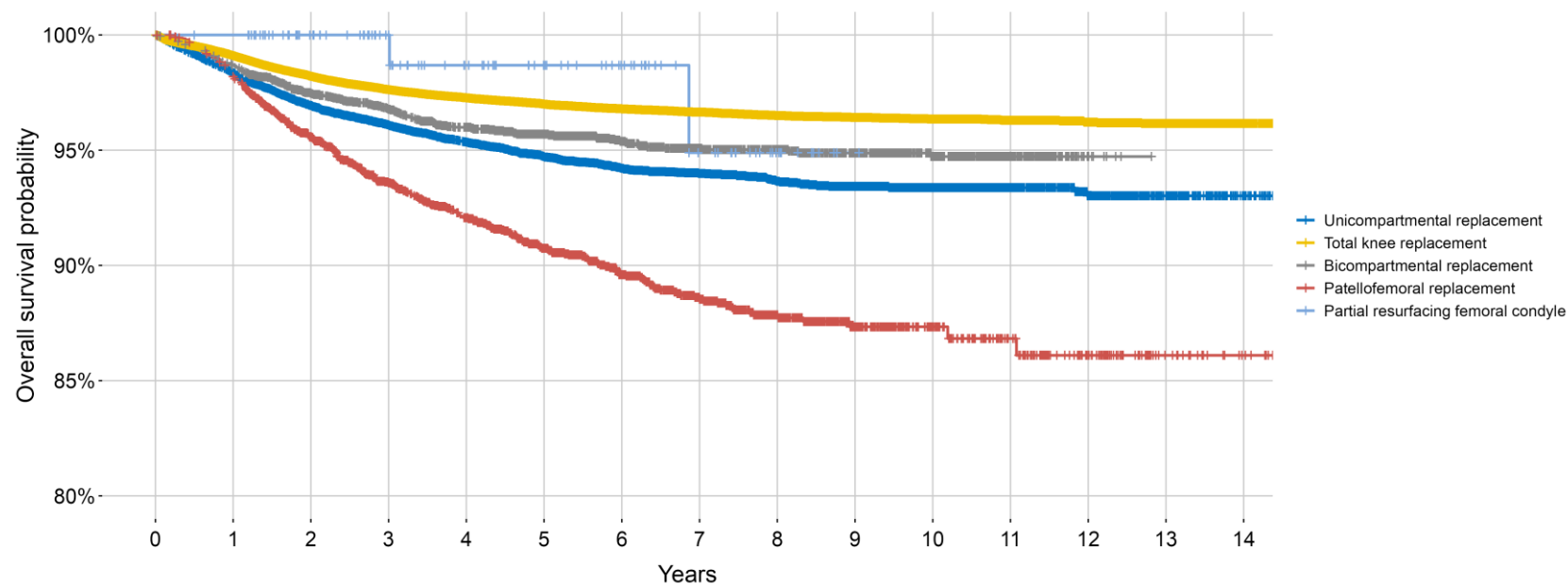
Number of events/Number at risk														
	0	1	2	3	4	5	6	7	8	9	10	11	12	13
Osteo- arthritis	1972/206 982	1875/203 703	1073/179 709	622/1542 28	400/1349 60	233/1095 07	127/8565 1	86/63592	40/43308	14/26368	5/14375	8/9439	3/5244	0/2212
Avascular necrosis	48/2779	32/2701	17/2419	9/2127	7/1810	5/1456	2/1154	4/855	0/553	0/294	0/164	0/110	0/65	0/30
Fracture	21/646	8/582	5/483	3/390	1/316	1/246	0/185	0/133	0/69	0/27	0/17	0/11	0/6	0/3
Inflammatory arthropathy	11/1246	16/1224	6/1116	5/992	4/884	2/740	0/577	2/437	0/309	0/198	0/114	0/73	0/44	0/21
Post trauma	75/4190	69/4087	32/3655	21/3159	19/2810	10/2365	6/1866	4/1372	2/972	0/564	1/294	0/192	0/107	0/54
Previous infection	5/144	2/136	2/116	0/89	0/81	0/66	0/45	0/26	0/16	0/2	0/0	0/0	0/0	0/0
Other indication	38/1794	31/1726	14/1516	6/1285	6/1108	13/830	3/585	1/386	0/233	0/129	0/83	0/49	0/29	0/13

Figure 2.18 Kaplan-Meier curve for alignment at primary knee replacement for patients with osteoarthritis as indication for knee replacement



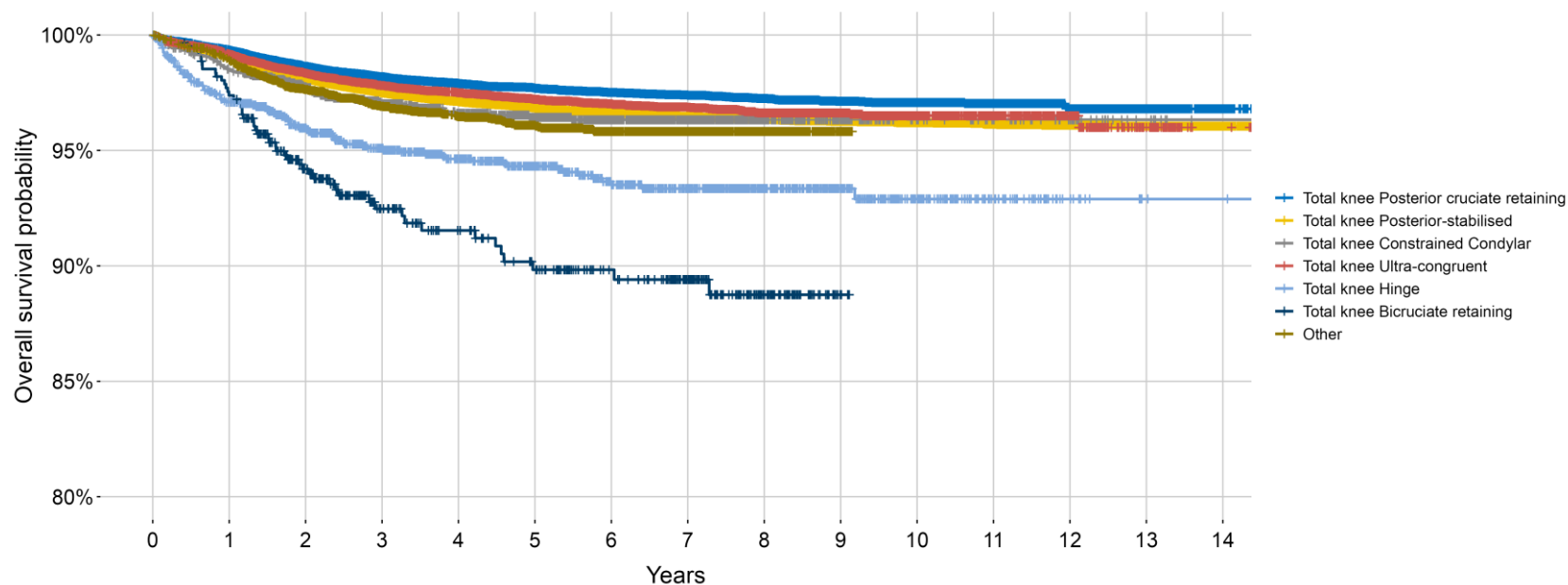
Number of events/Number at risk									
	0	1	2	3	4	5	6	7	8
Valgus	393/35796	295/35113	172/30437	105/25350	65/21582	26/16533	15/11911	8/7617	0/3766
Varus	861/95834	737/94269	393/81591	219/68096	113/57983	68/44572	27/32048	9/20643	0/10184
Normal	571/50786	670/49902	366/43435	203/36678	126/31386	67/24489	30/17851	11/11546	0/5630

Figure 2.19 Kaplan-Meier curve for type of implant at primary knee replacement



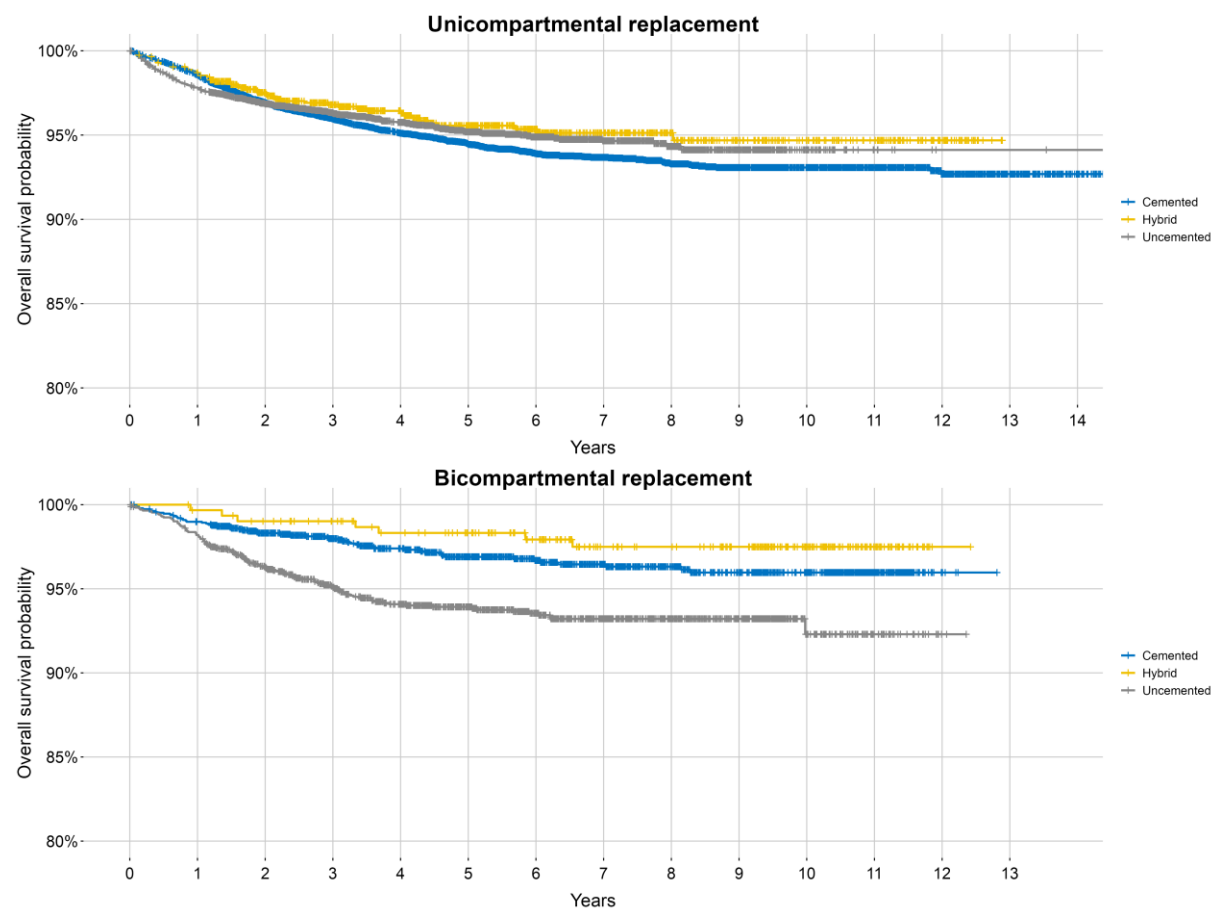
	Number of events/Number at risk													
	0	1	2	3	4	5	6	7	8	9	10	11	12	13
Unicompartmental replacement	375/2293 9	309/2248 1	155/1934 3	114/1599 5	79/13426	46/10348	15/7534	15/5351	7/3560	1/2224	0/1304	2/895	0/494	0/178
Total knee replacement	1671/186 230	1577/183 217	900/1620 44	476/1395 39	311/1224 80	187/9965 4	101/7817 4	73/57887	25/39034	12/23097	5/12387	5/8281	2/4730	0/2060
Bicompart-mental replacement	51/3902	46/3837	23/3465	24/3067	8/2776	7/2397	6/2008	1/1647	2/1348	1/1085	0/605	0/251	0/10	0/0
Patello-femoral replacement	67/3730	94/3651	63/3218	42/2752	31/2395	21/1938	15/1487	7/1073	3/688	0/361	1/191	1/125	0/70	0/20
Partial resurfacing femoral condyle	0/119	0/118	0/96	1/77	0/61	0/50	1/40	0/23	0/11	0/1	0/0	0/0	0/0	0/0

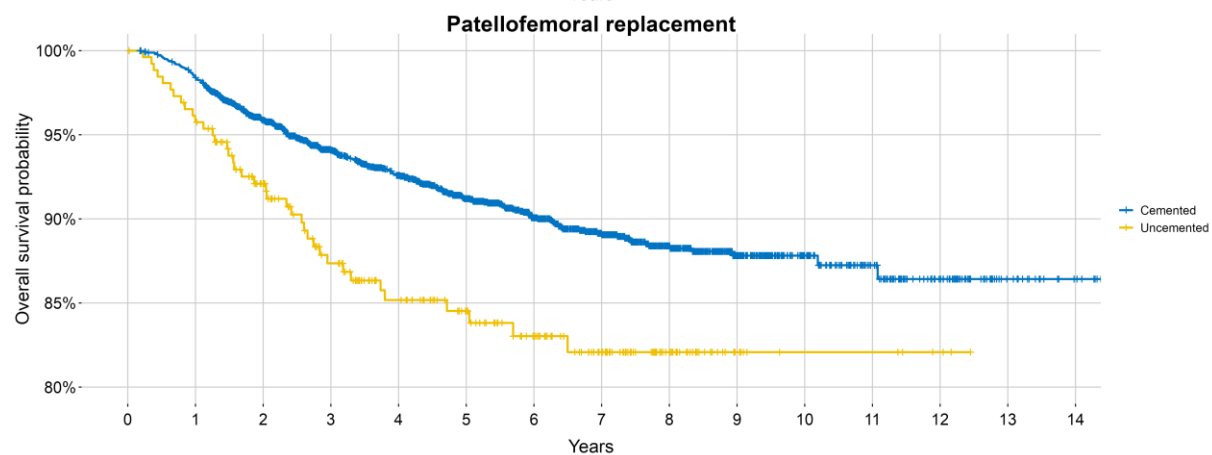
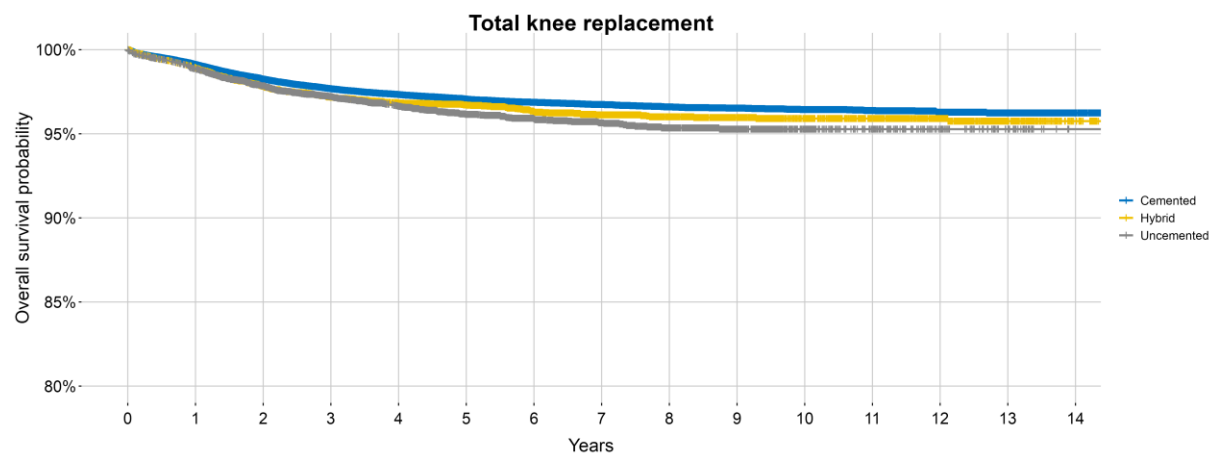
Figure 2.20 Kaplan-Meier curve for type of implant for total knee prostheses at primary knee replacement



