Orthopride

Belgian Hip and Knee Arthroplasty Registry

Annual Report

2015-2016

February 2017

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1 GENERAL INTRODUCTION

Table 1.1 Total joint replacement procedures entered in Orthopride during 2015-2016

	Knee procedures		Hip procedures	
	2015	2016*	2015	2016*
Primary procedure	20530	21244	23043	24260
Revision with new prosthesis	1629	1655	2396	2311
Resection with spacer	87	131	106	158
Resection without spacer	3	5	7	7
Total per year per joint	22249	23035	25552	26736
Total per joint	**45284**		**52288**	

*until 19/12/2016

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 inhabiltants > 45 years*	Percent of the inhabiltants >60 years*	Inhabiltants mean age* (years)
West-Flanders	6857	15,1%	580	51%	29%	44,1
Limburg	3973	8,8%	460	48%	26%	42,6
East-Flanders	6657	14,7%	448	47%	25%	42,1
Luxembourg	1190	2,6%	425	43%	22%	39,9
Hainaut	5336	11,8%	399	45%	24%	41,1
Antwerp	6729	14,9%	369	46%	25%	41,7
Walloon Brabant	1453	3,2%	366	45%	24%	41,1
Namur	1757	3,9%	359	45%	24%	41,0
Liège	3871	8,5%	352	45%	24%	41,2
Flemish Brabant	3803	8,4%	339	47%	25%	41,8
Brussels	2915	6,4%	245	36%	18%	37,4
Other country	743	1,6%				
	45284	**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 ± SD)	Frequency	Row Percent	Age (mean ± SD)
Brussels	2599	89,2%	68,5 ± 10,4	316	10,8%	68,9 ± 11,2
East-Flanders	6027	90,5%	66,6 ± 10,9	630	9,5%	63,5 ± 12,4
Hainaut	4927	92,3%	67,2 ± 9,4	409	7,7%	67 ± 11,3
West-Flanders	6336	92,4%	67,8 ± 10,7	521	7,6%	65 ± 11
Antwerp	6228	92,6%	68 ± 10,2	501	7,4%	65,6 ± 11,6
Liège	3584	92,6%	67,3 ± 10,3	287	7,4%	64,3 ± 11,5
Luxembourg	1105	92,9%	67,7 ± 10,1	85	7,1%	66,4 ± 11,3
Flemish Brabant	3551	93,4%	68,5 ± 10,7	252	6,6%	65,9 ± 12
Namur	1642	93,5%	67,6 ± 9,7	115	6,5%	66,2 ± 10,4
Limburg	3717	93,6%	67,2 ± 9,8	256	6,4%	64,2 ± 12,1
Walloon Brabant	1371	94,4%	68,5 ± 9,6	82	5,6%	67,1 ± 9,7
Total	**41087**	**92,2%**	**67,6 ± 10,3**	**3454**	**7,8%**	**65,5 ± 11,7**

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 inhabiltants > 45 years*	Percent of the inhabiltants >60 years*	Inhabiltants mean age* (years)
West-Flanders	7475	14,3%	632	51%	29%	44,1
Luxembourg	1373	2,6%	490	48%	26%	42,6
Walloon Brabant	1931	3,7%	487	45%	24%	41,1
Namur	2373	4,5%	485	45%	24%	41,0
Limburg	4120	7,9%	477	48%	26%	42,6
Liège	5183	9,9%	472	45%	24%	41,2
East-Flanders	6953	13,3%	468	47%	25%	42,1
Hainaut	6204	11,9%	464	45%	24%	41,1
Antwerp	7868	15,0%	431	46%	25%	41,7
Flemish Brabant	4483	8,6%	400	47%	25%	41,8
Brussels	3414	6,5%	287	36%	18%	37,4
Other country	911	1,7%				
	52288	**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 ± SD)**	**Frequency**	**Row Percent**	**Age (mean ± SD)**
Brussels	3025	88,6%	72,1 ± 13,7	389	11,4%	71 ± 15,1
Luxembourg	1227	89,4%	69,7 ± 13,2	146	10,6%	71,1 ± 12,9
Hainaut	5565	89,7%	69,3 ± 13,1	639	10,3%	68,6 ± 13,4
West-Flanders	6712	89,8%	70,5 ± 12,5	763	10,2%	71,8 ± 12
Namur	2142	90,3%	69,4 ± 12,9	231	9,7%	69,4 ± 12,6
Antwerp	7118	90,5%	70,6 ± 12,8	750	9,5%	69,8 ± 13,8
East-Flanders	6295	90,5%	70,5 ± 13	658	9,5%	71 ± 12,6
Liège	4706	90,8%	70,3 ± 13	477	9,2%	71,6 ± 12,7
Walloon Brabant	1762	91,2%	71,5 ± 12,5	169	8,8%	72,8 ± 10,9
Flemish Brabant	4107	91,6%	71,1 ± 12,5	376	8,4%	73,1 ± 11,3
Limburg	3842	93,3%	68,7 ± 12,6	278	6,7%	70,9 ± 12,9
Total	**46501**	**90,5%**	**70,3 ± 12,9**	**4876**	**9,5%**	**70,8 ± 13**

2 KNEE REPLACEMENT

2.1 INTRODUCTION

2.2 PRIMARY KNEE REPLACEMENT

2.2.1 Demographics

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

	N=41774	
	Mean	**SD**
Age (yrs)	67,5	10,3
	Count	**N %**
Age categories		
<45	745	1,8%
45-59	8411	20,1%
60-69	13762	32,9%
70-79	13839	33,1%
>=80	5011	12,0%
Gender		
Female	26337	63,0%
Male	15437	37,0%
Indication		
Osteoarthritis	39527	94,6%
Avascular necrosis	618	1,5%
Fracture	133	0,3%
Inflammatory arthropathy	270	0,6%
Post trauma	877	2,1%
Previous infection	31	0,1%
Indication other	318	0,8%