	Number of events/Number at risk													
	0	1	2	3	4	5	6	7	8	9	10	11	12	13
Total knee Posterior cruciate retaining	250/3846 3	256/3798 1	141/3318 2	81/28600	47/25029	37/20470	17/16297	15/12434	9/8981	3/5818	1/3231	3/2130	0/1212	0/540
Total knee Posterior-stabilised	1036/109 699	982/1079 17	575/9631 8	303/8372 9	197/7416 2	114/6089 5	68/48198	43/35984	16/24367	6/14740	4/8276	2/5650	1/3252	0/1448
Total knee Constrained Condylar	31/2111	15/2047	13/1828	6/1533	2/1333	1/1031	0/780	0/513	0/288	0/135	0/69	0/52	0/33	0/11
Total knee Ultra-congruent	231/2807 2	221/2762 4	121/2419 6	61/20296	46/17420	23/13708	14/10270	14/7171	0/4464	2/2107	0/694	0/401	1/221	0/58
Total knee Hinge	46/1618	16/1502	11/1281	5/1108	3/943	6/794	1/650	0/506	0/340	1/226	0/117	0/48	0/12	0/3
Total knee Bicruciate retaining	16/613	18/593	7/458	3/310	5/279	0/259	1/211	1/170	0/75	0/9	0/0	0/0	0/0	0/0
Other	61/5654	69/5553	32/4781	17/3963	11/3314	6/2497	0/1768	0/1109	0/519	0/62	0/0	0/0	0/0	0/0

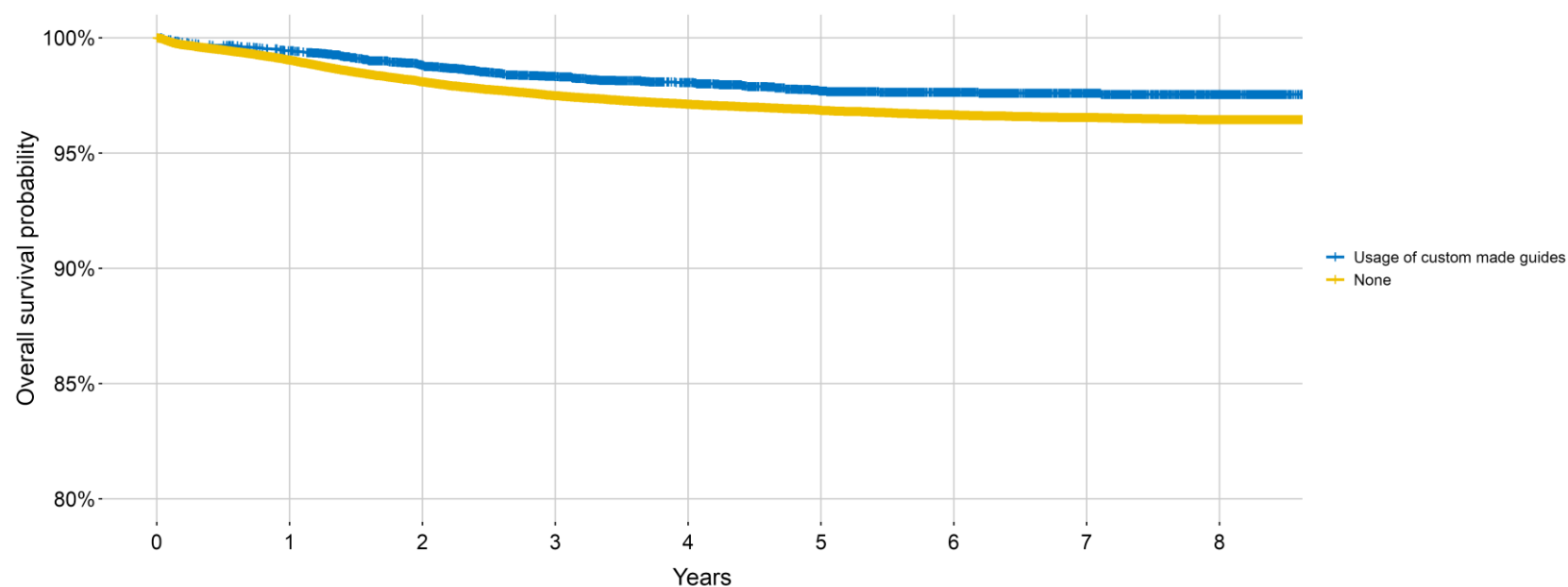
Figure 2.21 Kaplan-Meier curves for method of fixation according to primary knee replacement prosthesis type





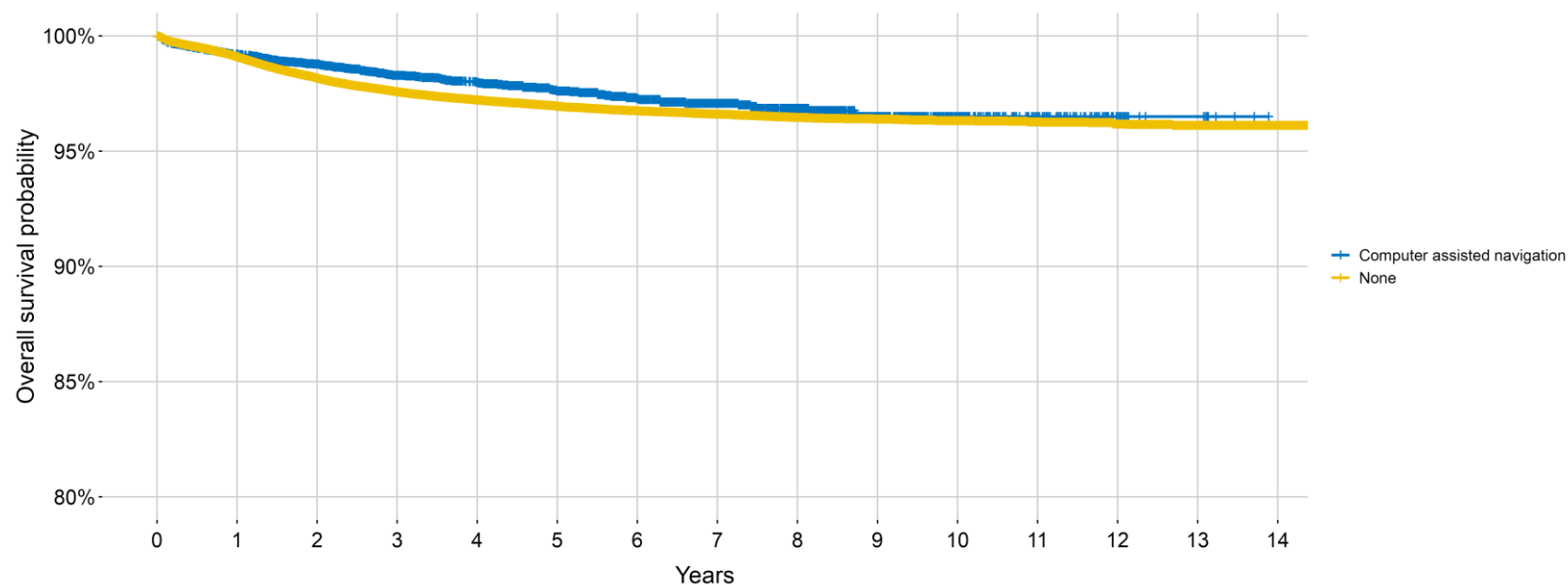
Number of events/Number at risk															
		0	1	2	3	4	5	6	7	8	9	10	11	12	13
Unicompartmental replacement	Cemented	228/15723	241/15440	123/13330	91/11104	57/9460	38/7355	11/5457	13/3949	5/2747	0/1760	0/1082	2/775	0/453	0/176
	Hybrid	15/1157	13/1137	7/992	3/854	6/704	1/570	1/432	0/327	1/218	0/164	0/124	0/95	0/38	0/0
	Uncemented	131/5983	54/5829	25/4947	20/3963	16/3188	6/2349	3/1572	2/1002	1/522	0/227	0/48	0/9	0/2	0/2
Total knee replacement	Cemented	1449/166186	1378/163525	799/145515	416/125775	279/110469	158/90026	85/70556	62/51953	22/34721	11/20319	5/10701	5/6975	1/3928	0/1718
	Hybrid	112/10437	107/10266	51/8446	24/7121	6/6231	18/4888	7/3934	3/3156	1/2440	1/1779	0/1332	0/1070	1/690	0/300
	Uncemented	109/9521	89/9341	49/8001	36/6562	26/5699	11/4659	8/3603	7/2698	1/1794	0/921	0/292	0/191	0/99	0/39
Bicompartmental replacement	Cemented	19/1873	12/1846	5/1632	8/1407	6/1253	2/1058	2/883	1/722	2/580	0/477	0/387	0/169	0/7	0/0
	Hybrid	1/307	2/304	0/299	2/290	0/281	1/270	1/247	0/213	0/207	0/191	0/121	0/47	0/1	0/0
	Uncemented	31/1722	32/1687	18/1534	14/1370	2/1242	4/1069	3/878	0/712	0/561	1/417	0/97	0/35	0/2	0/0
Patellofemoral replacement	Cemented	55/3441	83/3376	53/2983	38/2550	30/2222	19/1791	13/1361	6/972	3/622	0/325	1/172	1/111	0/61	0/19
	Uncemented	11/260	9/247	10/209	4/176	1/147	2/121	1/100	0/76	0/42	0/12	0/6	0/6	0/3	0/0

Figure 2.22 Kaplan-Meier curve for usage of custom made guides during primary knee replacement for total knee replacement



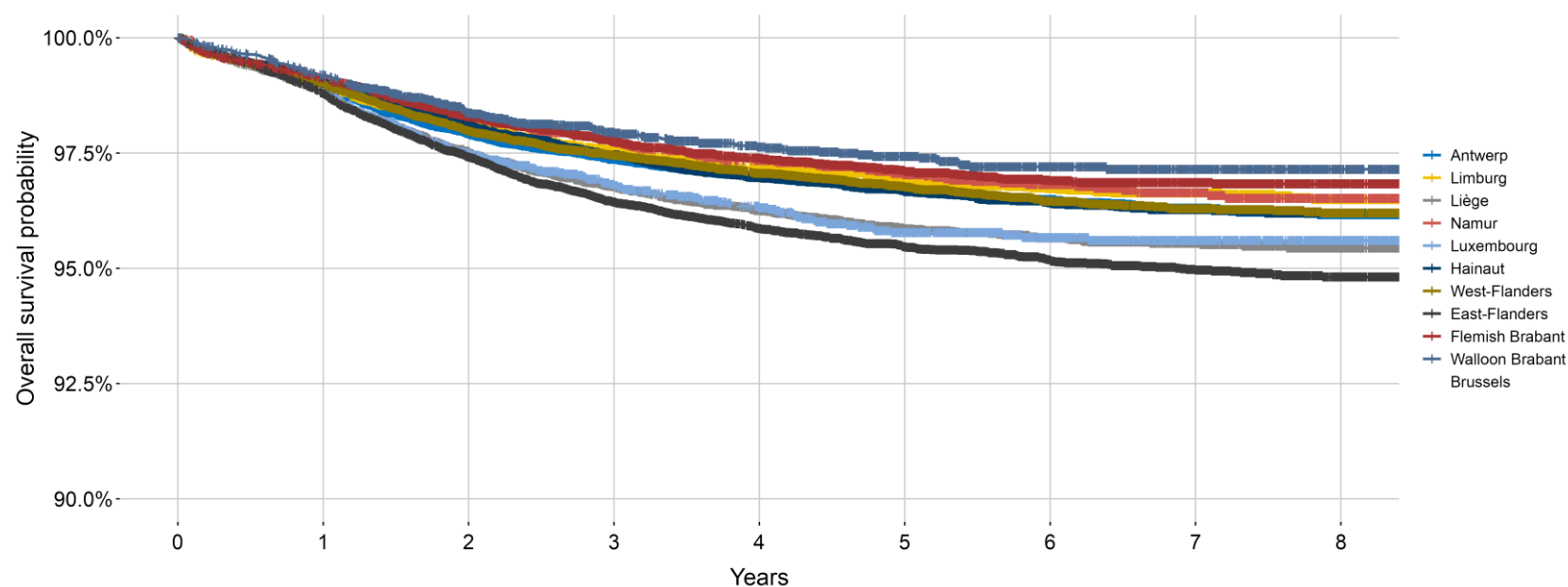
Number of events/Number at risk									
	0	1	2	3	4	5	6	7	8
Usage of custom made guides	48/8599	51/8497	35/7498	15/6225	18/5310	2/4179	1/3009	1/1966	0/995
None	1515/156366	1382/153563	759/133533	398/112407	230/96326	134/74694	53/54435	26/35238	0/17402

Figure 2.23 Kaplan-Meier curve for usage of computer assisted navigation during primary knee replacement for total knee replacement



Number of events/Number at risk														
	0	1	2	3	4	5	6	7	8	9	10	11	12	13
Computer assisted navigation	116/1483 1	56/14625	35/9241	14/5494	13/4006	8/2888	4/2088	3/1560	3/1059	0/621	0/263	0/141	0/44	0/11
None	1555/171 399	1521/168 592	865/1528 03	462/1340 45	298/1184 74	179/9676 6	97/76086	70/56327	22/37975	12/22476	5/12124	5/8140	2/4686	0/2049

Figure 2.24 Kaplan-Meier curve for location where primary knee replacement was performed



Number of events/Number at risk									
	0	1	2	3	4	5	6	7	8
Antwerp	308/28881	277/28365	129/24593	74/20567	46/17317	23/13249	15/9596	7/6167	308/28881
Limburg	172/16826	136/16552	79/14407	41/12105	23/10347	16/8063	5/5767	4/3801	172/16826
Liège	199/16549	197/16196	101/14005	57/11568	36/9817	13/7623	6/5509	3/3518	199/16549
Namur	71/7622	53/7485	36/6542	21/5482	13/4724	7/3686	4/2667	2/1687	71/7622
Luxembourg	49/4599	64/4512	25/4013	17/3446	15/3014	2/2288	1/1700	0/1099	49/4599
Hainaut	215/22112	187/21687	117/18733	73/15684	38/13498	23/10514	9/7634	3/4832	215/22112
West-Flanders	294/28950	274/28444	125/24865	76/20858	47/17683	36/13565	14/9809	4/6304	294/28950
East-Flanders	357/29413	380/28864	228/24740	113/20540	63/17374	34/13380	17/9558	7/6089	357/29413
Flemish Brabant	141/16065	126/15813	70/13760	39/11580	25/9864	14/7520	2/5378	1/3469	141/16065

Walloon Brabant	49/6099	47/5997	20/5156	13/4281	7/3653	6/2875	1/2095	0/1352	49/6099
Brussels	116/10316	77/10096	48/8710	32/7363	16/6366	9/4907	3/3571	3/2350	116/10316

2.3 NINETY-DAYS MORTALITY AFTER KNEE REPLACEMENT PROCEDURES (SINCE 2015)

Table 2.14 90-days mortality after knee replacement by type of procedure

	Alive 90 days post-procedure		Died before 90 days post-procedure	
	Count	N %	Count	N %
Primary procedure	191 726	99.8%	415	0.2%
Revision with new prosthesis	16 359	99.0%	171	1%
Resection with spacer	1 254	97.4%	33	2.8%
Resection without spacer	43	100%	0	0.0%
Total	209 382	99.7%	619	0.3%

Table 2.15 90-days mortality after primary knee replacement by primary knee replacement types

	Alive 90 days post-procedure		Died before 90 days post-procedure	
	Count	N %	Count	N %
Total knee replacement	164 663	99.8%	388	0.2%
Unicompartmental replacement	20 757	99.9%	18	0.1%
Bicompartmental replacement	2 826	99.8%	5	0.2%
Patellofemoral replacement	3 361	99.9%	4	0.1%
Partial resurfacing femoral condyle	119	100%	0	0.0%
Total	191 726	99.8%	415	0.2%

Table 2.16 90-days mortality after knee revision procedures by combinations of removed components during knee revision procedures

	Alive 90 days post-procedure		Died before 90 days post-procedure	
	Count	N %	Count	N %
All components	9 817	99.0%	101	1.0%
Tibia and Insert	773	99.5%	4	0.5%
Patella and insert	348	100%	0	0.0%
Femur and insert	250	98.0%	5	2.0%
Insert only	2 781	98.0%	58	2.0%
Patella only	1 993	99.9%	1	0.1%
Femur only	161	99.4%	1	0.6%
Other combination	237	99.6%	1	0.4%
Total	16 360	99.0%	171	1.0%

Table 2.17 90-days mortality after knee replacement by age category

	Alive 90 days post-procedure		Died before 90 days post-procedure	
	Count	N %	Count	N %
<45	3 262	99.9%	3	0.1%
45-59	44 345	99.9%	36	0.1%
60-69	68 271	99.9%	97	0.2%
70-79	69 593	99.7%	235	0.3%
>=80	23 862	99.0%	248	1.1%
Total	209 333	99.7%	619	0.3%

3 HIP REPLACEMENT

3.1 PRIMARY HIP REPLACEMENT

3.1.1 Demographics

Table 3.1 Age, gender and indications for primary hip replacement patients

N=32 474		
	Mean	SD
Age (yrs)	70.6	12.6
	Count	N %
Age categories		
<45	897	2.8%
45-59	5 275	16.2%
60-69	7 926	24.4%
70-79	10 175	31.3%
>=80	8 197	25.2%
Gender		
Female	19 079	58.8%
Male	13 168	40.5%
Undefined	227	0.7%
Indication		
Primary osteoarthritis	21 926	67.5%
Secondary osteoarthritis	556	1.7%
Avascular necrosis	1 360	4.2%
Rheumatoid arthritis	56	0.2%
Fracture	7 971	24.5%
Tumor	68	0.2%
Hip dysplasia	340	1.0%
Indication other	197	0.6%

Figure 3.1 Age distribution by gender for primary hip replacement patients

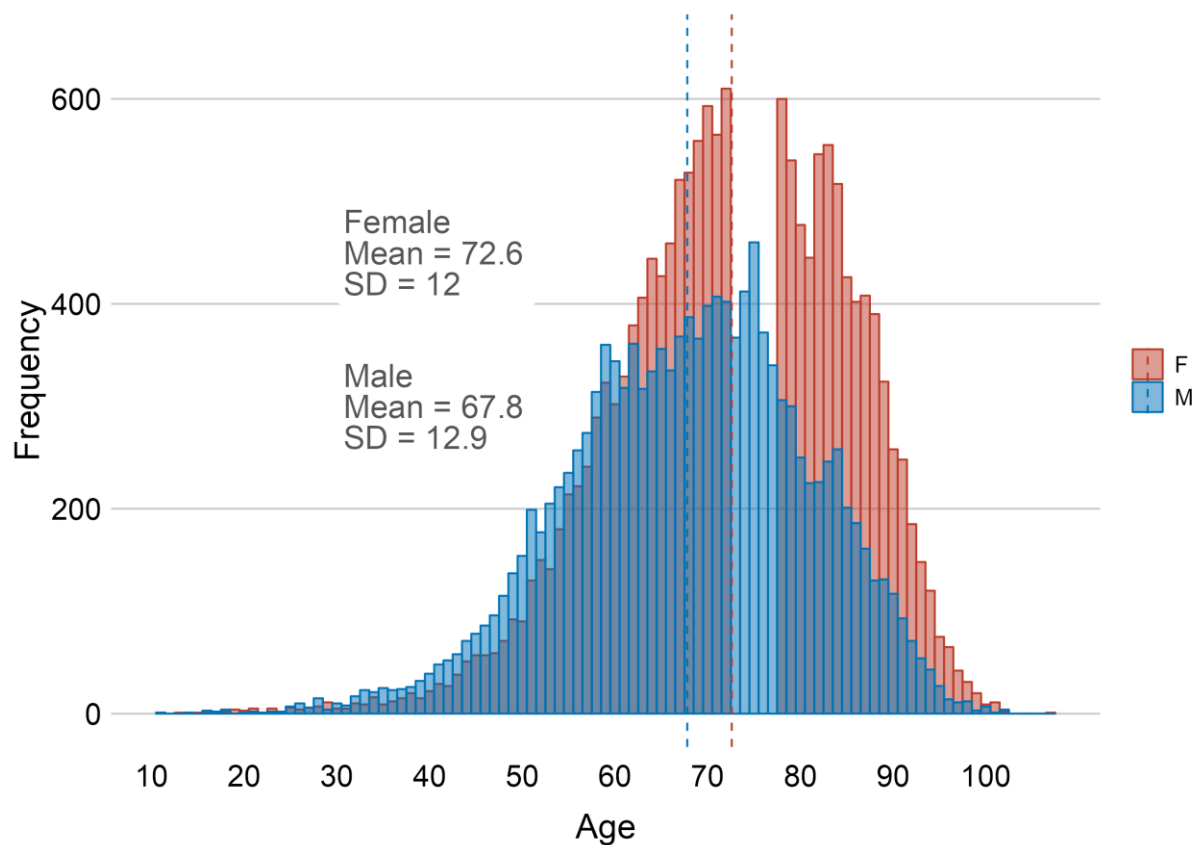


Figure 3.2 Age distribution by indication for primary hip replacement patients

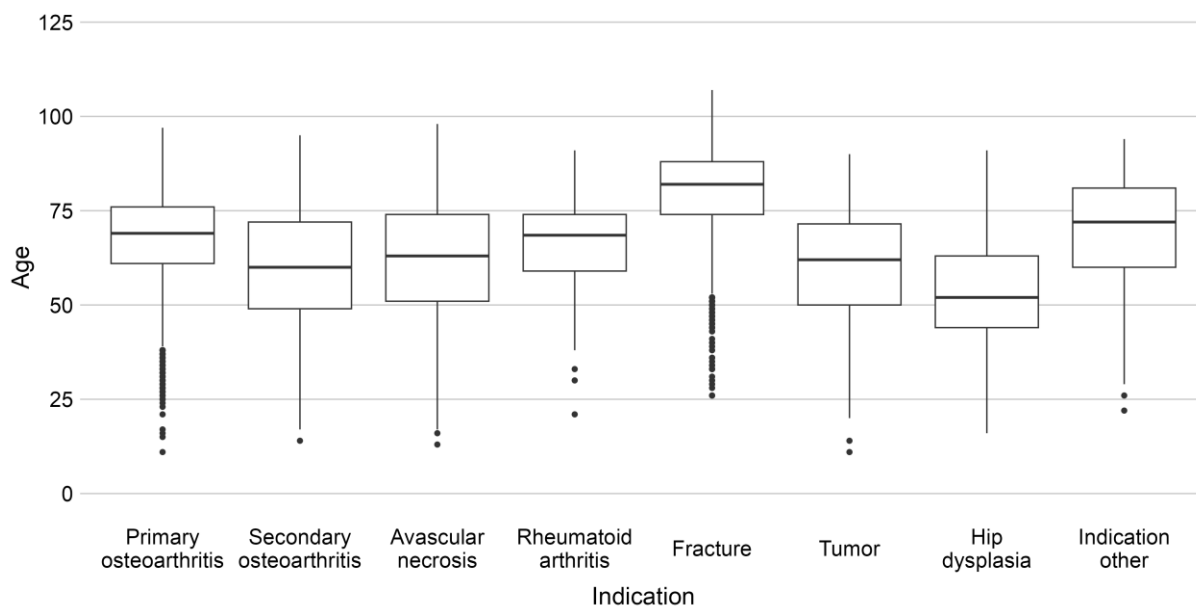
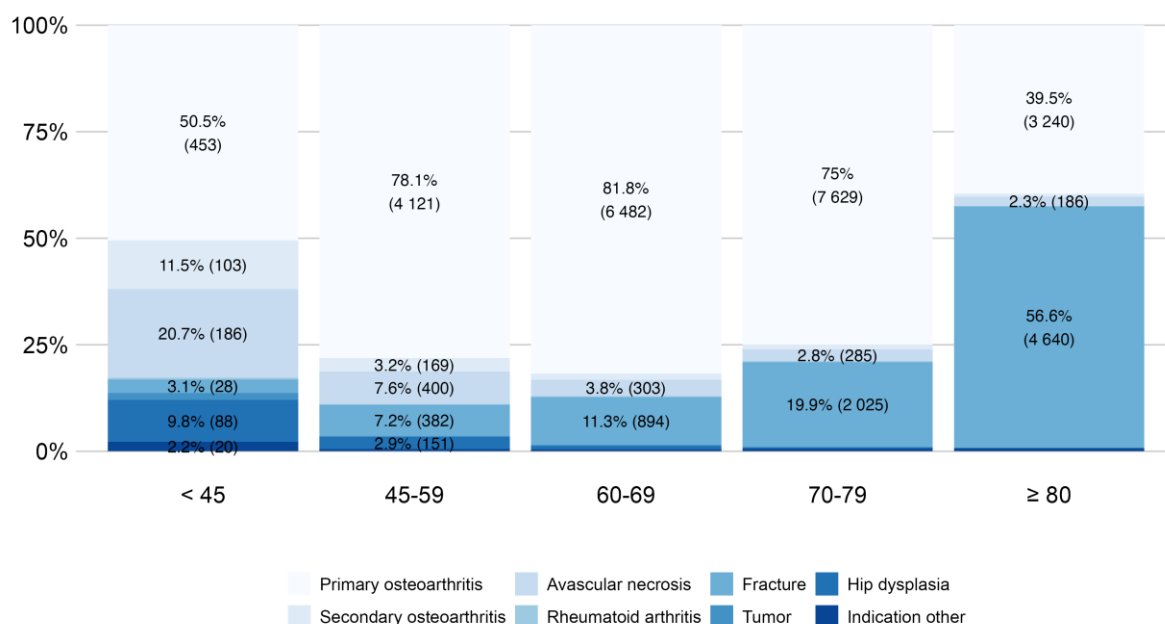


Table 3.2 Indications for primary hip replacements based on gender

	Male	Female
	N=13 168	N=19 079
	N (%)	N (%)
Primary osteoarthritis	9 422 (71.6%)	12 349 (64.7%)
Secondary osteoarthritis	283 (2.1%)	266 (1.4%)
Avascular necrosis	758 (5.8%)	586 (3.1%)
Rheumatoid arthritis	17 (0.1%)	39 (0.2%)
Fracture	2 483 (18.9%)	5 446 (28.5%)
Tumor	40 (0.3%)	28 (0.1%)
Hip dysplasia	83 (0.6%)	250 (1.3%)
Indication other	82 (0.6%)	115 (0.6%)

Figure 3.3 Indications for primary hip replacement according to age category



Note: For readability of the figure, labels with values and percentages smaller than 2% are not displayed.

3.1.2 Surgical technique and implant characteristics

Table 3.3 Numbers and percentages of primary hip replacement types

	Number	Percentage of total
Total prosthesis	24 913	76.7%
Total dual-mobility prosthesis	2 357	7.3%
Hemi - Bipolar	4 900	15.1%
Hemi Modular	43	0.1%
Hemi Monoblock	10	< 0.1%
Resurfacing Femoral (Hemi)	4	< 0.1%
Resurfacing Femoral + Cup	247	0.8%
Resurfacing Partial (Punaise)	0	0%
Total	32 474	100%

Table 3.4 Age and gender of primary hip replacement patients by type of replacement

	Total hip replacement	Total dual-mobility prosthesis	Hemi - Unipolar	Hemi - Bipolar	Resurfacing
	N=24 913	N=2 357	N=53	N=4 900	N=251
Mean age (years) (SD)	67.9 (11.6)	73.4 (11.5)	85.3 (8.4)	83.8 (8.2)	50.7 (9.3)
Age groups	% (N)	% (N)	% (N)	% (N)	% (N)
<45	3.2% (796)	1.8% (42)	0% (0)	0.1% (7)	20.7% (52)
45-59	19.3% (4 811)	10.5% (248)	1.9% (1)	1% (49)	66.1% (166)
60-69	29% (7 232)	19.3% (454)	3.8% (2)	4.3% (209)	11.6% (29)
70-79	33.5% (8 347)	36.4% (857)	13.2% (7)	19.6% (961)	1.2% (3)
>=80	14.9% (3 724)	32.1% (756)	81.1% (43)	75% (3 673)	0.4% (1)
Gender	% (N)	% (N)	% (N)	% (N)	% (N)
Male	42.8% (10 586)	35.8% (838)	37.7% (20)	30.3% (1 482)	97.2% (242)
Female	57.2% (14 134)	64.2% (1 501)	62.3% (33)	69.7% (3 404)	2.8% (7)