Figure 2.1 Age distribution by gender for primary knee replacement patients

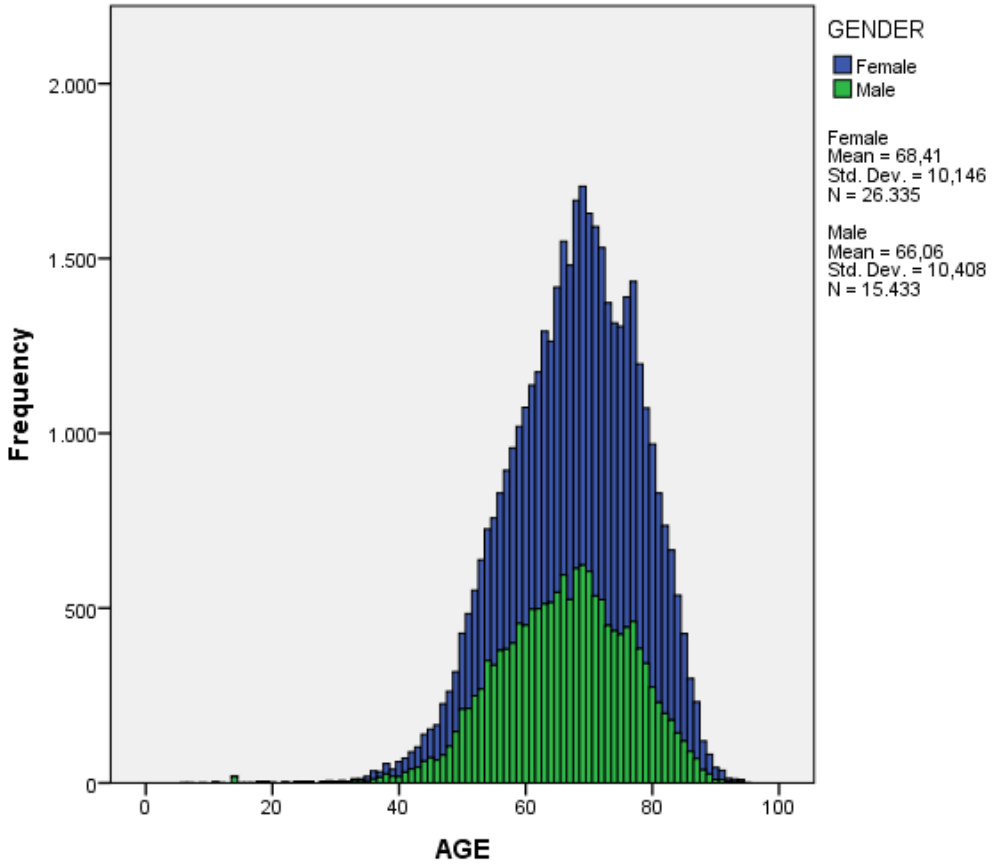


Figure 2.2 Age distribution by indication for primary knee replacement patients

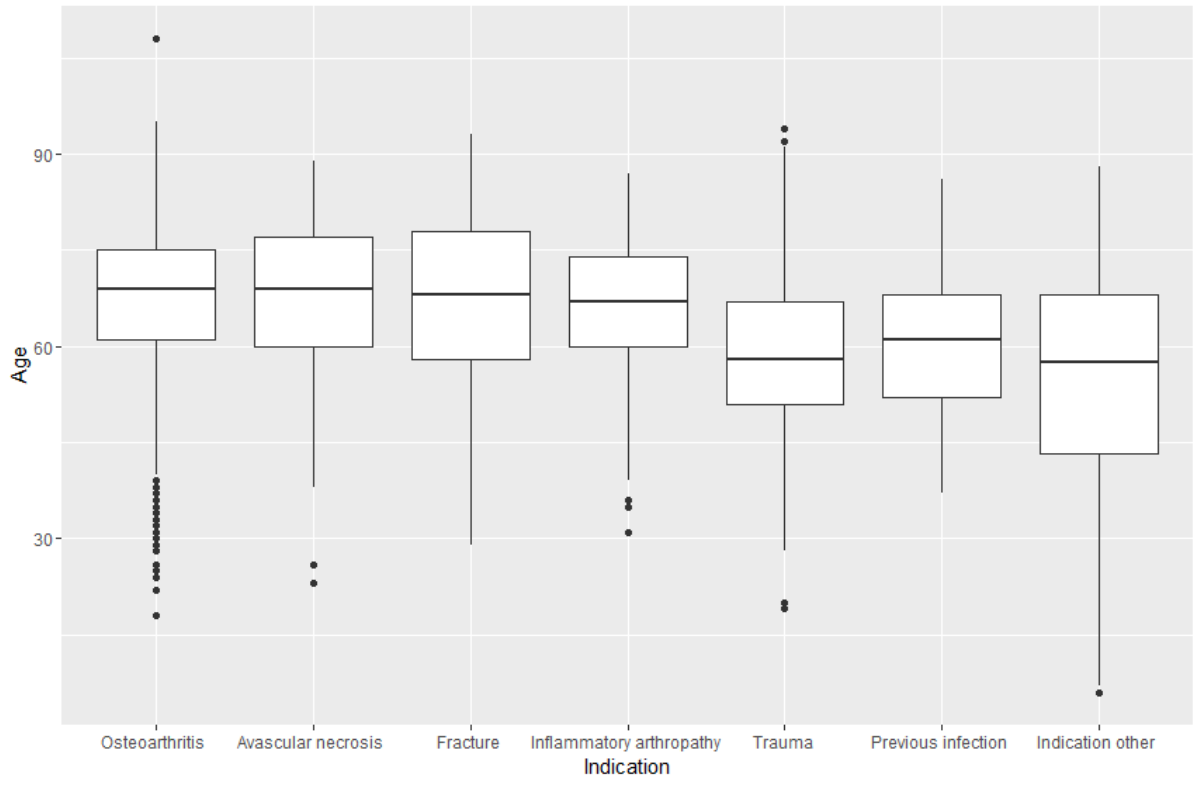


Table 2.2 Indications for primary knee replacements based on gender

	Male	Female
	N=15437	N=26337
	% (N)	**% (N)**
Osteoarthritis	93,1 (14379)	95,5 (25148)
Post trauma	3,6 (213)	1,2 (405)
Avascular necrosis	1,4 (558)	1,5 (319)
Fracture	0,2 (19)	0,4 (12)
Inflammatory arthropathy	0,5 (76)	0,7 (194)
Previous infection	0,1 (35)	0 (98)
Indication other	1 (157)	0,6 (161)

Table 2.3 Medical history of primary knee replacement patients

	Count	Percentage of total
No pre-operative surgeries	29596	70,8%
Pre-op Osteosynthesis of the tibia	438	1,0%
Pre-op Osteotomy	658	1,6%
Pre-op Synovectomy	211	0,5%
Pre-op Meniscectomy	8869	21,2%
Pre-op ACL reconstruction	621	1,5%
Pre-op Other	1933	4,6%

Table 2.4 Pre-operative alignment of primary knee replacement patients

	Count	Percentage of total
Valgus	8411	20,1%
Varus	21098	50,5%
Normal	12265	29,4%

2.2.2 Surgical technique and implant characteristics

Table 2.5 Numbers and percentages of primary knee replacement types

	Number	Percentage of total
Total knee replacement	37238	89,1%
Unicompartmental replacement	3138	7,5%
Bicompartmental replacement	630	1,5%
Patellofemoral replacement	745	1,8%
Partial resurfacing femoral condyle	23	0,1%
Total	**41774**	**100%**

Figure 2.3 Distribution of primary total knee prosthesis types

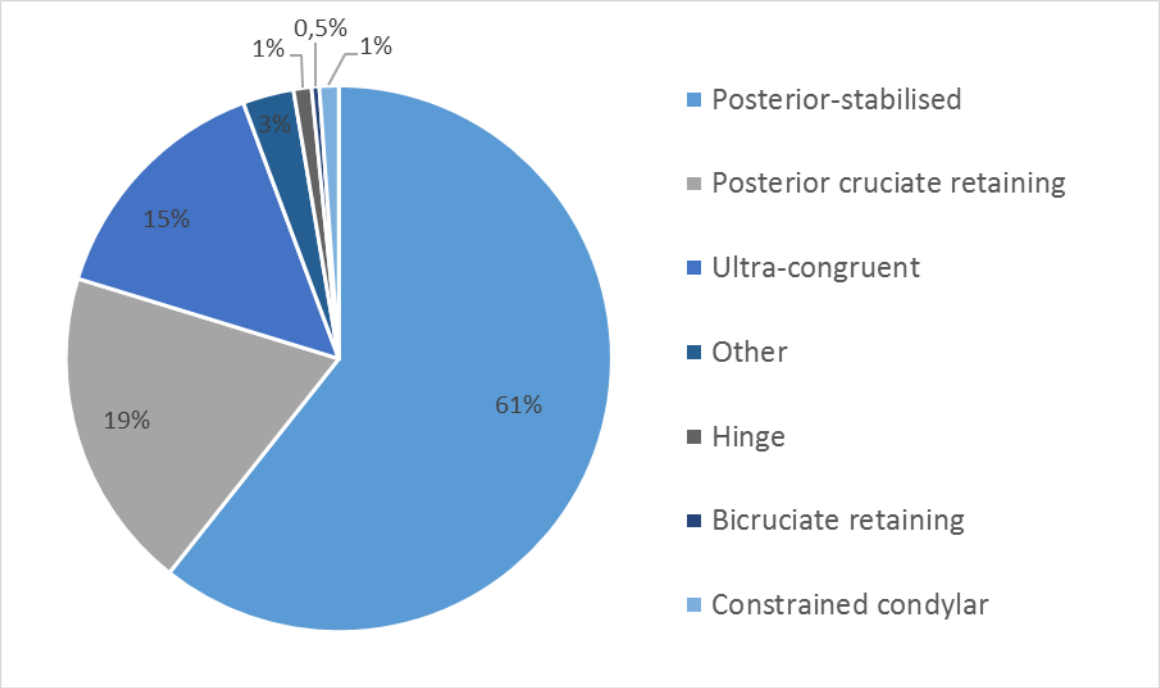


Table 2.6 Age and gender of primary knee replacement patients by type of replacement

	Total knee replacement	Unicompartmental replacement	Bicompartmental replacement	Patellofemoral replacement	Partial Resurfacing femoral condyle
	N=37238	N=3138	N=630	N=745	N=23
Mean age (years) (SD)	68,2 (9,9)	62,5 (10,6)	67,6 (10,1)	54,9 (12,3)	45,8 (10,6)
Age groups [Missing]	% (N)[5]	% (N)[1]	% (N)	% (N)	% (N)
<45	1,2 (438)	4 (124)	1,9 (12)	21,5 (160)	47,8 (11)
45-59	18,3 (6798)	36,5 (1145)	20,5 (129)	44,3 (330)	39,1 (9)
60-69	33,2 (12368)	32,7 (1026)	32,7 (206)	21,3 (159)	13 (3)
70-79	34,6 (12899)	21,1 (662)	32,7 (206)	9,7 (72)	0 (0)
>=80	12,7 (4730)	5,7 (180)	12,2 (77)	3,2 (24)	0 (0)
Gender	% (N)	% (N)	% (N)	% (N)	% (N)
Female	63,9 (23796)	50,2 (1574)	60,6 (382)	76,5 (570)	65,2 (15)
Male	36,1 (13442)	49,8 (1564)	39,4 (248)	23,5 (175)	34,8 (8)

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

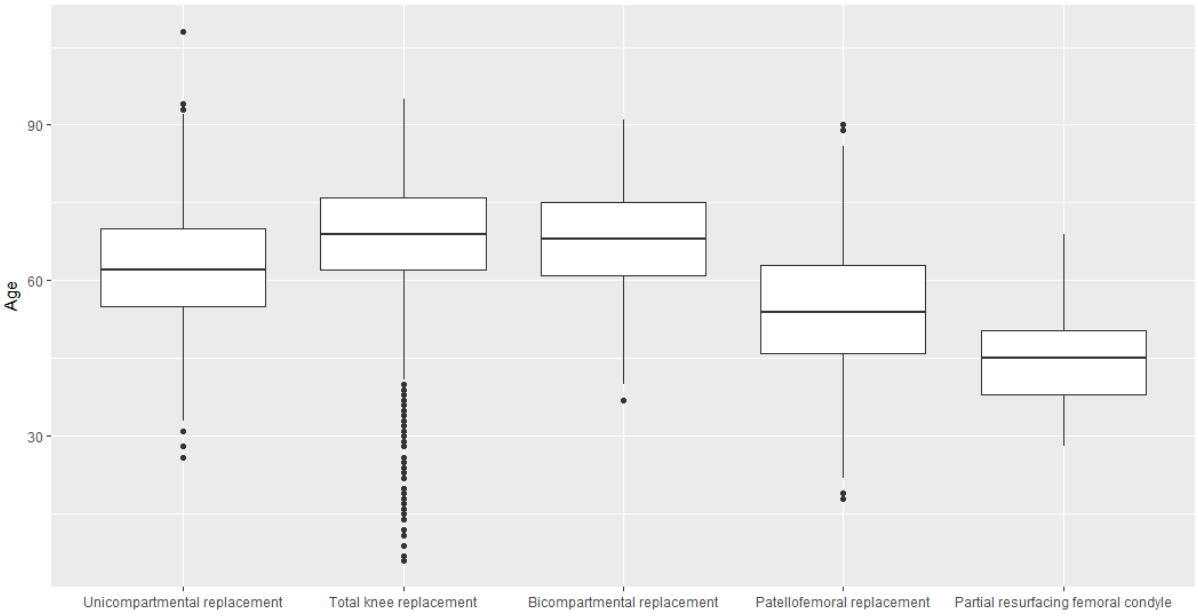


Table 2.7 Numbers and percentages of primary knee prosthesis fixation by type of prosthesis

	Total knee replacement	Unicompartmental replacement	Bicompartmental replacement	Patellofemoral replacement
	N=37238	N=3138	N=630	N=745
	% (N)	% (N)	% (N)	% (N)
Cemented	90,3 (33634)	71,9 (2255)	39,2 (247)	89,3 (665)
Revers hybrid	0,3 (123)	1,4 (44)	0,3 (2)	0 (0)
Hybrid	3,9 (1454)	3,4 (107)	3,3 (21)	0 (0)
Uncemented	5,4 (2027)	23,3 (732)	57,1 (360)	10,7 (80)

Figure 2.5 Method of fixation by primary knee prosthesis type

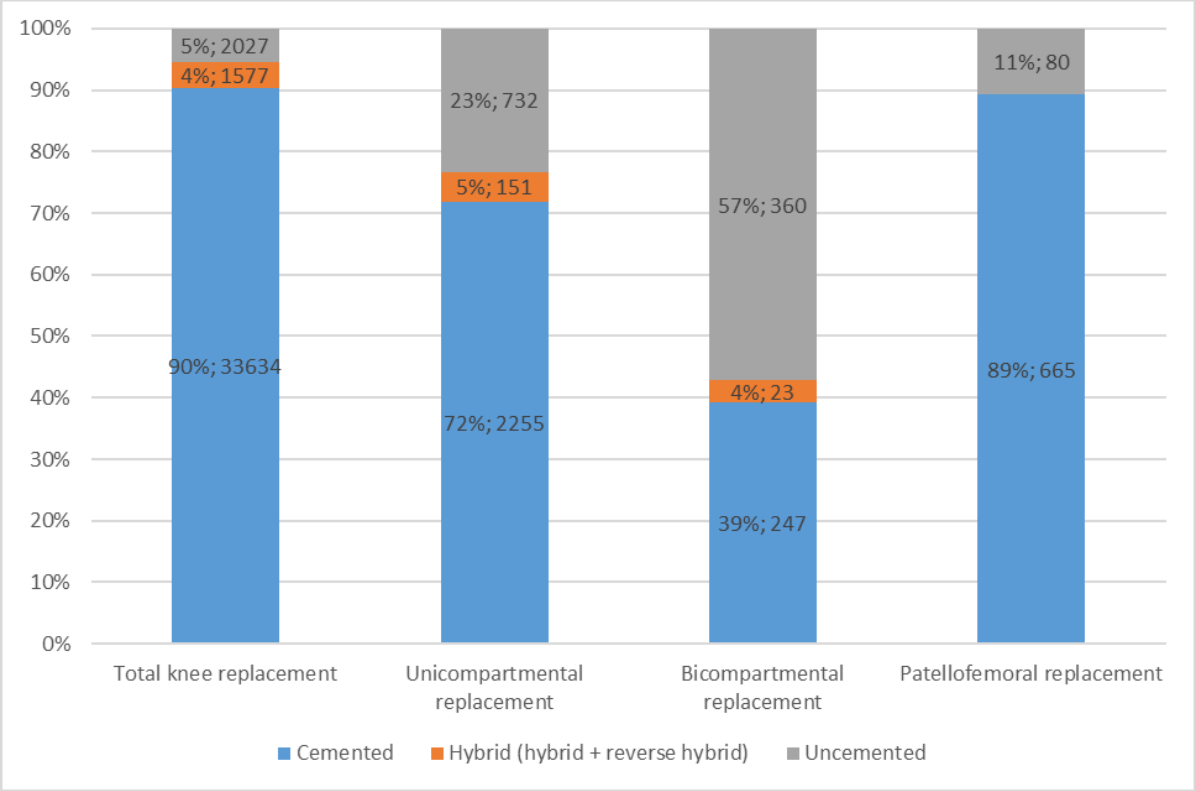
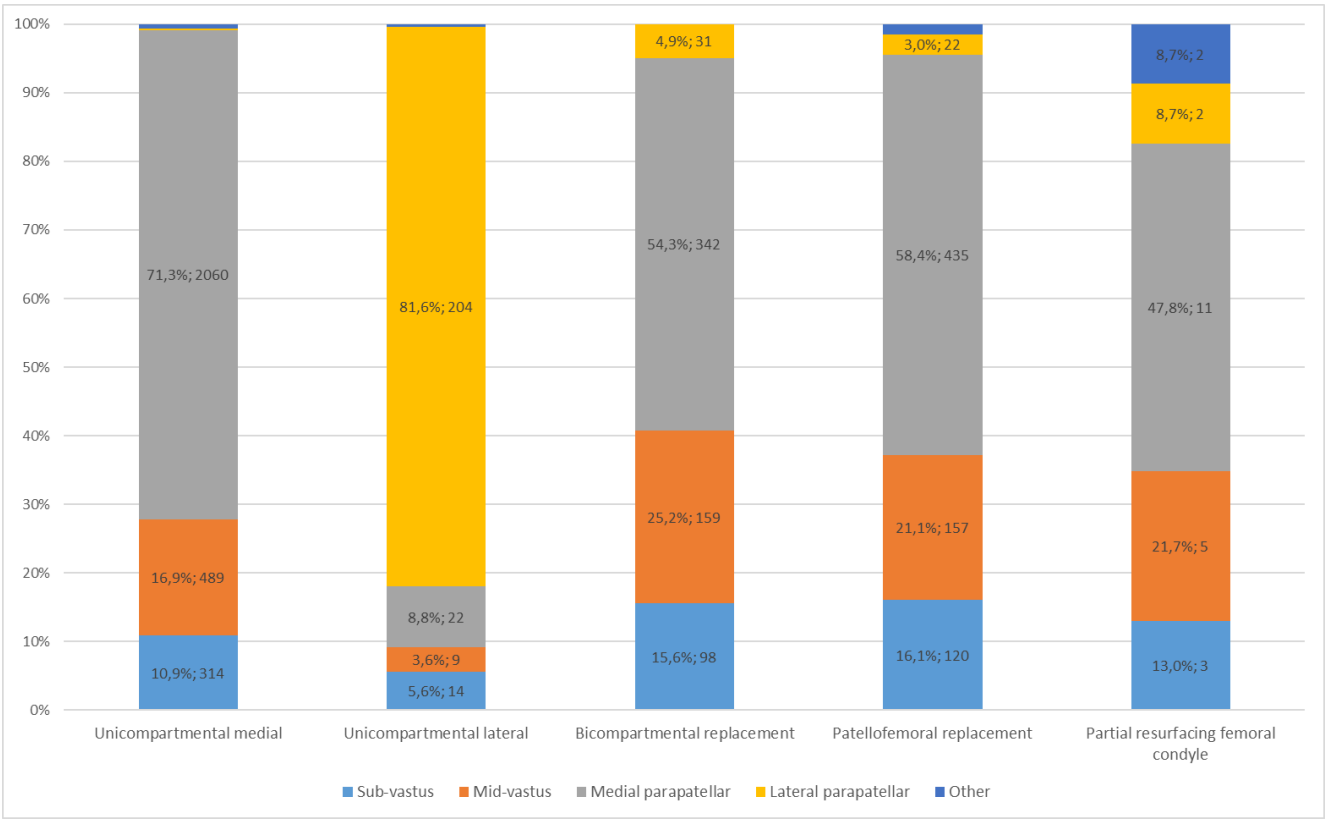
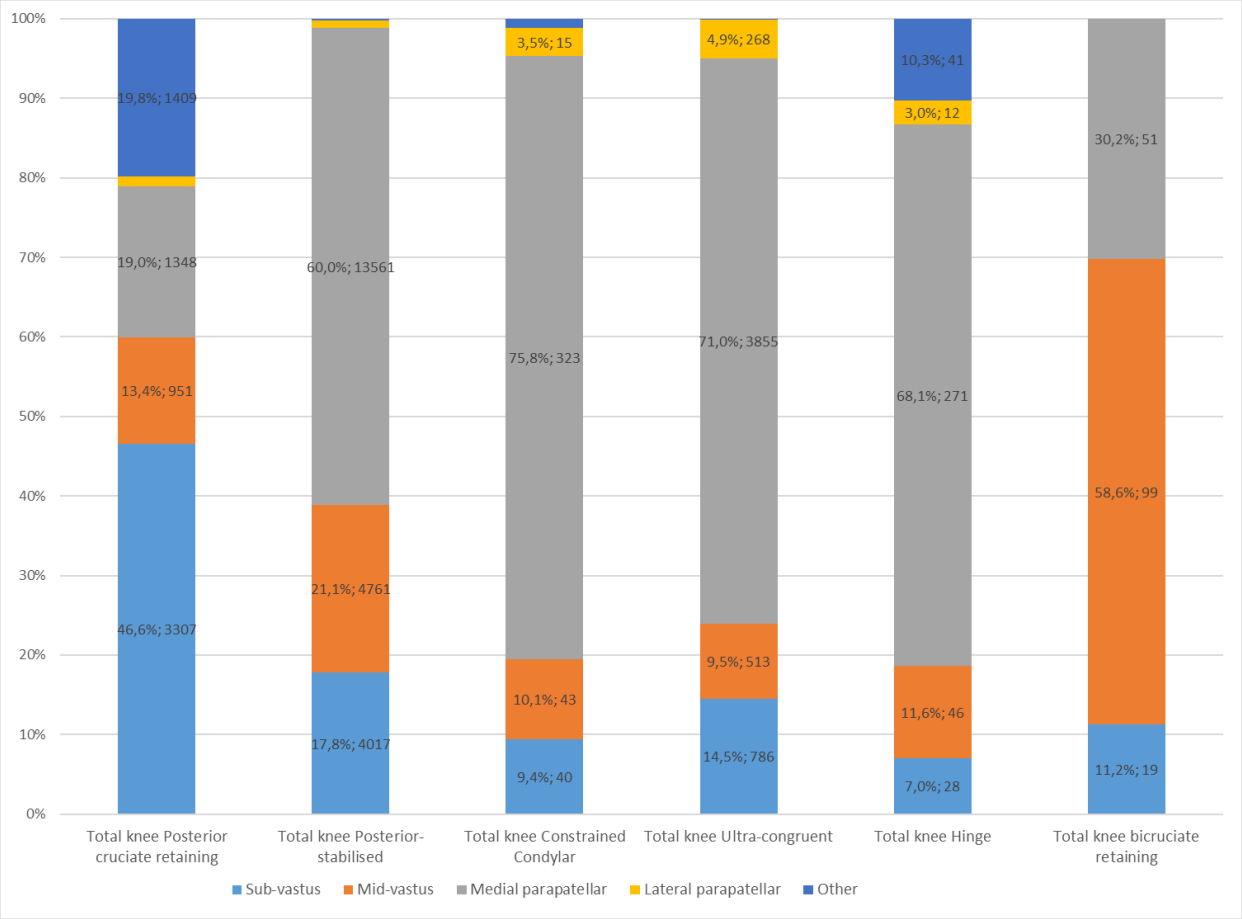


Figure 2.6 Approach used during primary partial knee replacements



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)	1051 (2,6%)	1946 (4,8%)
Amount of hospitals (% of all hospitals)	31/104 (29,8%)	41/104 (39,4%)