Figure 3.4 Age distribution by implant type for primary hip replacement patients

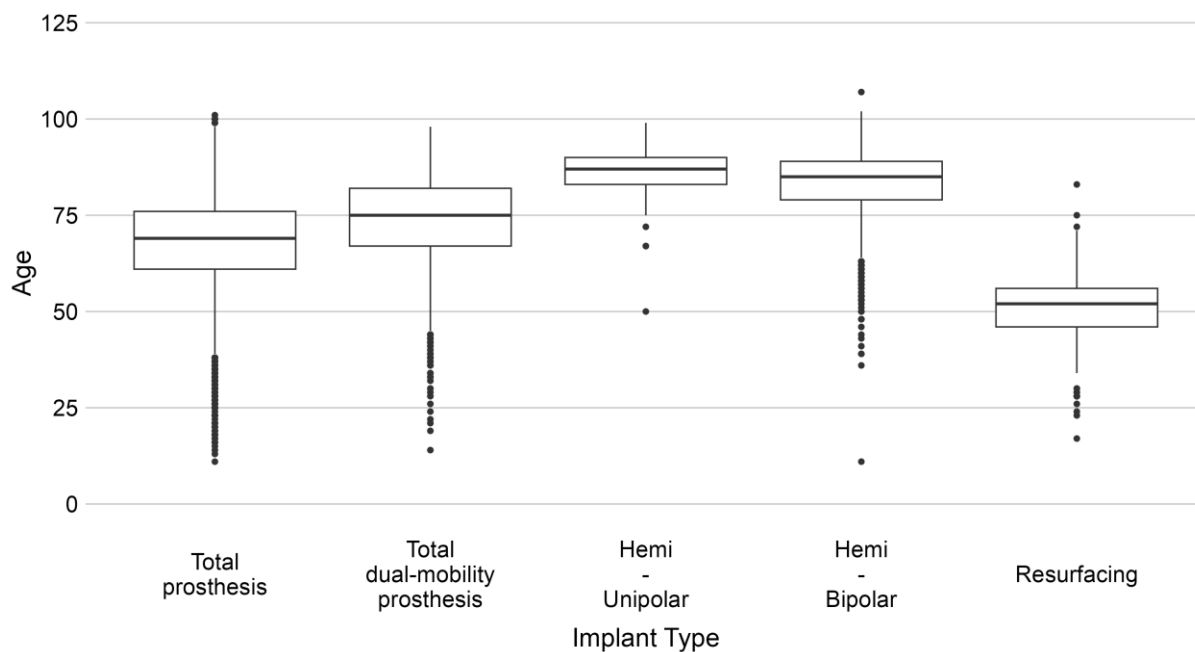
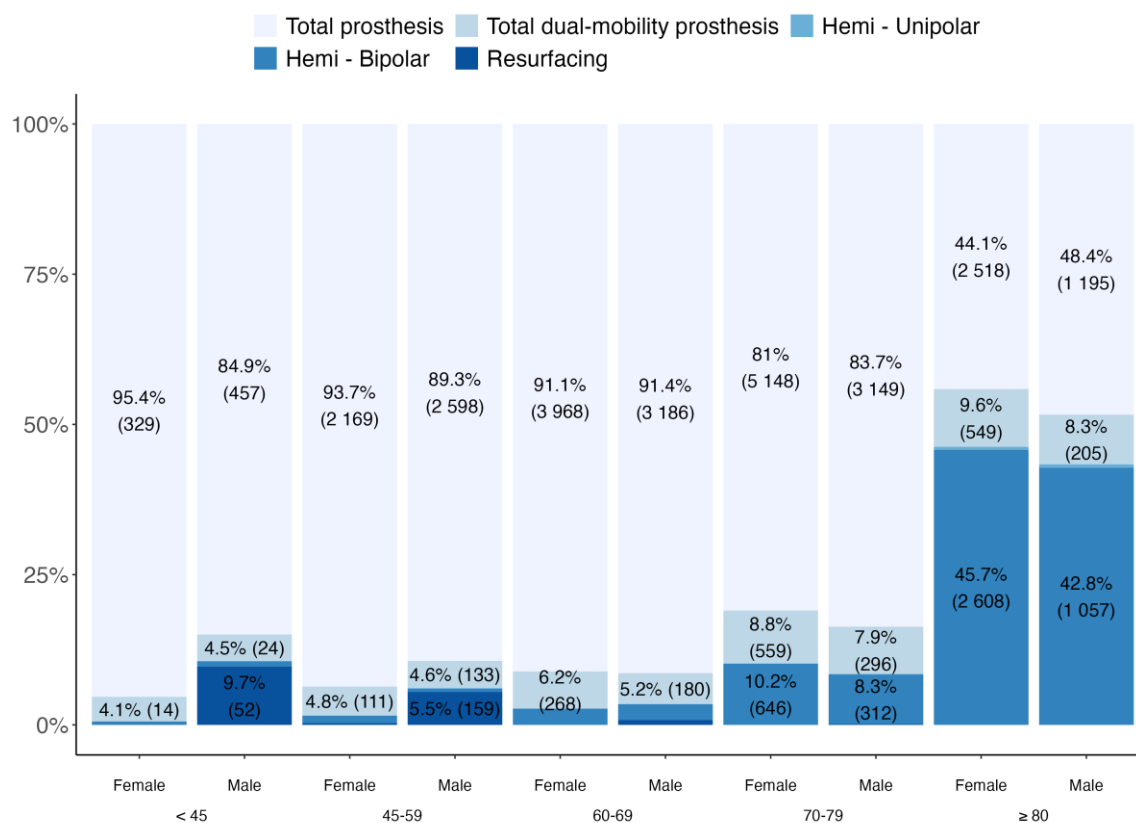
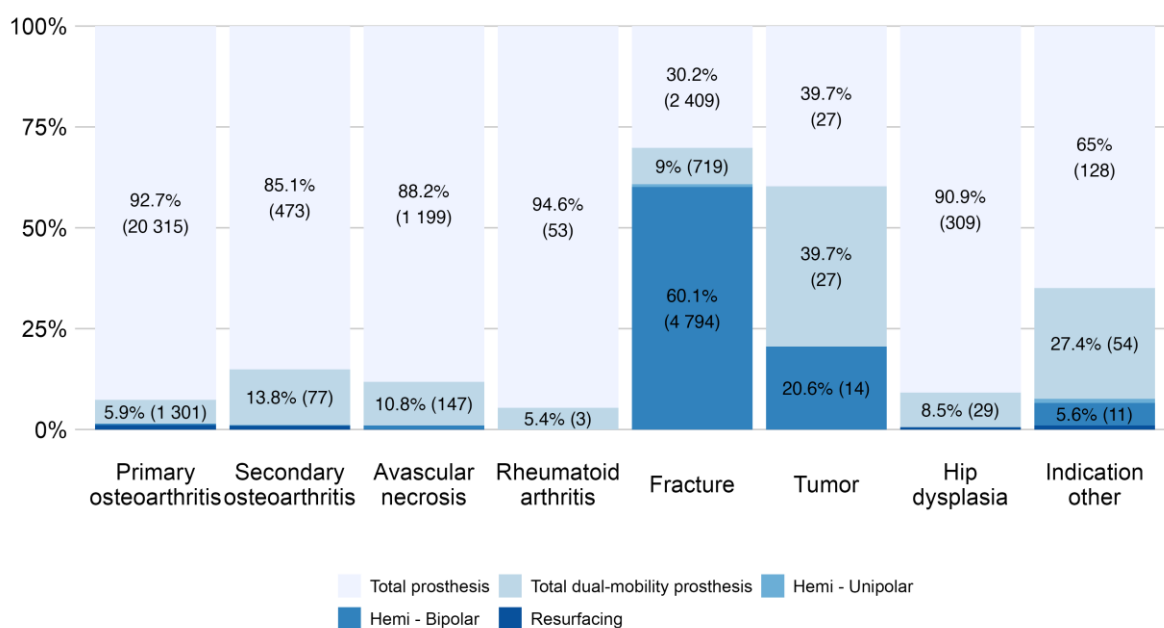


Figure 3.5 Type of primary hip replacement procedures by age groups and gender



Note: For readability of the figure, labels with values and percentages smaller than 4% are not displayed.

Figure 3.6 Type of primary hip replacement procedures by indication



Note: For readability of the figure, labels with values and percentages smaller than 3% are not displayed.

Table 3.5 Numbers and percentages of bearing surfaces in primary hip replacements according to type of replacement

	Total hip replacement	Total dual-mobility prosthesis (head)	Total dual-mobility prosthesis (cup)	Hemi - Bipolar	Resurfacing
	N=24 913	N=2 357	N=2 357	N=4 900	N=247
	% (N)	% (N)	% (N)	% (N)	% (N)
Metal - Polyethylene	5.4 (1350)	35.8 (844)	95.7 (2255)	55.5 (2718)	0.4 (1)
Ceramic - Polyethylene	47 (11721)	63.6 (1498)	0 (0)	41.4 (2027)	0 (0)
Metal - Metal	0.2 (39)	0 (0)	0 (0)	0.8 (38)	99.6 (246)
Ceramic - Ceramic	46.9 (11687)	0 (0)	0 (0)	1 (49)	0 (0)
Other	0.5 (116)	0.6 (15)	4.3 (102)	1.4 (68)	0 (0)

Figure 3.7 Fixation of primay hip prosthesis according to type of replacement

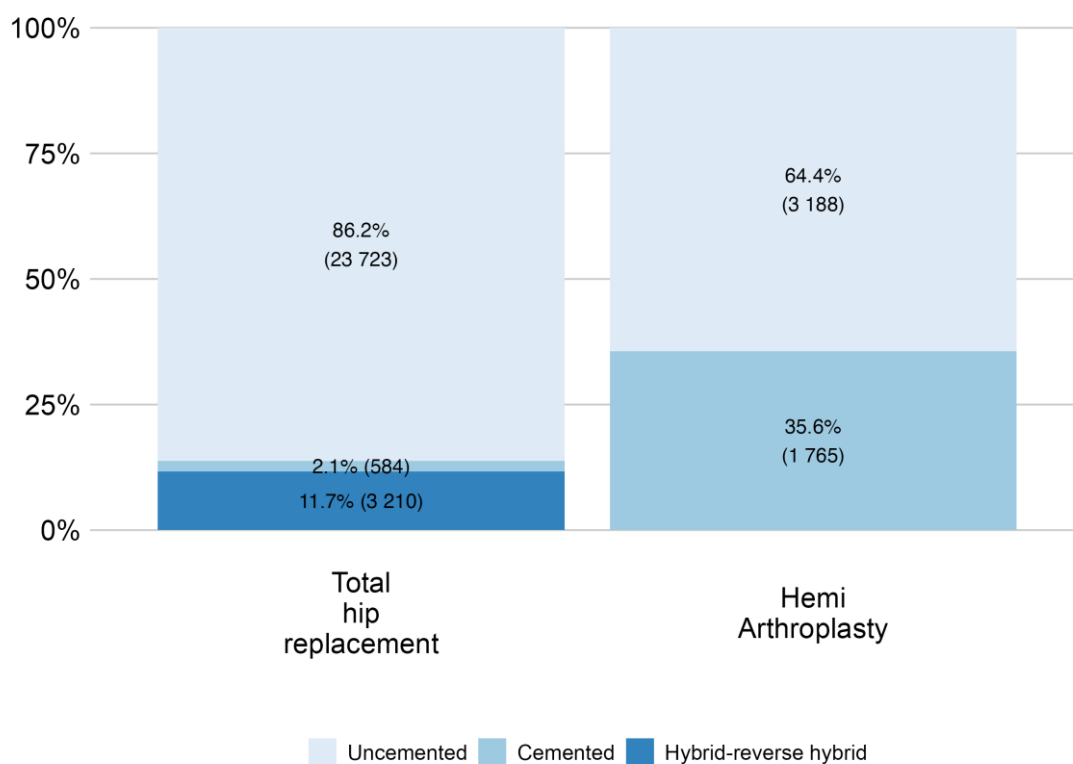


Figure 3.8 Fixation of total primay hip prosthesis according to age category

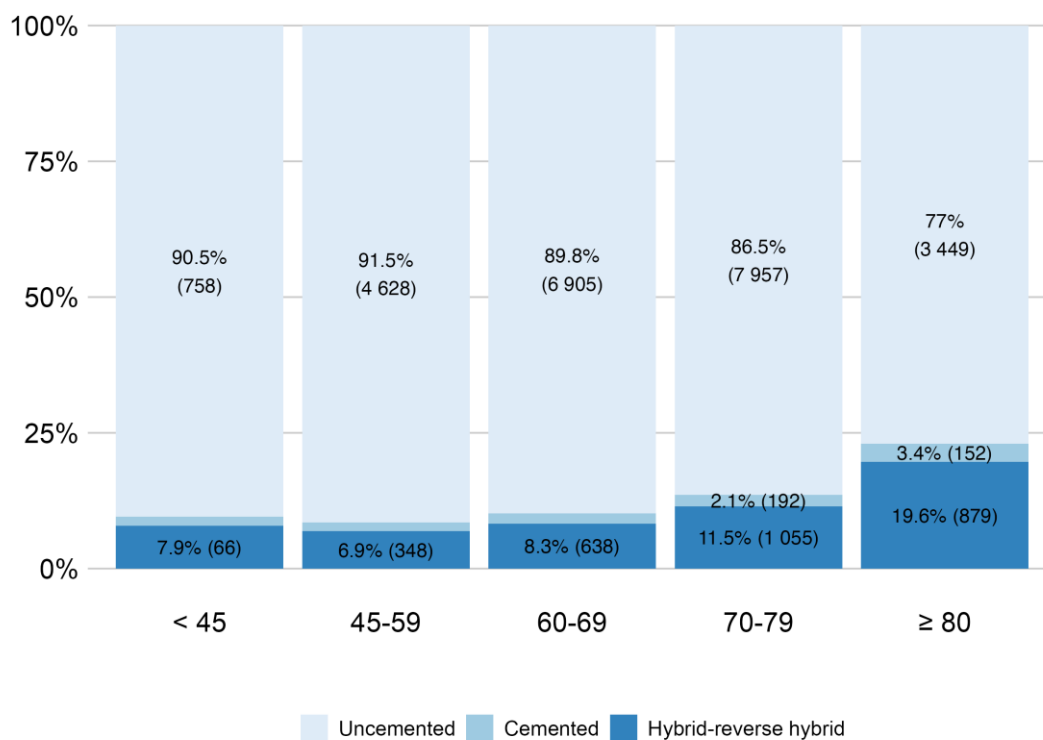


Figure 3.9 Approach used during primary hip replacement according to gender

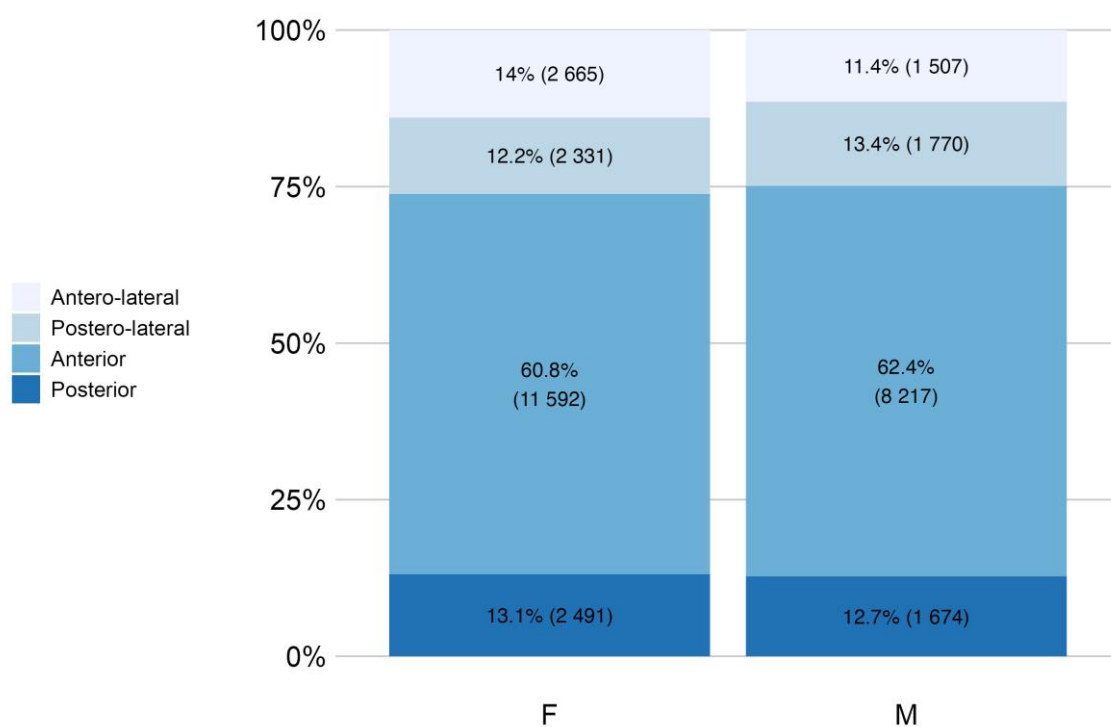


Figure 3.10 Approach used during primary hip replacement according to prosthesis type