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

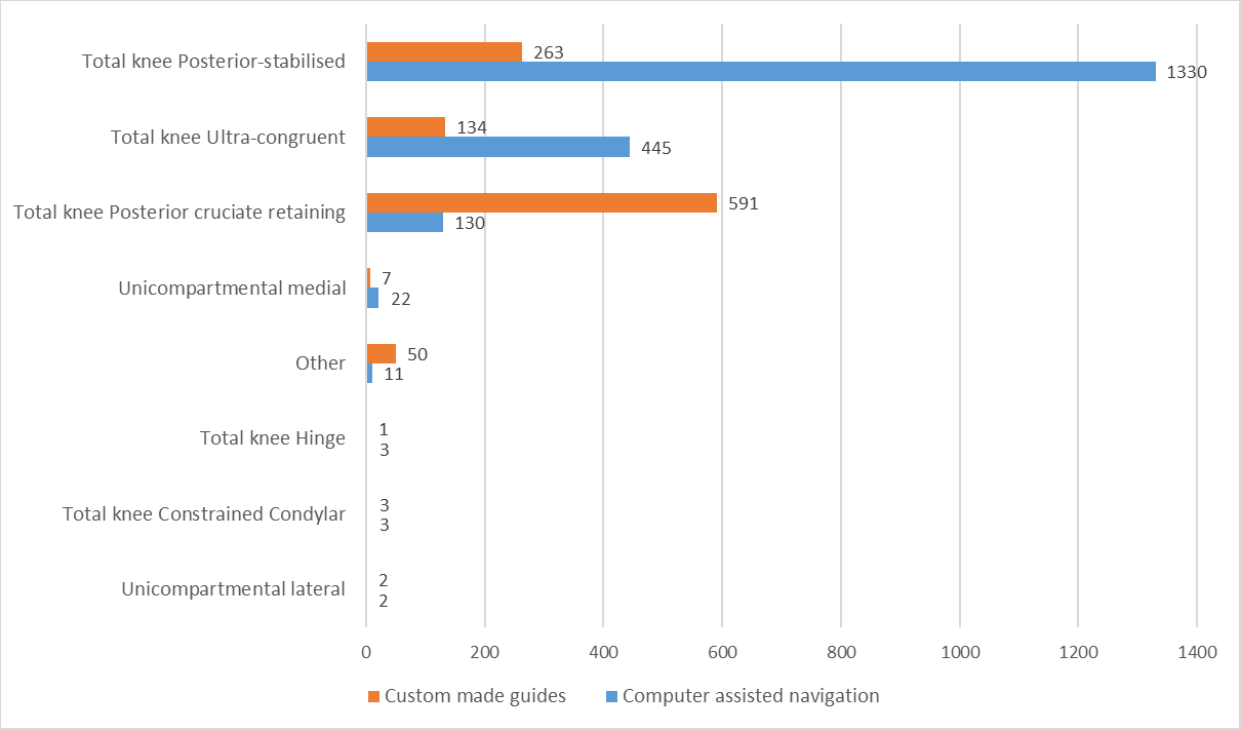


Figure 2.9 Insert type according to primary knee replacement type

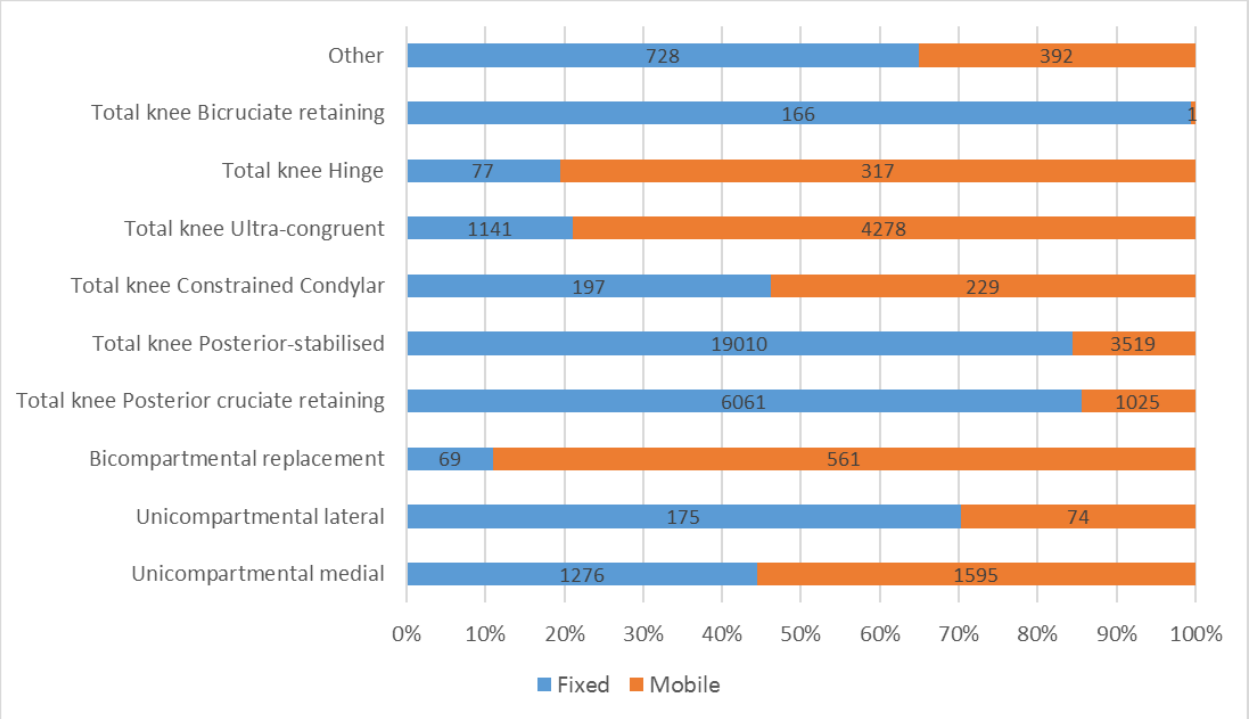


Table 2.9 Top 5 knee prosthesis brands according to primary knee prosthesis type for notified material

	Producer	Brand	Amount	Percentage of total
Total knee prosthesis	Smith & Nephew	Genesis II	4864	13,6%
	Depuy	Attune	4360	12,2%
	Biomet	Vanguard	4315	12,1%
	Stryker	T'HLON	3747	10,5%
	Smith & Nephew	Journey II	2891	8,1%
	Total		**35634**	
Unicompartmental replacements	Biomet	Oxford	1653	54,2%
	Zimmer	Uni Flex	684	22,4%
	Smith & Nephew	Journey	371	12,2%
	Smith & Nephew	Accuris	105	3,4%
	X NOV		72	2,4%
	Total		**3051**	
Bicompartmental replacements	Peter Brehm	BPKS	207	33,2%
	Zimmer	Innex	120	19,2%
	DePuy	Attune	110	17,6%
	Smith & Nephew	TC-pluc	54	8,7%
	Zimmer	Uni Flex	36	5,8%
	Total		**624**	
Patellofemoral replacements	Zimmer	PFJ	305	47,9%
	Smith & Nephew	Journey	223	35,0%
	Biomet	Vanguard	34	5,3%
	MicroPort	FPV Evos	19	3,0%
	Arthrex	iBalance	18	2,8%
	Total		**637**	

2.3 REVISIONS AFTER PRIMARY KNEE REPLACEMENT

2.3.1 Demographics

Table 2.10 Age, gender and indications for knee revision procedures

	N=3510	
	Mean	**SD**
Age (yrs)	65,5	11,6
	Count	**N %**
Age categories		
<45	126	3,6
45-59	941	26,8
60-69	1058	30,2
70-79	1008	28,7
>=80	376	10,7
Gender		
Female	2245	64,0
Male	1265	36,0
Indication		
Aseptic loosening	1057	30,1
Wear of polyethylene component	211	6,0
Instability	631	18,0
Infection	637	18,1
Periprosthetic fracture	167	4,8
Pain	767	21,9
Stiffness	209	6,0
Malalignment	227	6,5
Implant fracture	30	0,9
Progressive osteoarthritis in non-replaced component	444	12,6
Indication other	283	8,1

Figure 2.10 Knee revision burden according to age category

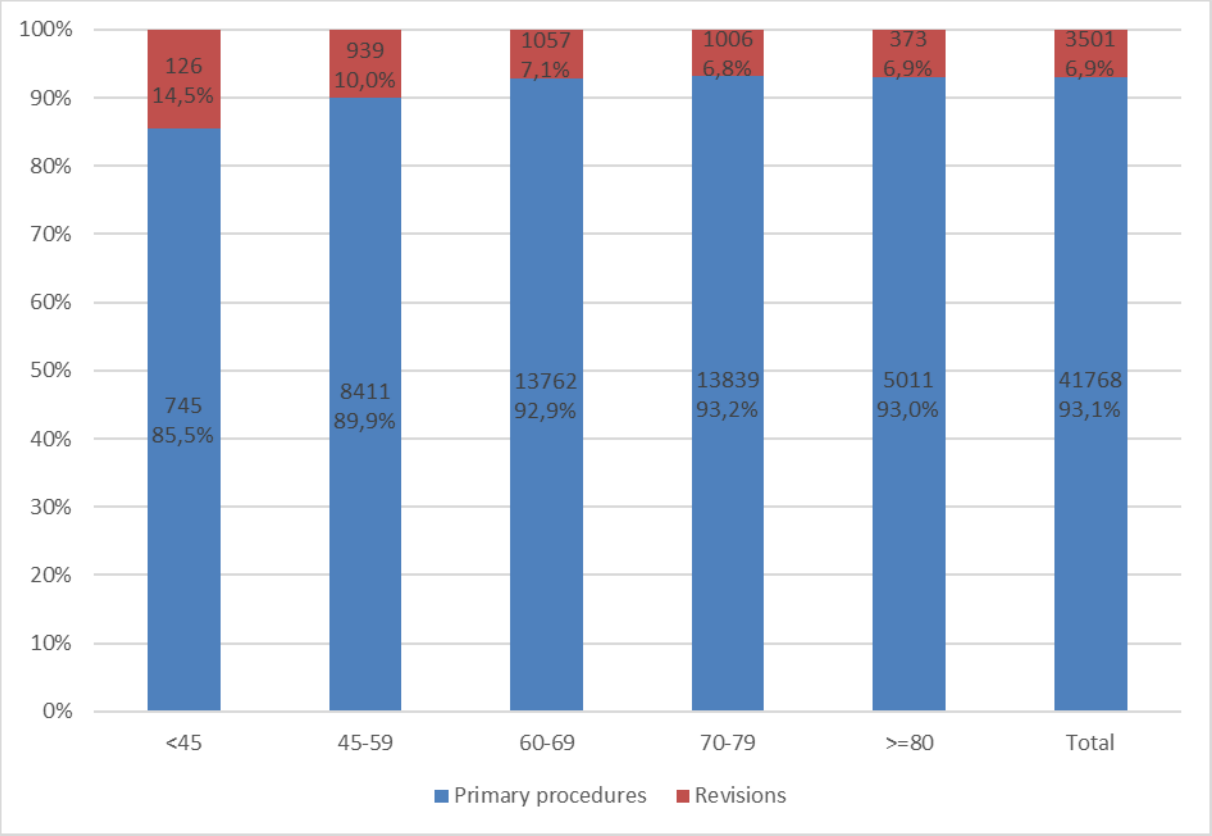


Figure 2.11 Age and gender by number of knee revision procedures

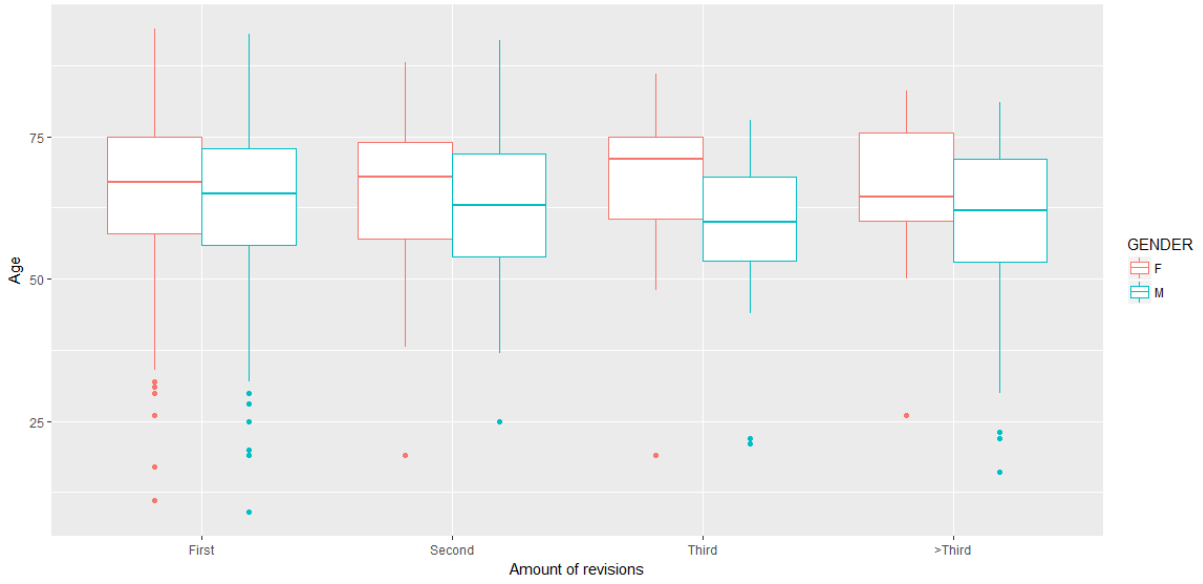
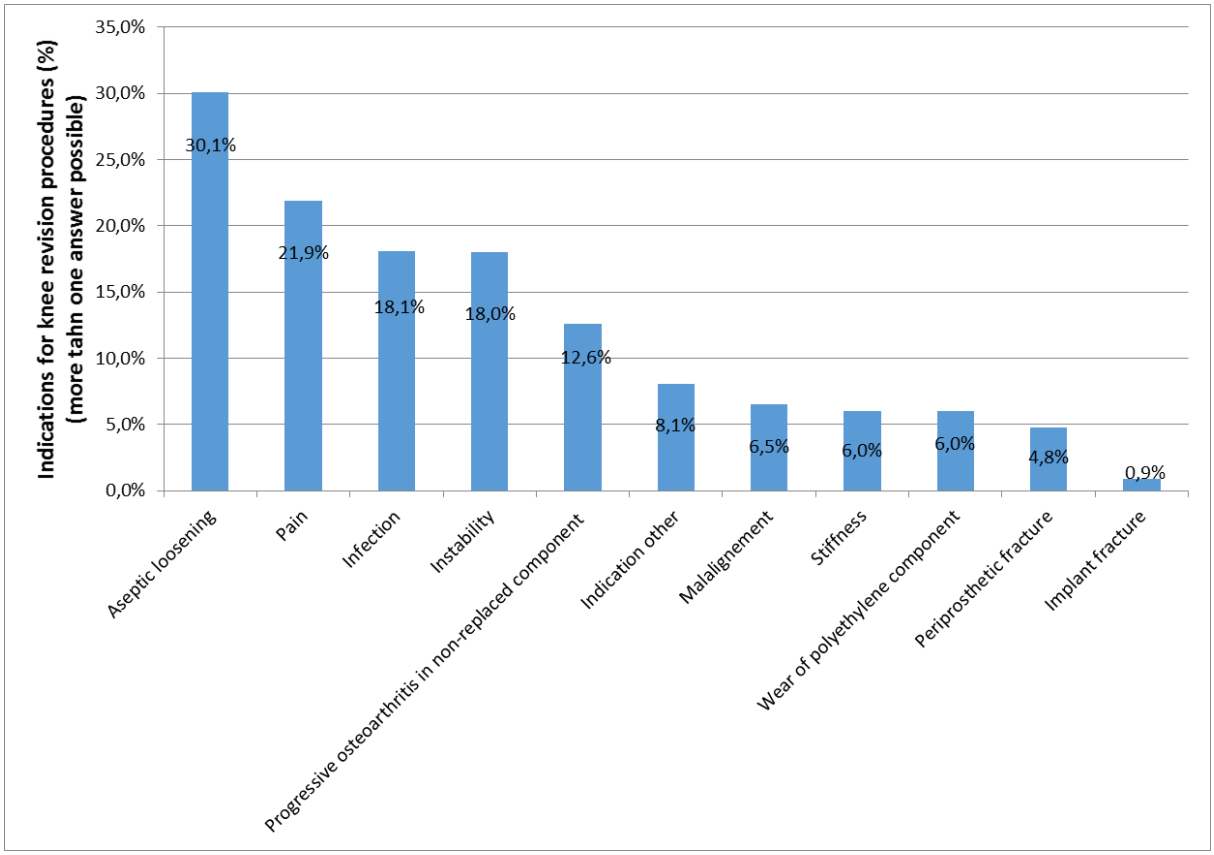


Figure 2.12 Indications for knee revision procedures



2.3.2 Surgical technique and implant characteristics

Table 2.11 Components removed during knee revision procedures

	Number	Proportion (%)[1]
Tibia	2193	66,8
Femur	2085	63,5
Patella	1428	43,5
Insert	2789	84,9
Total number of procedures	**3284**	

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

Table 2.12 Combinations of removed components during knee revision procedures

	Number	Percentage of total (%)
All components	1972	60,0
Tibia and insert	191	5,8
Patella and insert	72	2,2
Femur and insert	47	1,4
Insert only	466	14,2
Patella only	440	13,4
Femur only	38	1,2
Other combination	58	1,8
Total number of procedures	**3284**	**100,0**

Table 2.13 Numbers and percentages of implanted knee types during knee revision procedures

	Number	Percentage of total (%)
Total knee replacement	2596	92,1
Unicompartmental	9	0,3
Bicompartmental replacement	43	1,5
Patellofemoral replacement	170	6,0
Total number of procedures	**2818**	**100,0**

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

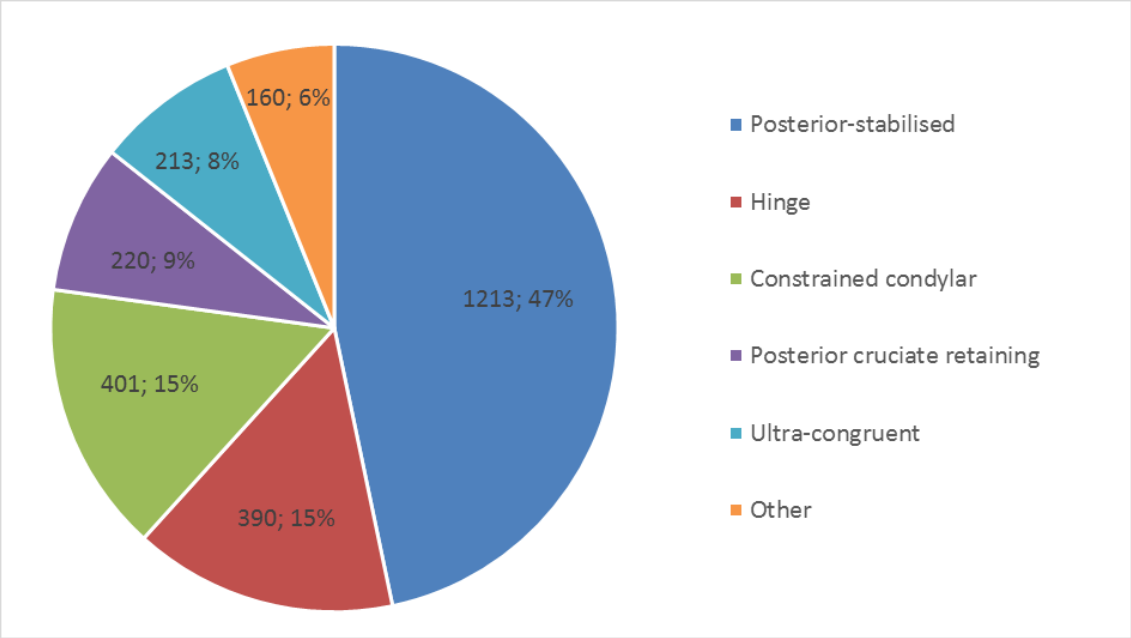
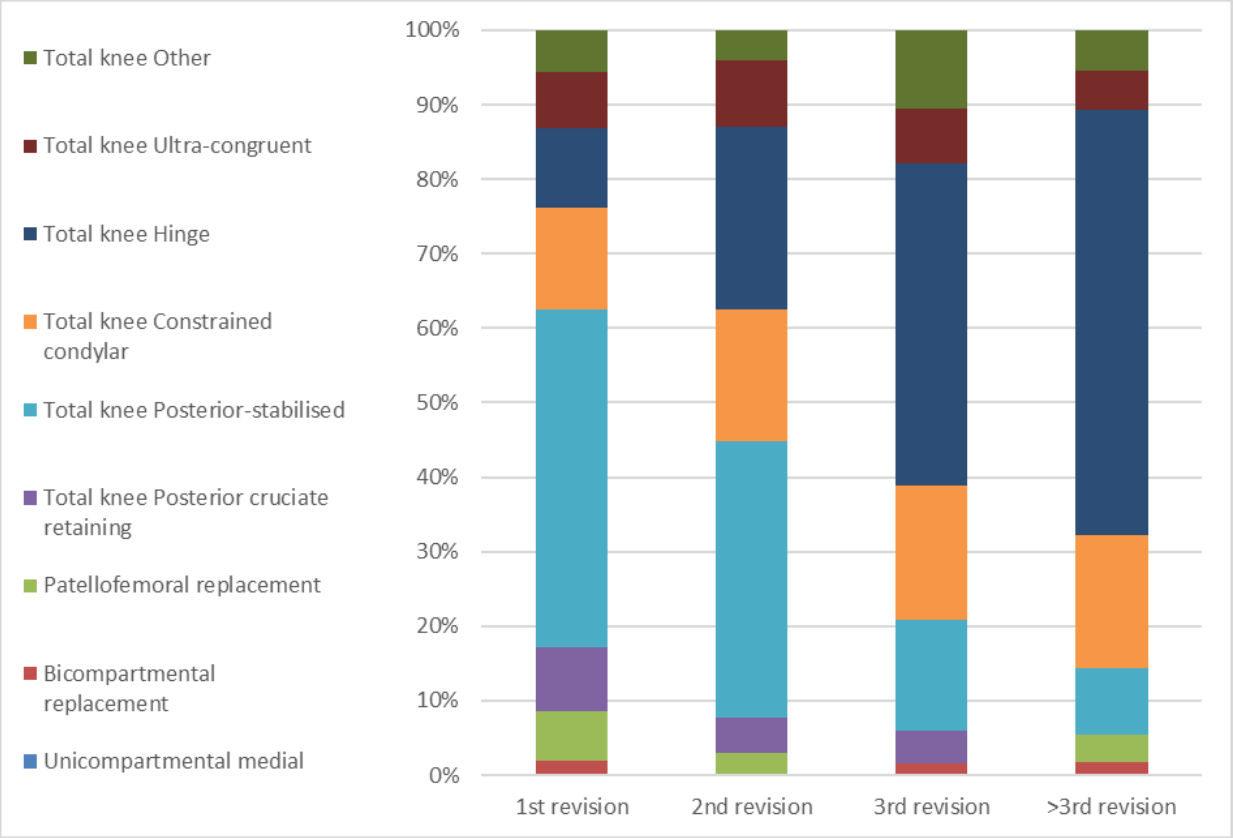