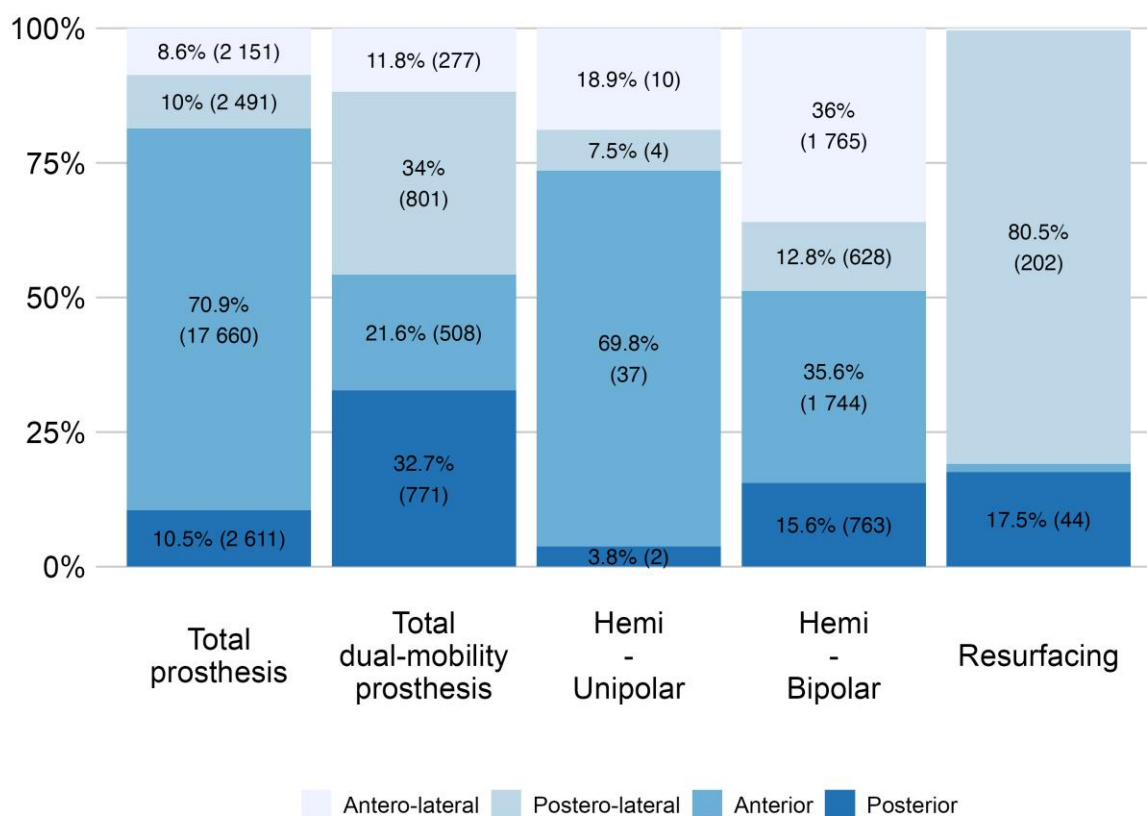


Table 3.6 Usage of custom made guides, computer assisted navigation and bone grafts during primary hip procedures

	Count	Percentage of total
Custom made guides	43	0.1%
Computer assisted navigation	1 484	4.6%
Bone grafts	306	0.9%
Autografts	254	0.8%
Allografts	36	0.1%
Auto and allografts	16	<0.1%

Table 3.7 Usage of modular femoral neck according to type of prosthesis during primary hip procedures

	Count	Percentage of total
Total prosthesis	1 710	6.9%
Total dual-mobility prosthesis	289	12.3%
Hemi - Bipolar	336	6.9%
Total	2 335	7.3%

Table 3.8 Modular femoral neck types during primary hip procedures with modular necks

		Count	Percentage of total modular necks used
Frontal	Valgus	109	4.7%
	Varus	281	12.0%
	Neutral	1 945	83.3%
Lateral	Anteversion	458	19.6%
	Retroversion	17	0.7%
	Neutral	1 860	79.7%
Offset	Extended	698	29.9%
	Standard	1 637	70.1%

3.2 REVISIONS AFTER PRIMARY HIP REPLACEMENT

3.2.1 Demographics

Table 3.9 Age, gender and indications for hip revision procedures

N=2 799		
	Mean	SD
Age (yrs)	72.1	12.9
	Count	N %
Age categories		
<45	85	3.0%
45-59	381	13.6%
60-69	573	20.5%
70-79	878	31.4%
>=80	882	31.5%
Gender		
Female	1 588	56.7%
Male	1 196	42.7%
Undefined	15	0.5%
Indication		
Aseptic loosening	778	27.8%
Infection	504	18.0%
Instability	432	15.4%
Periprosthetic fracture	765	27.3%
Pain	292	10.4%
Wear	194	6.9%
Other indication	276	9.9%

Figure 3.11 Hip revision burden according to age category

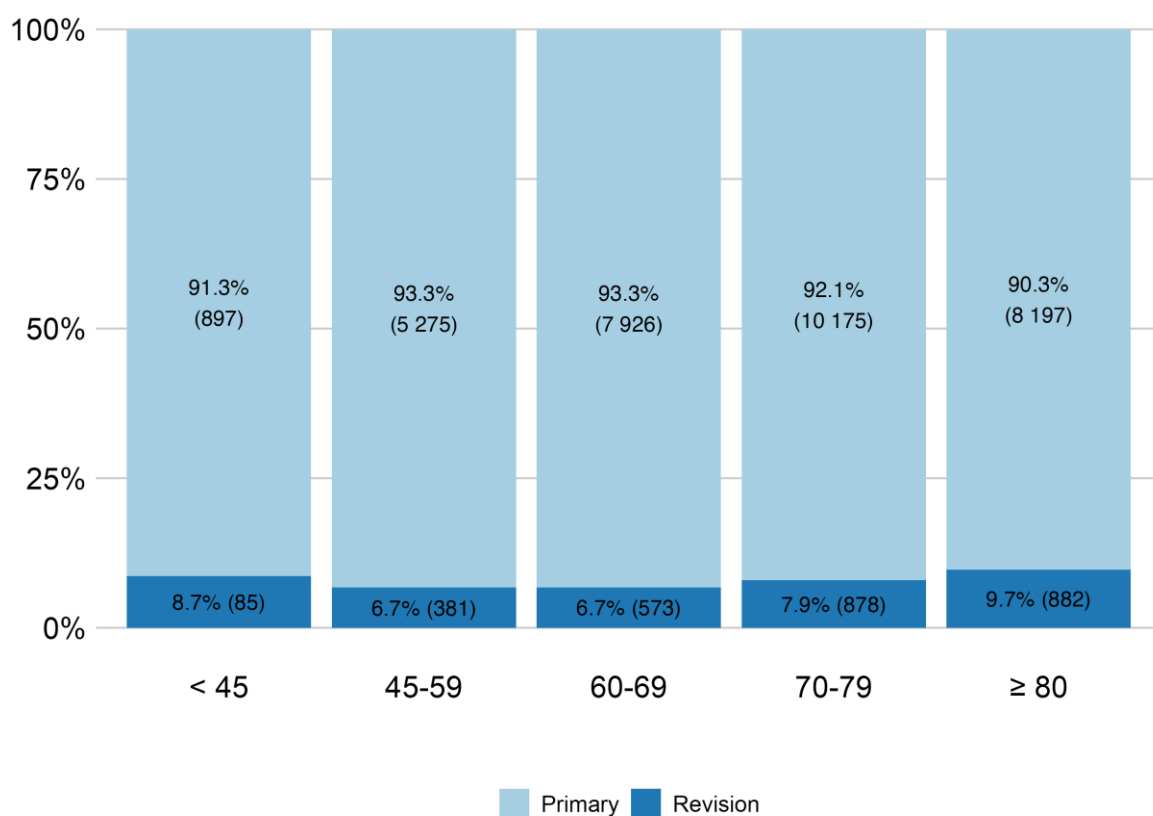


Figure 3.12 Age and gender by number of hip revision procedures

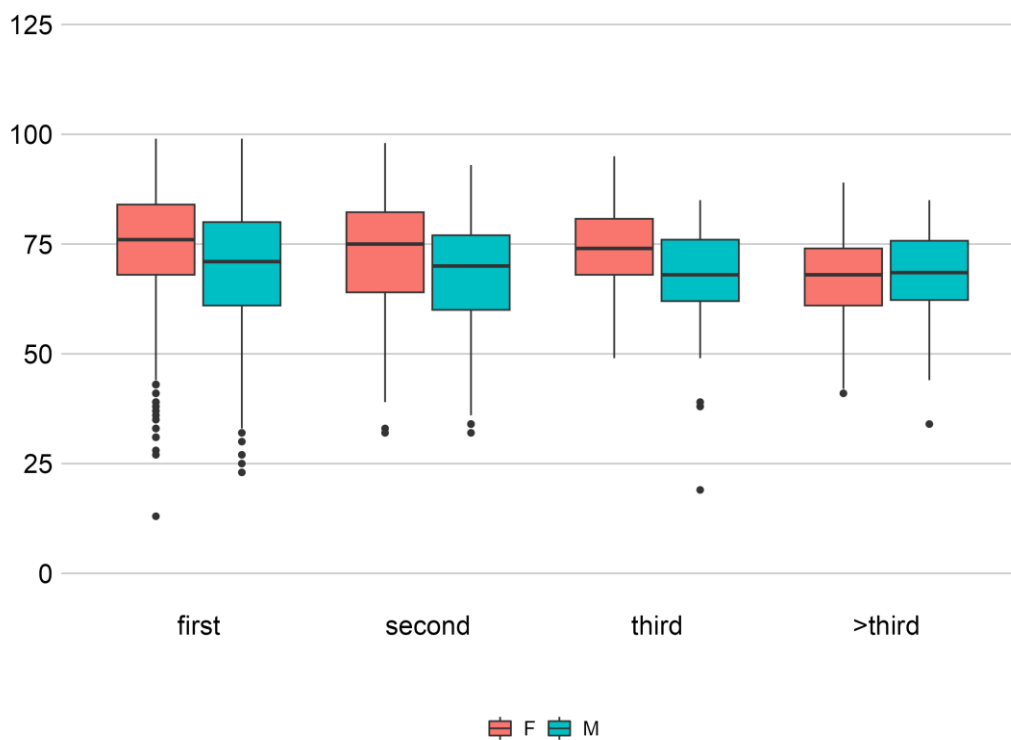
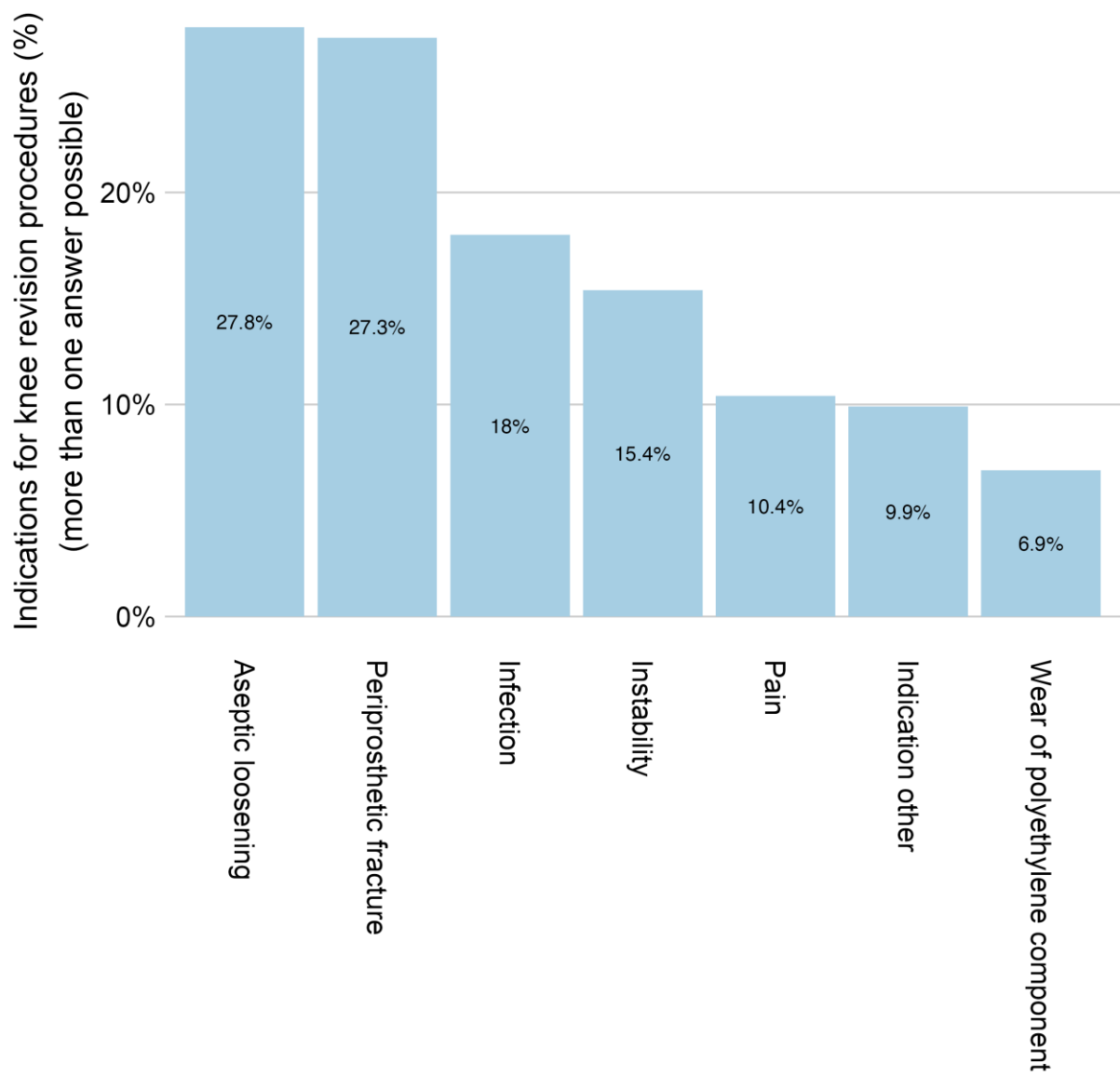