Figure 2.14 Type of implanted knee prosthesis during revision procedures according to the number of revisions



	1st revision	2nd revision	3rd revision	>3rd revision
	N (%)	N (%)	N (%)	N (%)
Total knee Other	135 (5,7)	12 (4)	7 (10,4)	3 (5,4)
Total knee Ultra-congruent	177 (7,4)	27 (9)	5 (7,5)	3 (5,4)
Total knee Hinge	255 (10,7)	74 (24,6)	29 (43,3)	32 (57,1)
Total knee Constrained condylar	326 (13,7)	53 (17,6)	12 (17,9)	10 (17,9)
Total knee Posterior-stabilised	1083 (45,4)	112 (37,2)	10 (14,9)	5 (8,9)
Total knee Posterior cruciate retaining	202 (8,5)	14 (4,7)	3 (4,5)	0 (0)
Patellofemoral replacement	159 (6,7)	9 (3)	0 (0)	2 (3,6)
Bicompartmental replacement	41 (1,7)	0 (0)	1 (1,5)	1 (1,8)
Unicompartmental medial	6 (0,3)	0 (0)	0 (0)	0 (0)
Total amount	**2384 (100)**	**301 (100)**	**67 (100)**	**56 (100)**

Figure 2.15 Approach during knee revision procedures

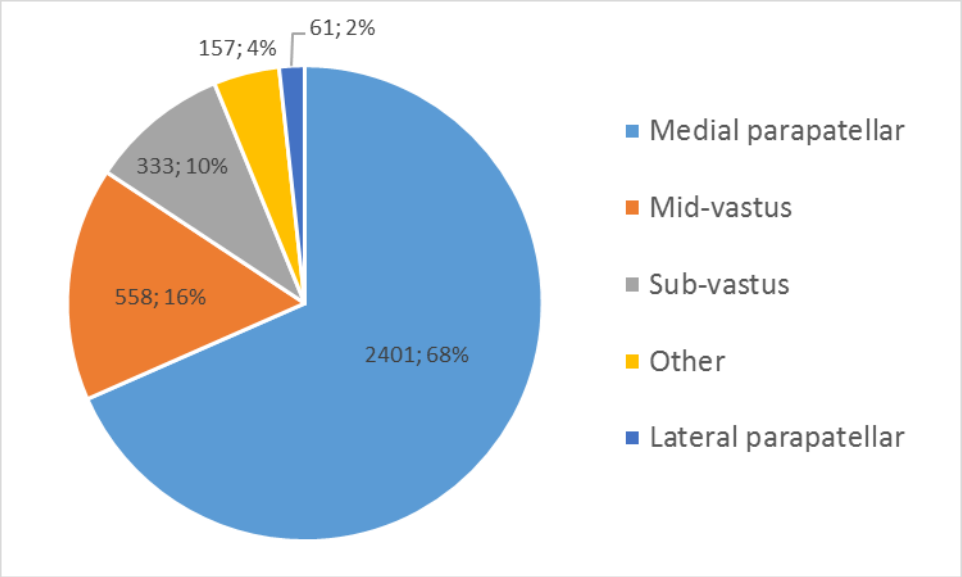


Table 2.14 Numbers and percentages of knee revisions by fixation

	Number	Percentage of total
Cemented	2164	96,0%
Reverse hybrid	9	0,4%
Hybrid	36	1,6%
Uncemented	44	2,0%
Total number of procedures	**2253**	**100,0%**

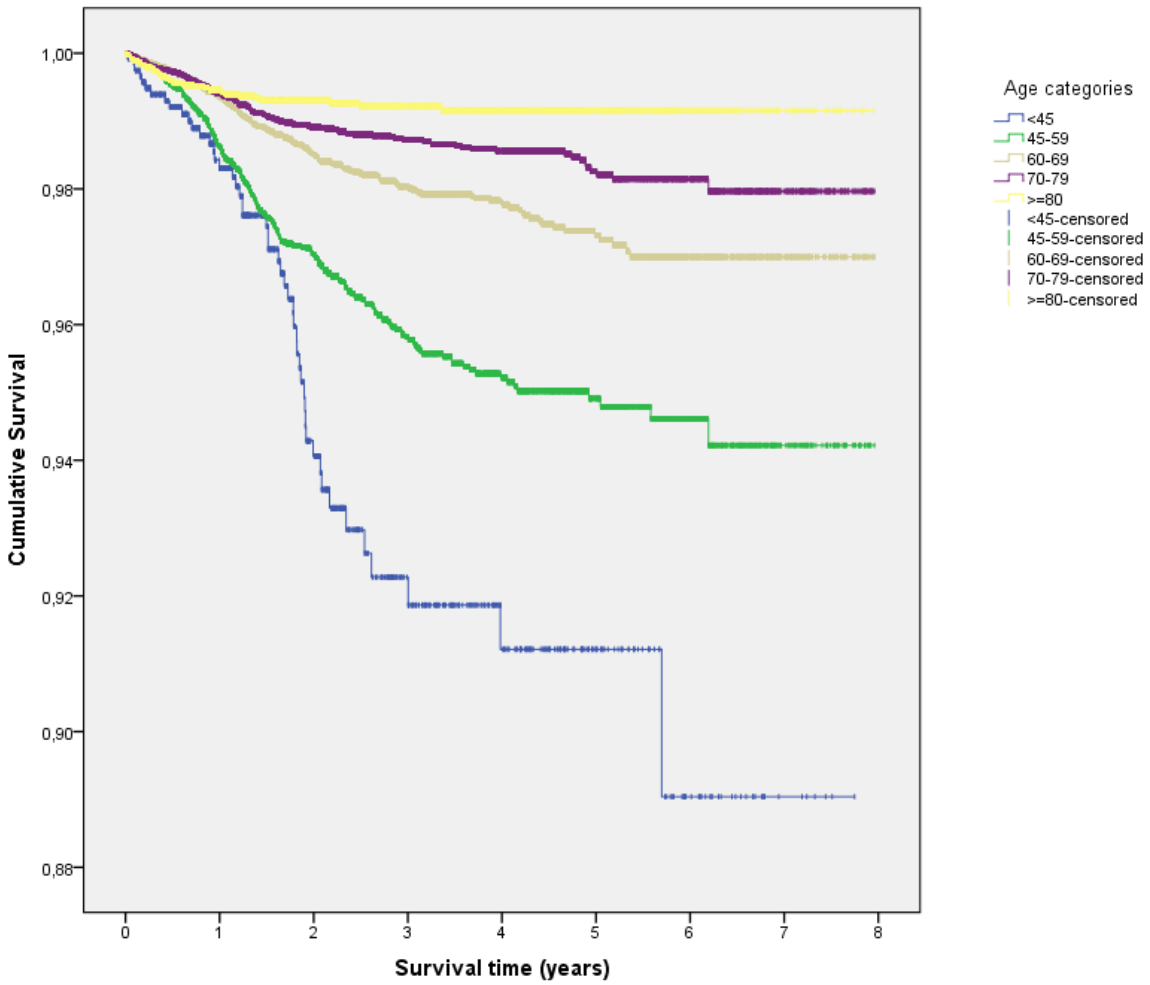
Note: Only replacements during which the femoral and/or tibial component were replaced were taken into account.