Figure 3.13 Indications for hip revision procedures



3.2.3 Surgical technique and implant characteristics

Figure 3.14 Combinations of revised components during hip revision procedures

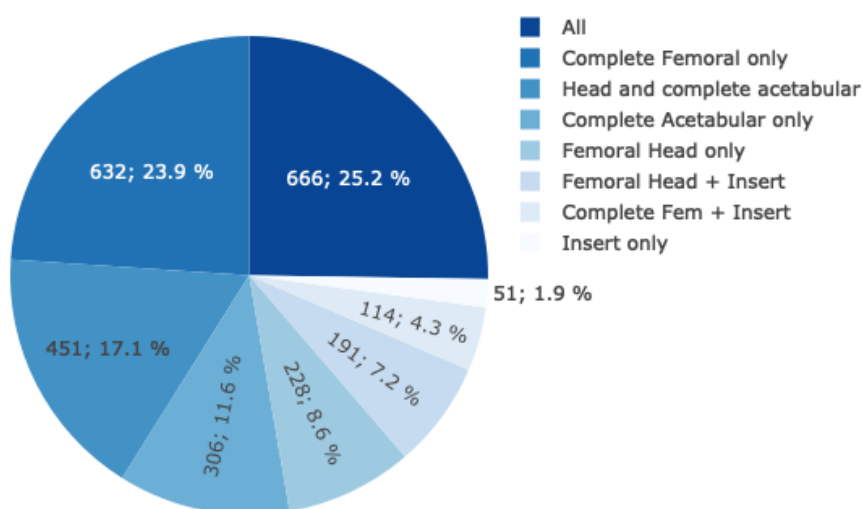


Table 3.10 Numbers and percentages of implanted hip types during hip revision procedures

	Number	Percentage of total
Total prosthesis	1 643	62.3
Total dual-mobility prosthesis	845	32
Hemi - Unipolar	6	0.2
Hemi - Bipolar	90	3.4
Insert only	51	1.9
Resurfacing	4	0.2
Total number of procedures	2 639	100%

Table 3.11 Numbers and percentages of bearing surfaces in hip revisions according to type of replacement

	Total hip replacement	Total dual-mobility prosthesis (head)	Total dual-mobility prosthesis (cup)	Hemi - Bipolar
	N=1 642	N=845	N=845	N=90
	% (N)	% (N)	% (N)	% (N)
Metal - Polyethylene	13.9 (229)	39.2 (331)	92.9 (785)	54.4 (49)
Ceramic - Polyethylene	57.1 (937)	58.9 (498)	0.0 (0)	42.2 (38)
Metal - Metal	0.5 (8)	0.0 (0)	0.0 (0)	0.0 (0)
Ceramic - Ceramic	27.3 (449)	0.0 (0)	0.0 (0)	1.1 (1)
Other	1.2 (19)	1.9 (16)	7.1 (60)	2.2 (2)

Figure 3.15 Fixation of hip prosthesis according to type of replacement during hip revision procedures

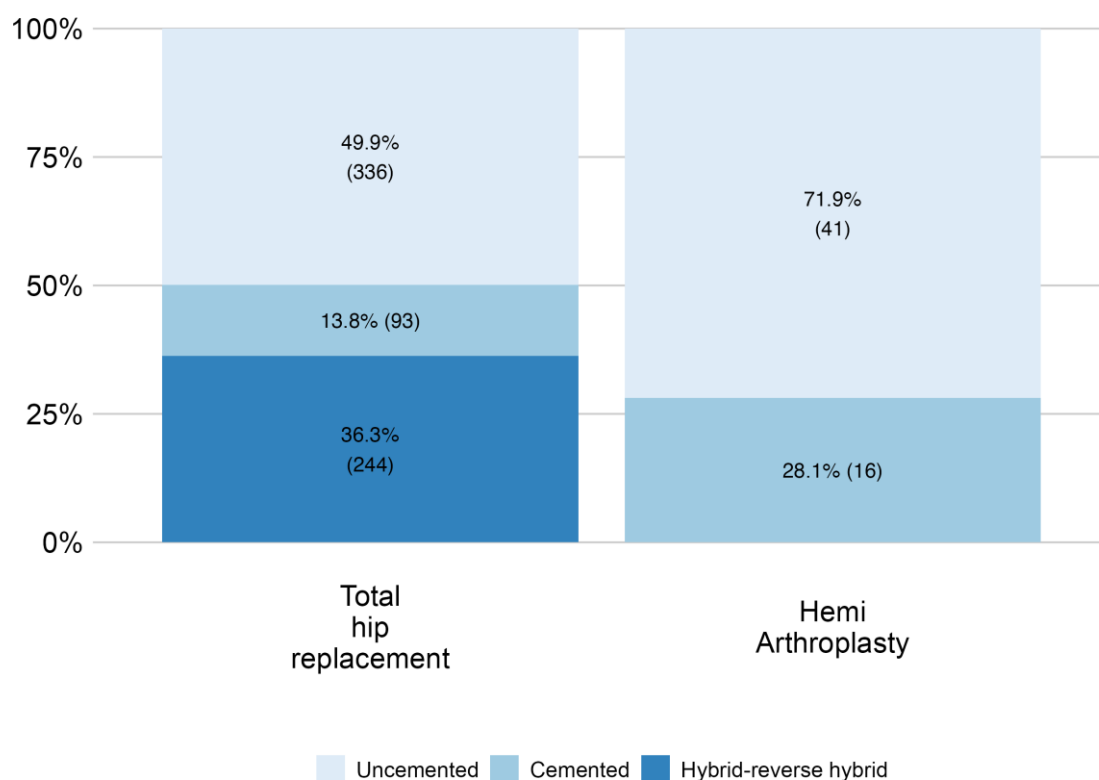


Figure 3.16 Approach used during revision hip replacement according to prosthesis type

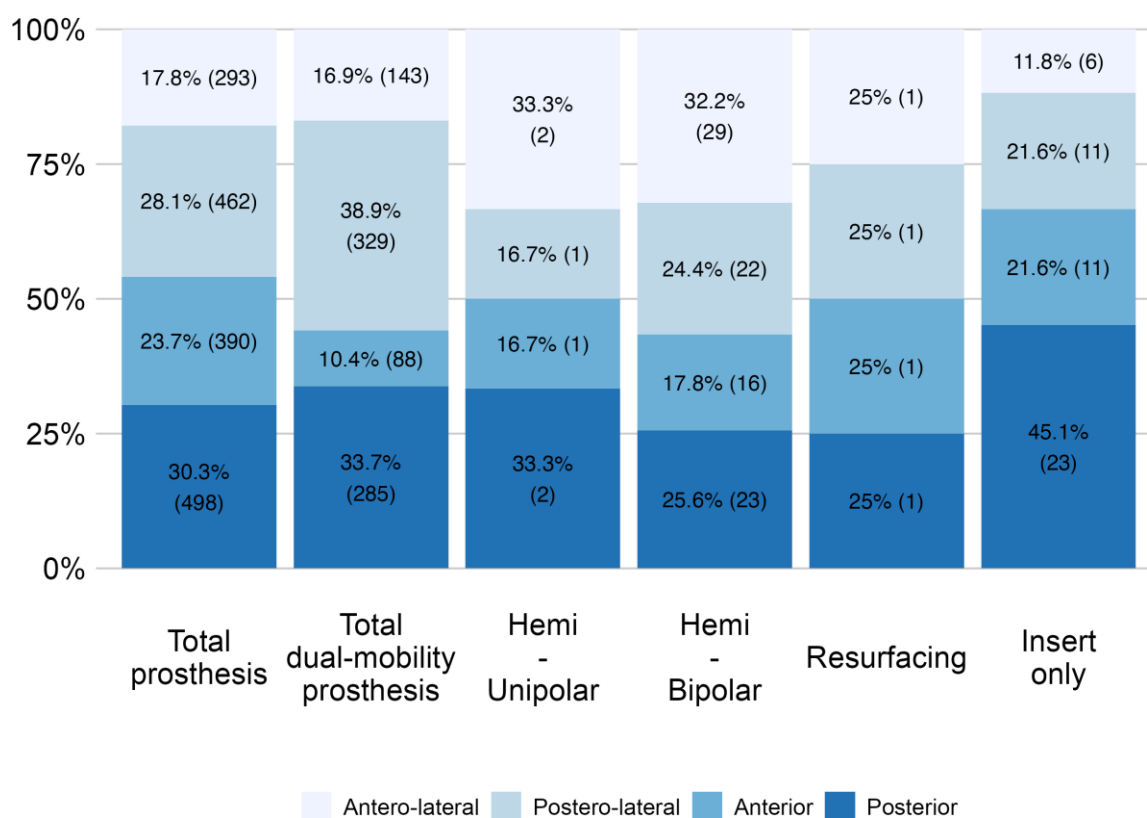


Table 3.12 Usage of custom made guides, computer assisted navigation and bone grafts during hip revision procedures

	Count	Percentage of total
Custom made guides	13	0.5%
Computer assisted navigation	3	0.1%
Bone grafts	456	17.3%
Autografts	60	2.3%
Allografts	375	14.5%
Auto and allografts	21	0.8%

Table 3.13 Usage of modular femoral neck according to type of prosthesis during hip revision procedures

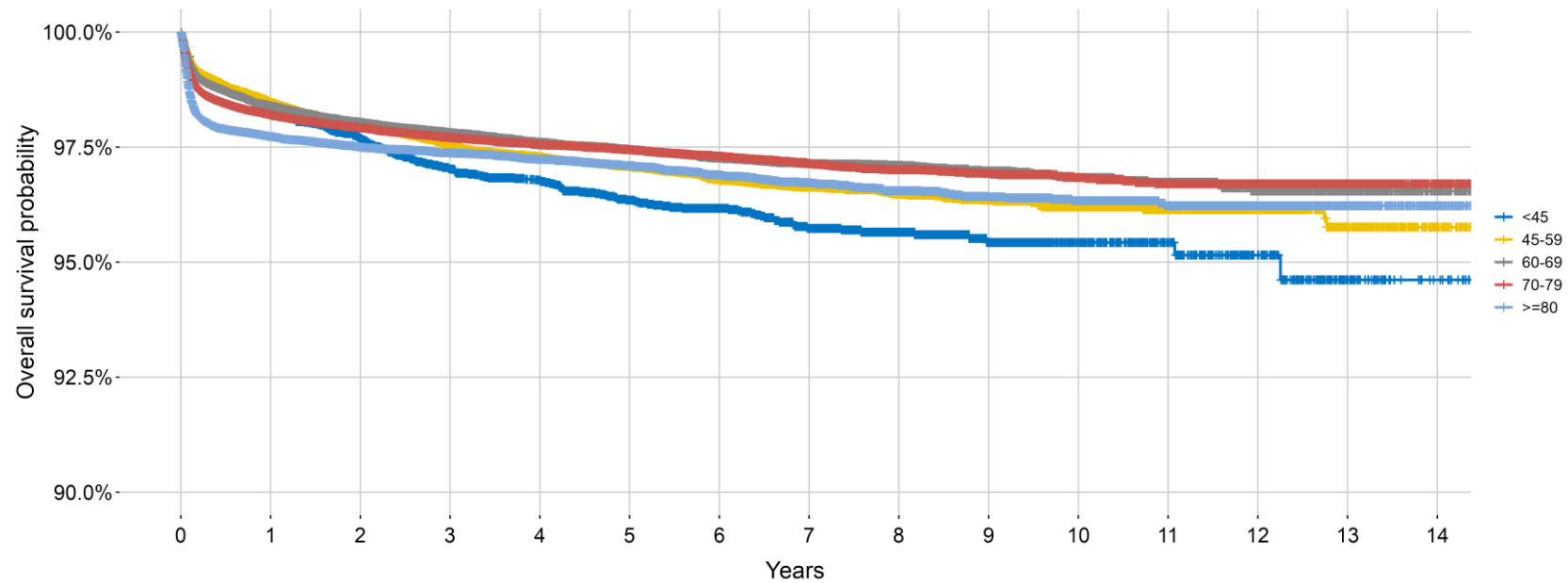
	Count	Percentage of total
Total prosthesis	229	15.1%
Total dual-mobility prosthesis	104	15.1%
Hemi - Bipolar	13	14.4%
Total	346	15.1%

Table 3.14 Usage of modular femoral neck types

		Count	Percentage of total modular necks used
Frontal	Valgus	23	6.6%
	Varus	44	12.7%
	Neutral	279	80.6%
Lateral	Anteversion	159	46.0%
	Retroversion	6	1.7%
	Neutral	181	52.3%
Offset	Extended	131	37.9%
	Standard	215	62.1%

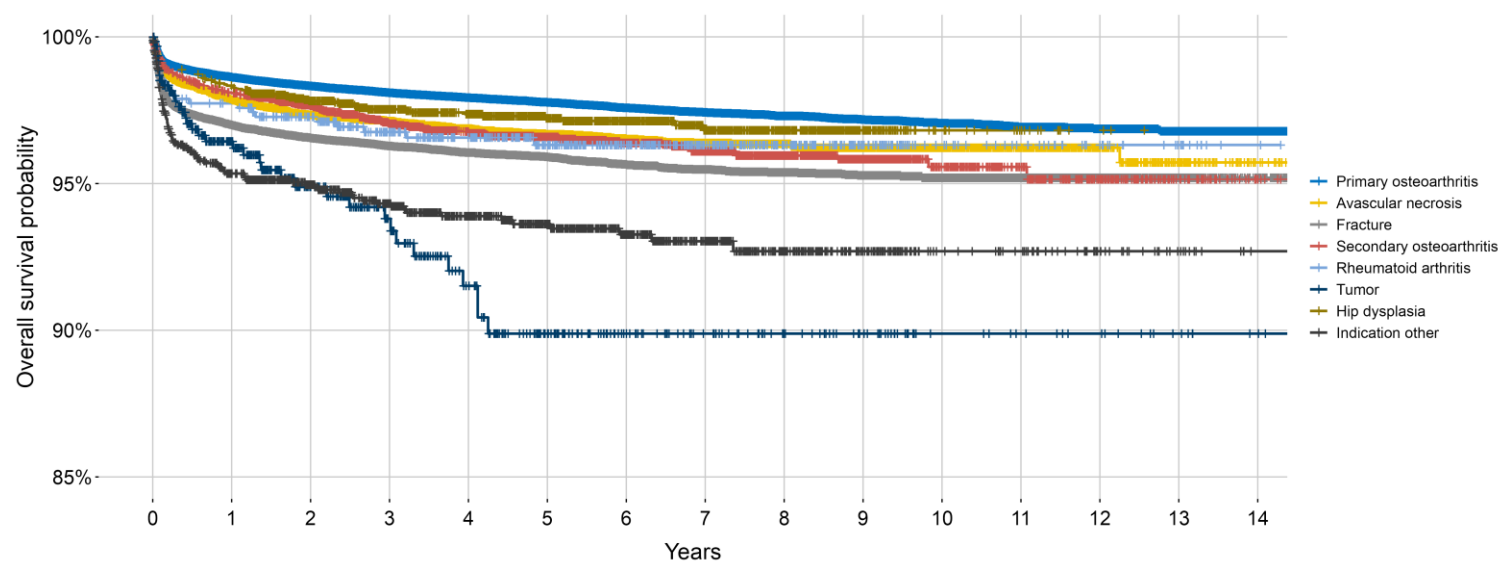
3.2.4 Implant survival after primary procedures