Table 2.15 Top 5 total knee revision prosthesis brands for notified material

Producer	Brand	Amount	Percentage of total
Smith & Nephew	Legion	370	19,3%
Zimmer	Nexgen	303	15,8%
Biomet	Vanguard	272	14,2%
DePuy	LCS	122	6,4%
Stryker	T'hlon	122	6,4%
Total		**1916**	

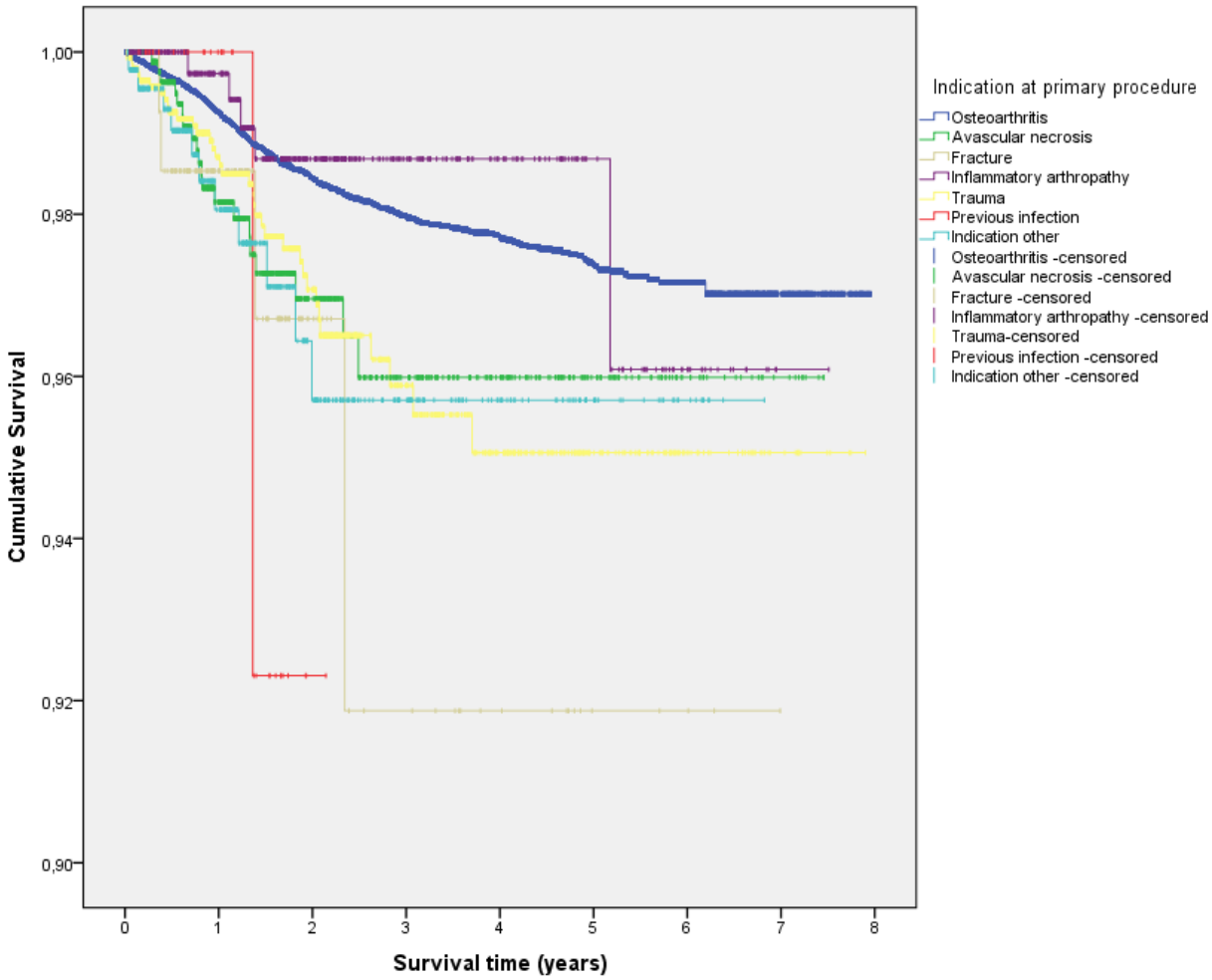
2.3.3 Implant survival after primary procedures

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



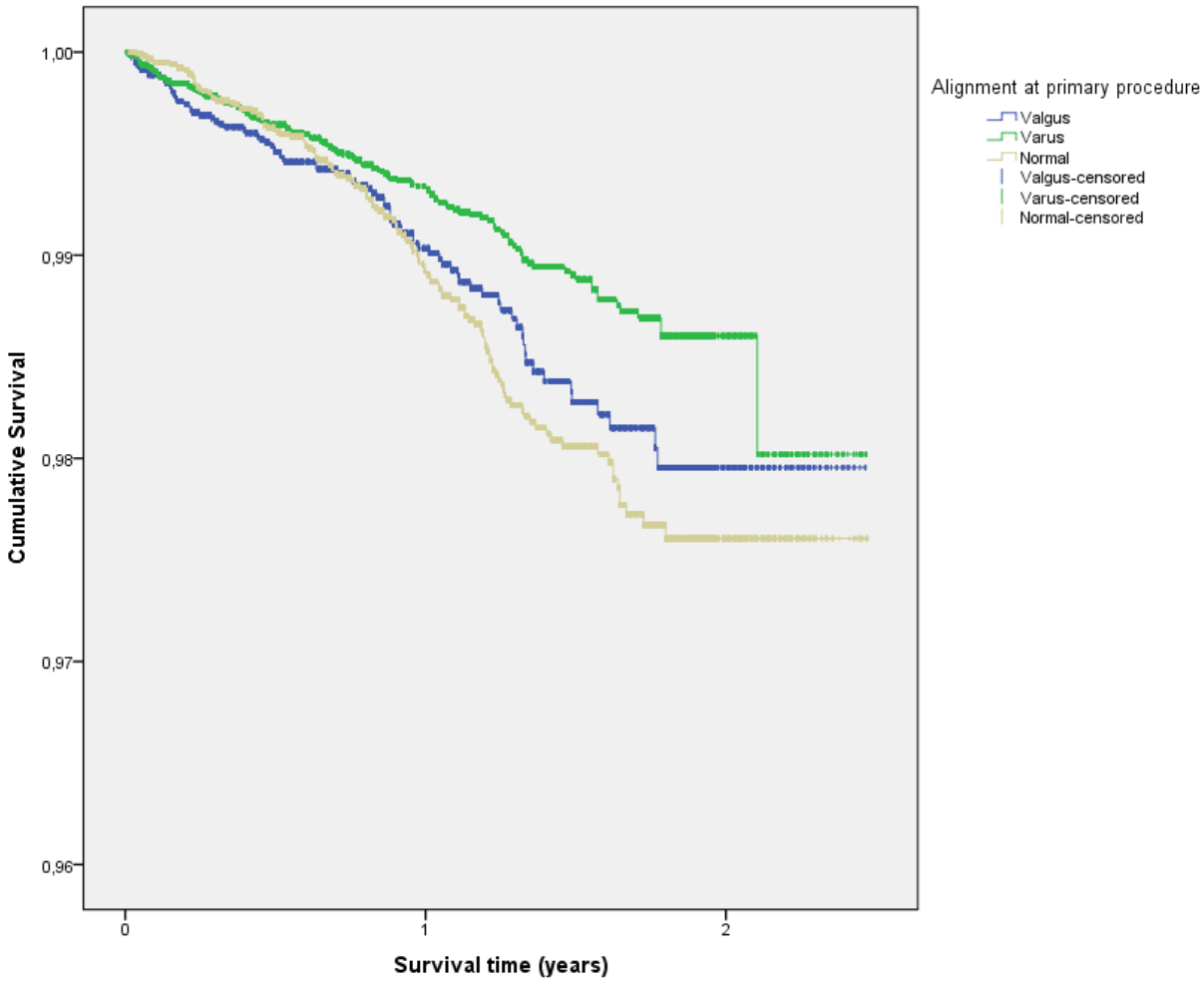
Number of events/Number at risk								
	0	**1**	**2**	**3**	**4**	**5**	**6**	**7**
<45	17/1183	23/802	6/410	2/224	0/140	1/68	0/30	0/6
45-59	151/13537	116/9009	43/4961	13/2467	4/1557	2/819	1/323	0/75
60-69	120/22497	102/15309	30/8577	9/4523	11/2883	4/1497	0/585	0/147
70-79	117/23085	63/15797	12/9091	7/5026	6/3296	2/1774	1/717	0/189
>=80	40/8322	8/5574	2/3229	1/1733	0/1085	0/544	0/186	0/47

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



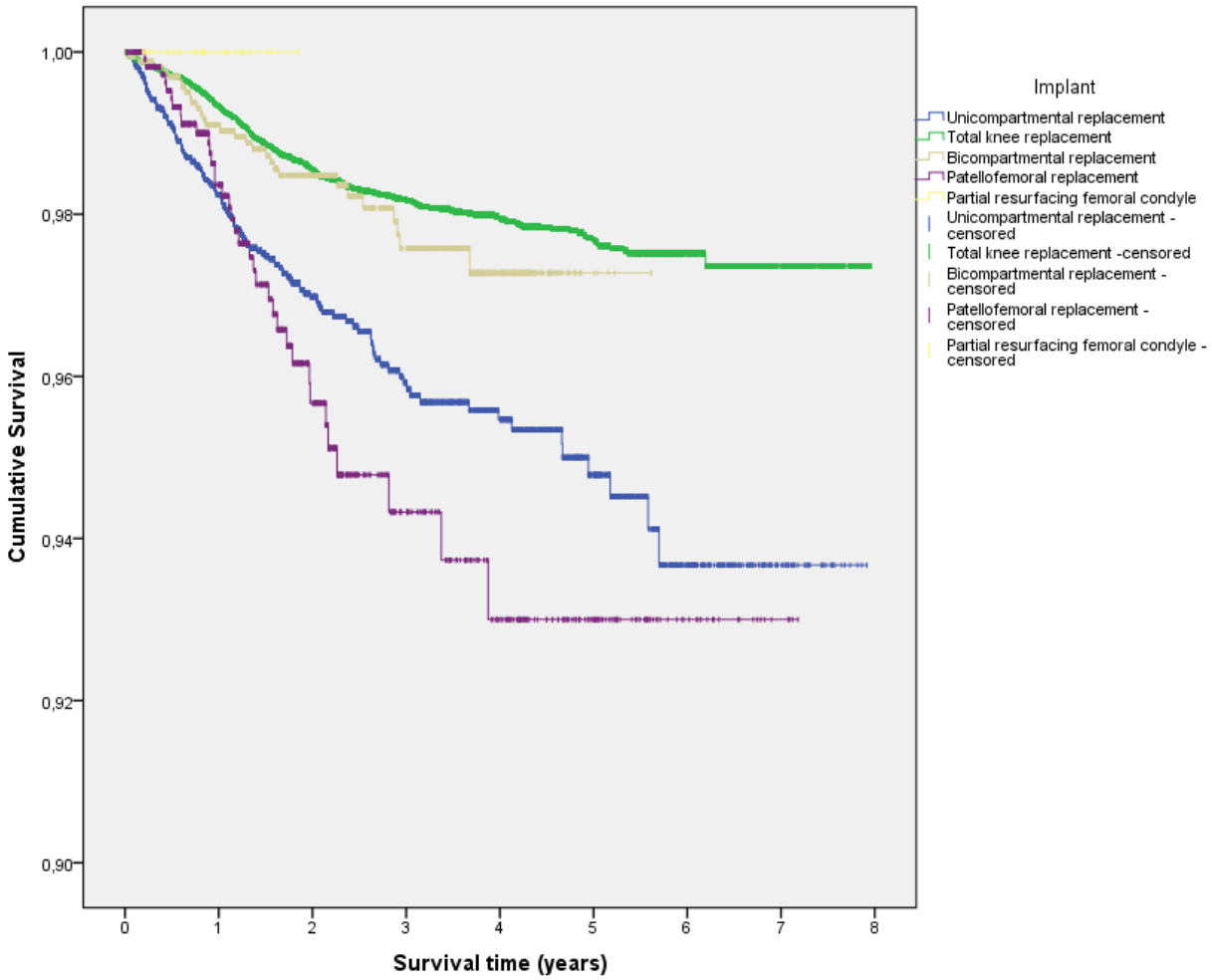
Number of events/Number at risk								
	0	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Osteoarthritis	406/65188	285/44280	86/25109	30/13364	21/8580	8/4516	2/1756	0/442
Avascular necrosis	13/905	5/560	2/277	0/153	0/102	0/57	0/23	0/9
Fracture	2/158	1/82	1/25	0/17	0/11	0/4	0/3	0/0
Inflammatory arthropathy	1/462	3/324	0/187	0/107	0/70	1/39	0/17	0/1
Post trauma	16/1441	12/967	5/551	2/275	0/176	0/85	0/37	0/12
Previous infection	0/32	1/19	0/1	0/0	0/0	0/0	0/0	0/0
Indication other	7/456	4/274	0/131	0/79	0/47	0/23	0/9	0/0