Figure 3.17 Kaplan-Meier curve for age at primary hip replacement



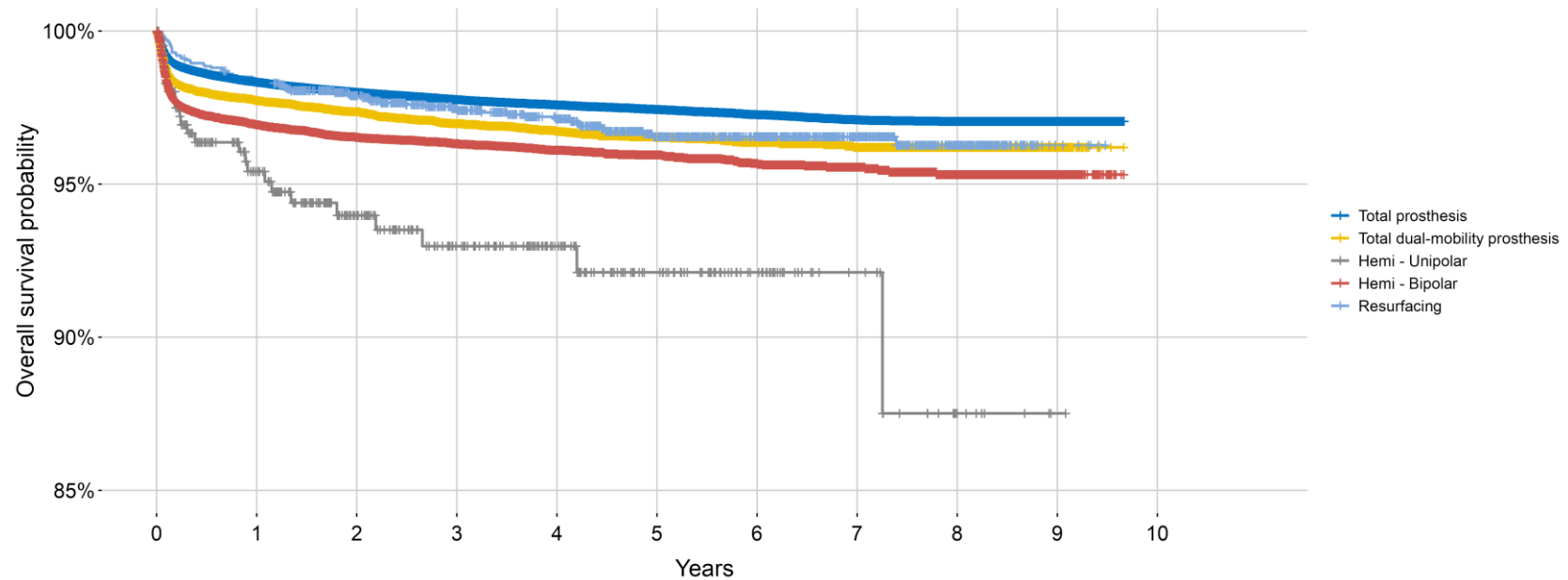
Number of events/Number at risk														
	0	1	2	3	4	5	6	7	8	9	10	11	12	13
<45	135/8182	51/8008	47/7205	15/6243	23/5534	8/4562	14/3651	2/2714	3/1843	0/1054	0/522	1/358	1/211	0/83
45-59	658/4328 0	218/4228 3	145/3759 0	76/32200	57/27732	58/22498	25/17595	15/12767	9/8533	5/4820	1/2395	0/1567	2/857	0/382
60-69	1024/640 13	212/6195 8	116/5472 9	93/46725	59/40290	56/32631	27/25438	6/18841	12/12662	7/7381	3/3635	3/2315	0/1251	0/564
70-79	1338/750 72	193/7112 1	121/6121 0	76/51329	43/43588	43/34917	37/26746	24/19455	9/13198	5/8277	5/4349	0/2702	0/1552	0/712
80+	1432/664 03	120/5452 4	50/44285	44/34502	32/26865	36/20128	22/14820	17/10768	9/7634	3/5521	2/2816	0/1736	0/895	0/402

Figure 3.18 Kaplan-Meier curve for indication at primary hip replacement



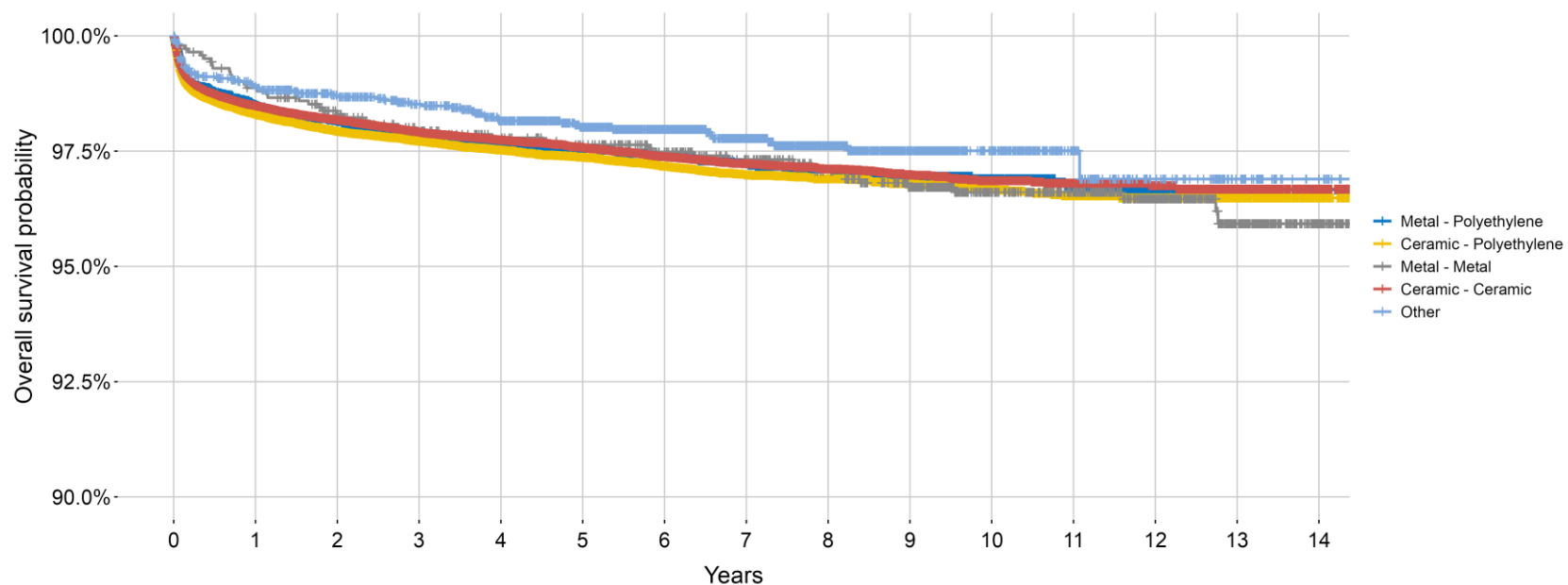
Number of events/Number at risk															
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	
Primary osteoarthritis	2373/172859	488/168753	322/148900	202/126552	157/108937	147/87903	94/68302	52/50124	33/33960	17/20571	11/10706	3/6744	2/3801	0/1721	
Avascular necrosis	257/12089	58/11567	21/10158	21/8693	14/7461	9/6087	6/4778	1/3542	3/2384	0/1401	0/653	0/442	1/233	0/97	
Fracture	1713/61520	200/47724	91/37310	58/28380	29/21310	37/15749	17/11439	8/8185	5/5711	2/4010	0/1859	0/1128	0/525	0/238	
Secondary osteoarthritis	98/5143	21/4971	26/4452	10/3832	6/3316	5/2706	5/2049	2/1523	1/1069	1/690	0/333	1/236	0/136	0/53	
Rheumatoid arthritis	15/662	3/640	3/591	1/518	1/457	0/378	0/296	0/224	0/156	0/91	0/49	0/38	0/23	0/12	
Tumor	20/625	6/428	3/304	5/228	3/177	0/135	0/94	0/77	0/58	0/45	0/23	0/19	0/15	0/8	
Hip dysplasia	43/2587	13/2535	6/2249	3/1901	2/1630	1/1204	2/861	0/554	0/324	0/113	0/28	0/14	0/3	0/0	
Other indication	69/1524	5/1334	7/1109	4/941	2/764	2/610	1/455	1/330	0/214	0/132	0/66	0/57	0/30	0/14	

Figure 3.19 Kaplan-Meier curve for type of implant at primary hip replacement



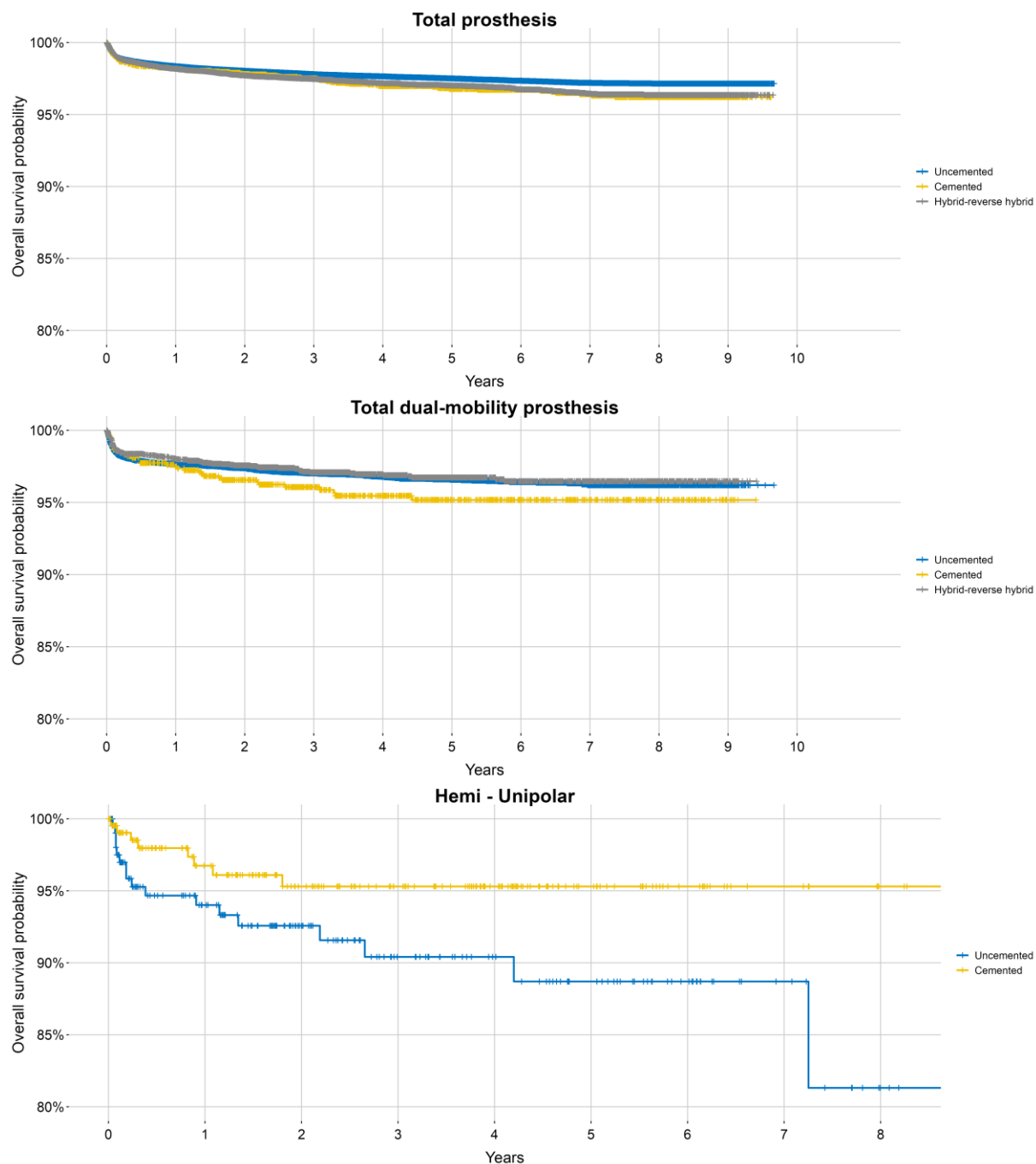
Number of events/Number at risk									
	0	1	2	3	4	5	6	7	8
Total prosthesis	2968/178534	552/172181	329/149035	199/123335	139/102726	116/78794	78/56487	17/36040	0/18070
Total dual-mobility prosthesis	332/14989	46/13472	40/10958	19/8574	13/6770	7/4902	4/3331	0/2088	0/902
Hemi - Unipolar	17/443	4/293	2/211	0/159	1/119	0/78	0/45	1/23	0/8
Hemi - Bipolar	1016/36650	98/25871	34/19027	24/13436	13/9165	14/6038	4/3791	4/2105	0/908
Resurfacing	32/2001	10/1966	7/1757	5/1523	7/1311	0/1040	0/764	1/486	0/212

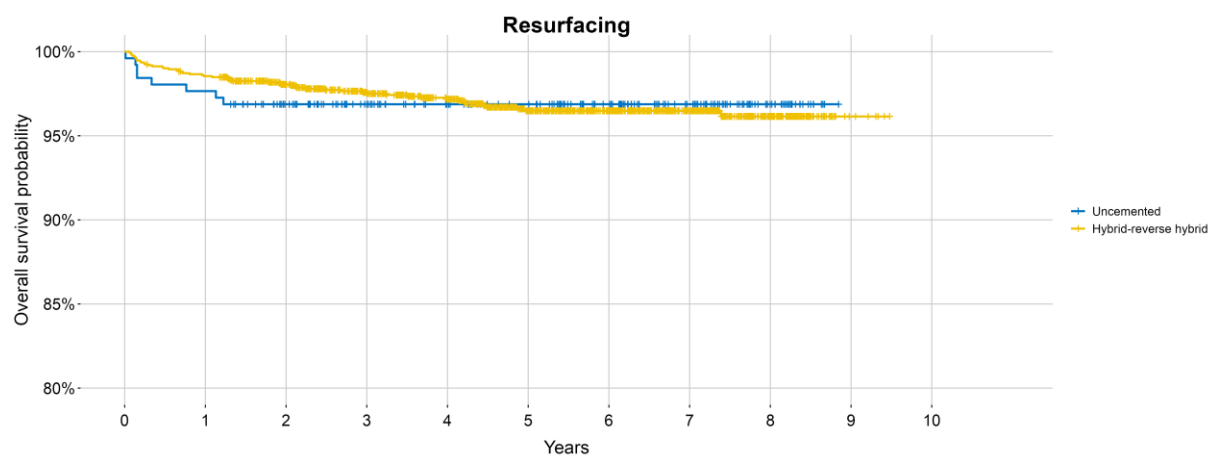
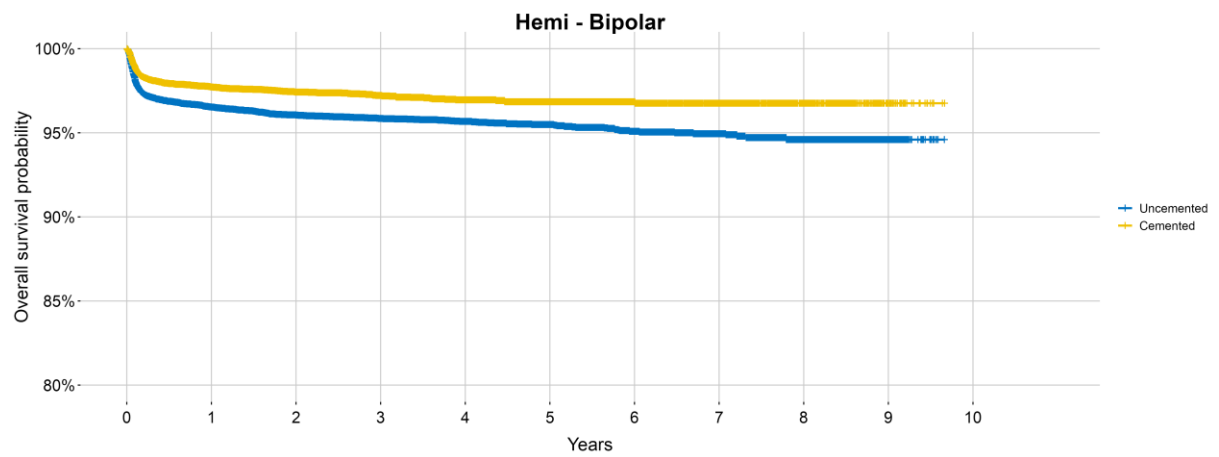
Figure 3.20 Kaplan-Meier curve for bearing surface for total hip prostheses at primary hip replacement



Number of events/Number at risk														
	0	1	2	3	4	5	6	7	8	9	10	11	12	13
Metal – Poly-ethylene	182/1238 7	42/11758	26/10358	20/9169	8/8275	12/7215	9/6172	6/5039	6/4046	1/3056	3/1681	0/1168	0/675	0/319
Ceramic – Poly-ethylene	1276/751 24	251/7227 0	121/6141 4	89/50279	62/42020	58/33228	42/25305	14/18680	12/13236	7/8801	6/5079	1/3161	0/1544	0/601
Metal - Metal	16/1425	8/1399	5/1361	2/1333	2/1308	2/1284	2/1232	3/1191	4/1141	1/1063	0/822	1/743	2/581	0/284
Ceramic - Ceramic	1648/109 109	323/1061 79	236/9540 0	134/8208 2	104/7070 8	101/5689 0	60/43906	31/31586	18/20452	10/11237	2/4880	1/2942	1/1625	0/756
Other	31/2836	5/2737	5/2587	9/2493	3/2381	1/2103	3/1740	2/1374	1/986	0/638	0/345	1/174	0/99	0/56

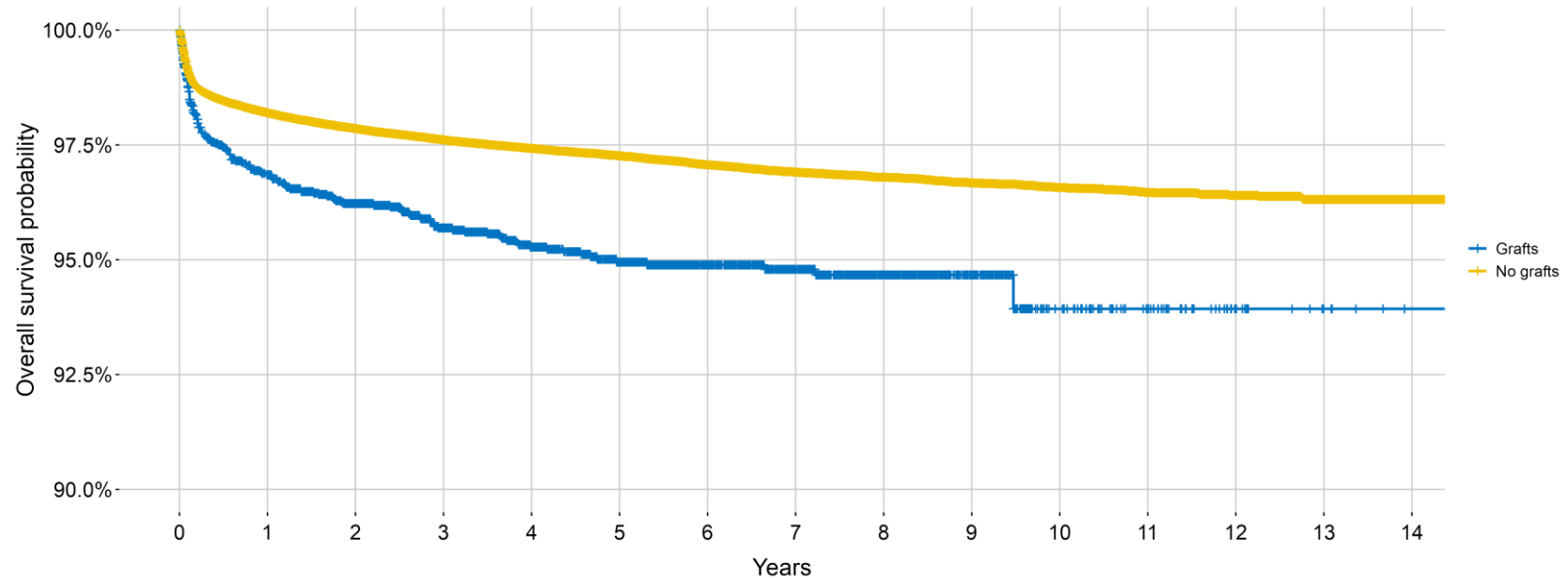
Figure 3.21 Kaplan-Meier curves for method of fixation according to primary hip replacement prosthesis type





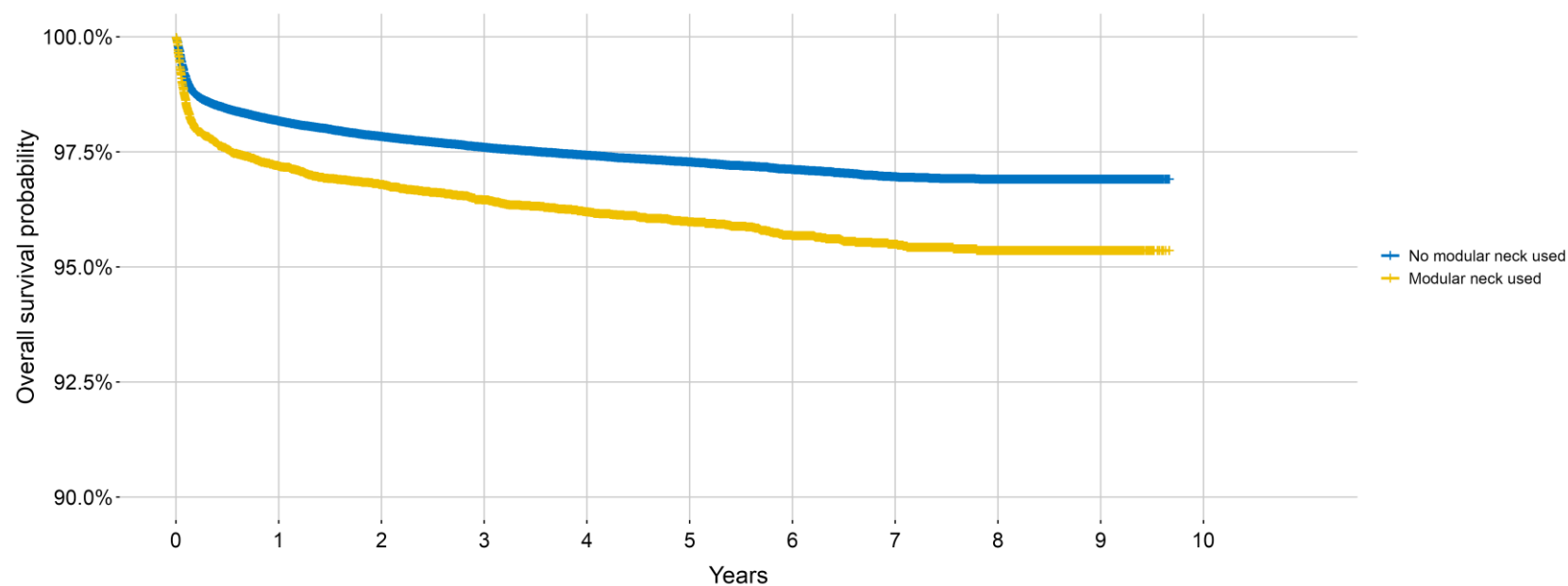
Number of events/Number at risk										
		0	1	2	3	4	5	6	7	8
Total prosthesis	Uncemented	2560/155893	460/150765	285/130589	151/108075	119/89849	97/68820	60/49134	12/31203	0/15588
	Cemented	70/3888	13/3666	9/3162	14/2714	4/2392	1/1908	4/1487	2/1041	0/623
	Hybrid	338/18753	79/17750	35/15284	34/12546	16/10485	18/8066	14/5866	3/3796	0/1859
Total dual-mobility prosthesis	Uncemented	247/10758	26/9778	27/7970	14/6266	9/4984	5/3637	4/2488	0/1551	0/648
	Cemented	22/918	7/778	3/635	3/504	1/387	0/272	0/184	0/124	0/65
	Hybrid	63/3313	13/2916	10/2353	2/1804	3/1399	2/993	0/659	0/413	0/189
Hemi - Unipolar	Uncemented	11/221	2/140	2/98	0/69	1/54	0/42	0/26	1/14	0/5
	Cemented	6/222	2/153	0/113	0/90	0/65	0/36	0/19	0/9	0/3
Hemi - Bipolar	Uncemented	759/24053	74/17007	23/12610	14/9016	10/6166	14/4100	3/2605	4/1425	0/623
	Cemented	257/12597	24/8864	11/6417	10/4420	3/2999	0/1938	1/1186	0/680	0/285
Resurfacing	Uncemented	6/256	2/250	0/228	0/197	0/177	0/160	0/128	0/88	0/27
	Hybrid	25/1720	8/1692	7/1507	5/1307	7/1118	0/873	0/630	1/392	0/181

Figure 3.22 Kaplan-Meier curve for usage of grafts during primary hip replacement



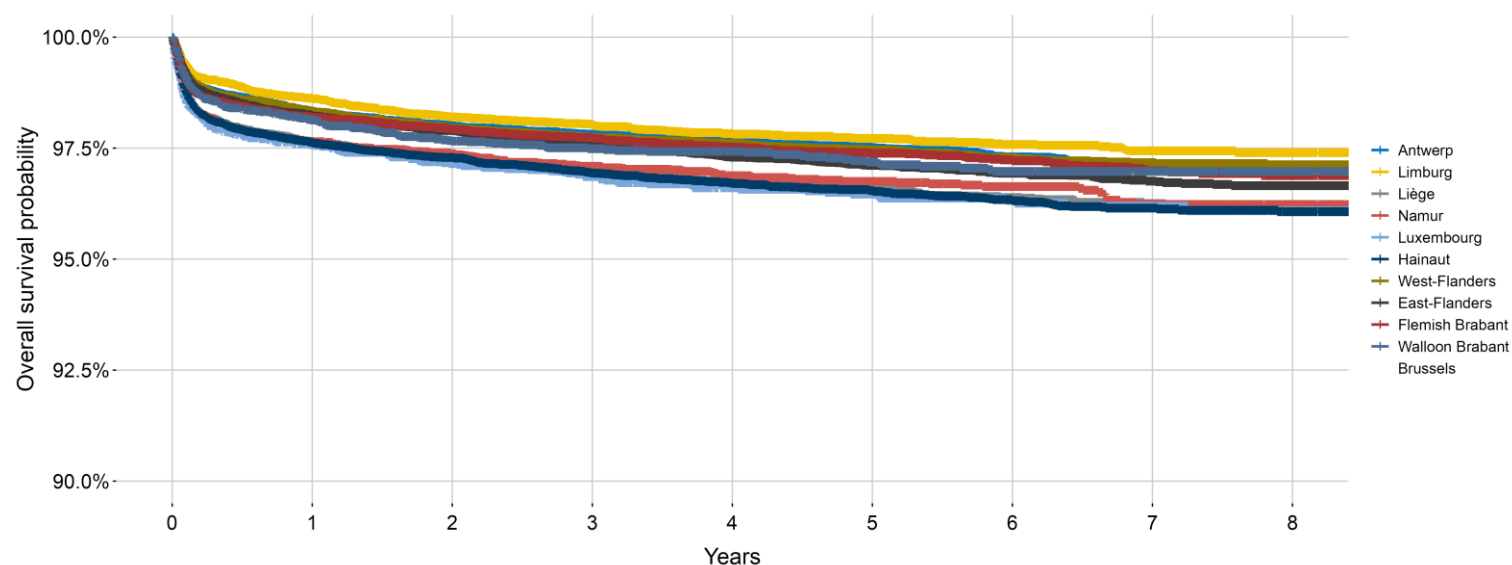
	Number of events/Number at risk													
	0	1	2	3	4	5	6	7	8	9	10	11	12	13
No grafts used	4479/253466	774/234739	465/202240	295/168692	208/142088	200/113182	124/87065	63/63690	42/43392	19/26823	11/13637	4/8629	3/4746	0/2135
Grafts used	109/3543	20/3213	14/2833	9/2353	6/1964	1/1590	1/1209	1/869	0/484	1/230	0/80	0/49	0/20	0/8

Figure 3.23 Kaplan-Meier curve for usage of a modular neck during primary hip replacement



Number of events/Number at risk									
	0	1	2	3	4	5	6	7	8
No modular neck used	3751/209606	623/192906	352/162935	209/131905	143/107578	115/81286	76/57444	16/36009	0/17781
Modular neck used	565/20573	73/18624	51/16089	33/13441	22/11084	22/8449	10/6165	5/4224	0/2099

Figure 3.24 Kaplan-Meier curve for location where primary hip replacement was performed



Number of events/Number at risk									
	0	1	2	3	4	5	6	7	8
Antwerp	588/36180	105/33146	48/27950	29/22704	28/18632	25/14116	15/9947	4/6205	0/2991
Limburg	259/19128	71/17857	24/15192	24/12347	10/10172	9/7673	6/5475	1/3466	0/1697
Liège	491/21412	81/19353	42/16305	24/13213	16/10814	14/8178	7/5815	2/3758	0/1899
Namur	229/9910	23/9061	21/7640	12/6212	6/5096	4/3874	9/2823	0/1850	0/912
Luxembourg	134/5601	20/5097	12/4400	9/3677	4/3069	3/2318	2/1639	1/1065	0/528
Hainaut	617/26543	79/24262	66/20507	36/16641	21/13640	20/10356	12/7358	3/4589	0/2220
West-Flanders	561/34217	116/31912	52/27287	28/22032	24/17729	20/13297	9/9303	2/5917	0/2975
East-Flanders	550/31866	95/29318	79/24644	45/19928	26/16121	19/12141	12/8611	5/5397	0/2712
Flemish Brabant	372/21022	48/19275	29/16098	26/13033	13/10530	11/7949	10/5612	3/3462	0/1657
Walloon Brabant	150/8222	35/7580	10/6413	3/5169	9/4210	6/3220	0/2277	0/1412	0/739
Brussels	328/12981	30/11475	19/9619	7/7795	14/6333	5/4831	2/3435	2/2219	0/1070

3.3 NINETY-DAYS MORTALITY AFTER HIP REPLACEMENT PROCEDURES (SINCE 2015)

Table 3.15 90-days mortality after hip replacement by type of procedure

	Alive 90 days post-procedure		Died before 90 days post-procedure	
	Count	N %	Count	N %
Primary procedure	224 015	96.8%	7 303	3.2%
Revision with new prosthesis	20 918	95.9%	887	4.1%
Resection with spacer	1 248	93.6%	86	6.4%
Resection without spacer	58	86.6%	9	13.4%
Total	246 239	96.7%	8 285	3.3%

Table 3.16 90-days mortality after hip replacement by age category

Alive 90 days post-procedure			Died before 90 days post-procedure	
	Count	N %	Count	N %
<45	7 957	99.8%	12	0.2%
45-59	42 149	99.7%	133	0.3%
60-69	61 761	99.2%	495	0.8%
70-79	72 742	98.2%	1 344	1.8%
>=80	61 563	90.7%	6 301	9.3%
Total	246 172	96.7%	8 285	3.3%