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



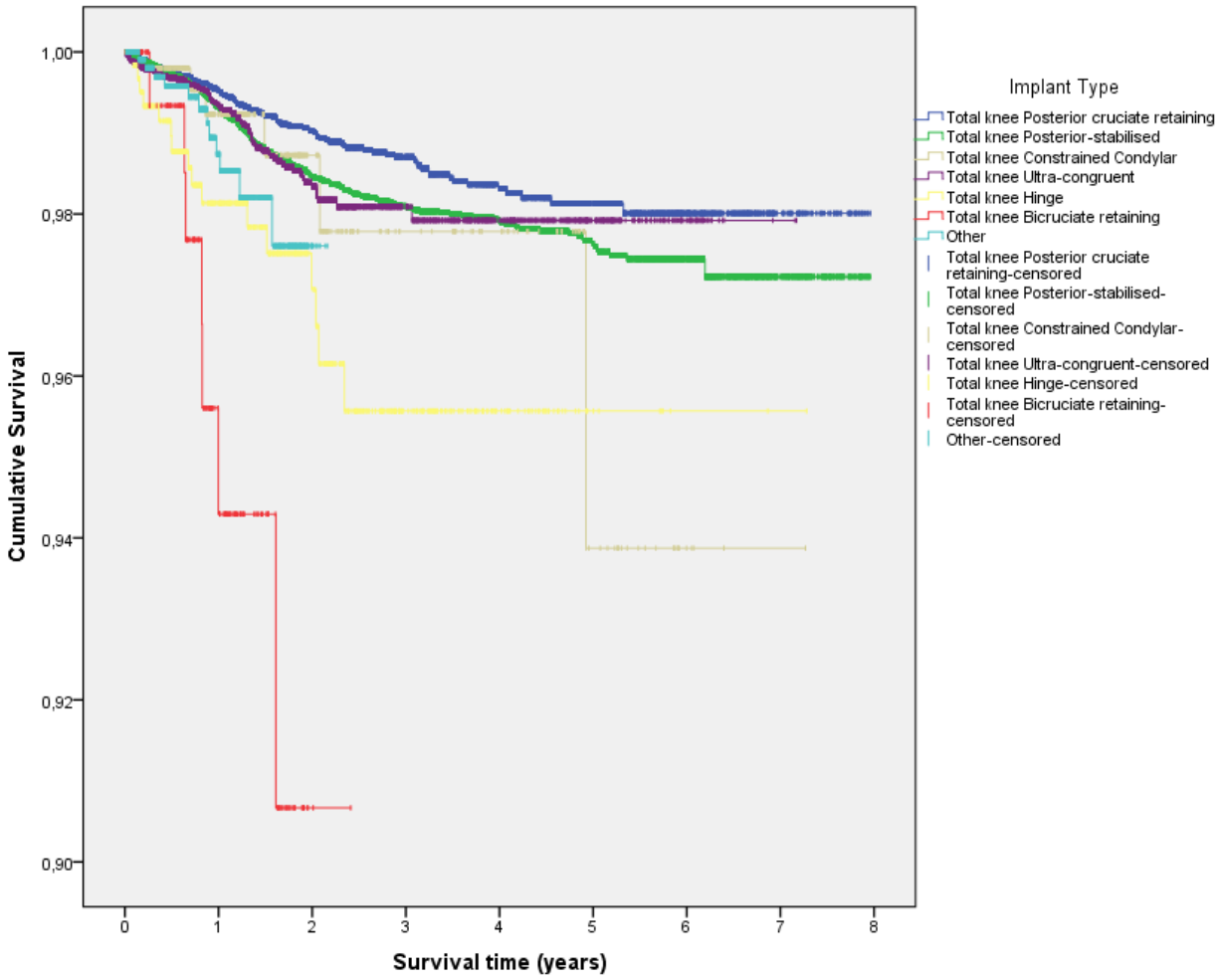
Number of events/Number at risk			
	0	**1**	**2**
Valgus	59/8082	24/3945	0/189
Varus	106/20619	41/9966	1/361
Normal	91/11921	48/5953	0/396

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



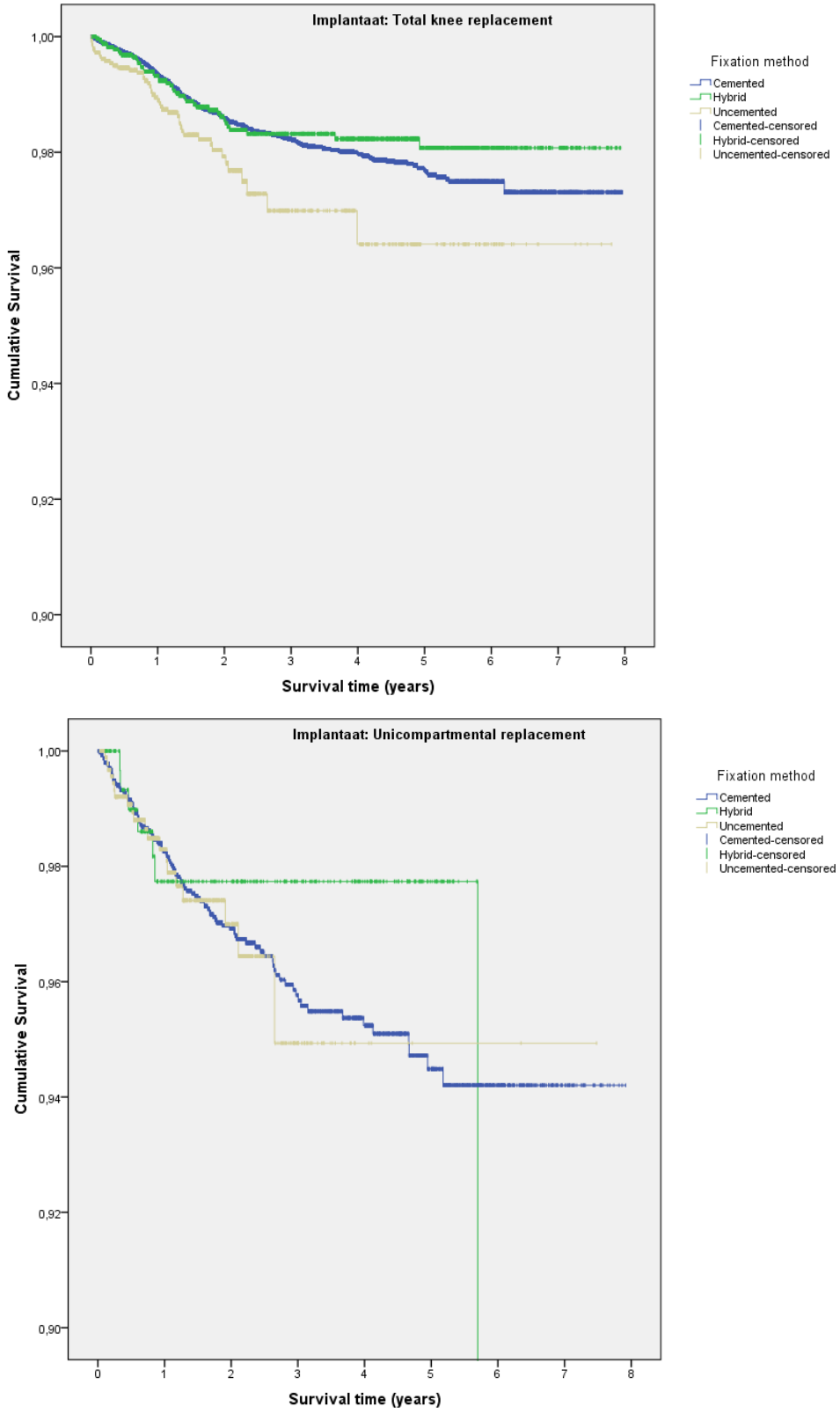
Number of events/Number at risk								
	0	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Unicompartmental replacement	81/5402	38/3601	17/2191	5/1249	4/826	3/422	0/147	0/34
Total knee replacement	329/59490	243/39899	61/21788	23/11462	15/7554	6/4071	2/1615	0/423
Bicompartmental replacement	14/1717	8/1396	6/1066	1/571	0/188	0/6	0/0	0/0
Patellofemoral replacement	15/1149	15/745	4/389	2/187	0/120	0/62	0/19	0/4
Partial resurfacing femoral condyle	0/23	0/10	0/0	0/0	0/0	0/0	0/0	0/0

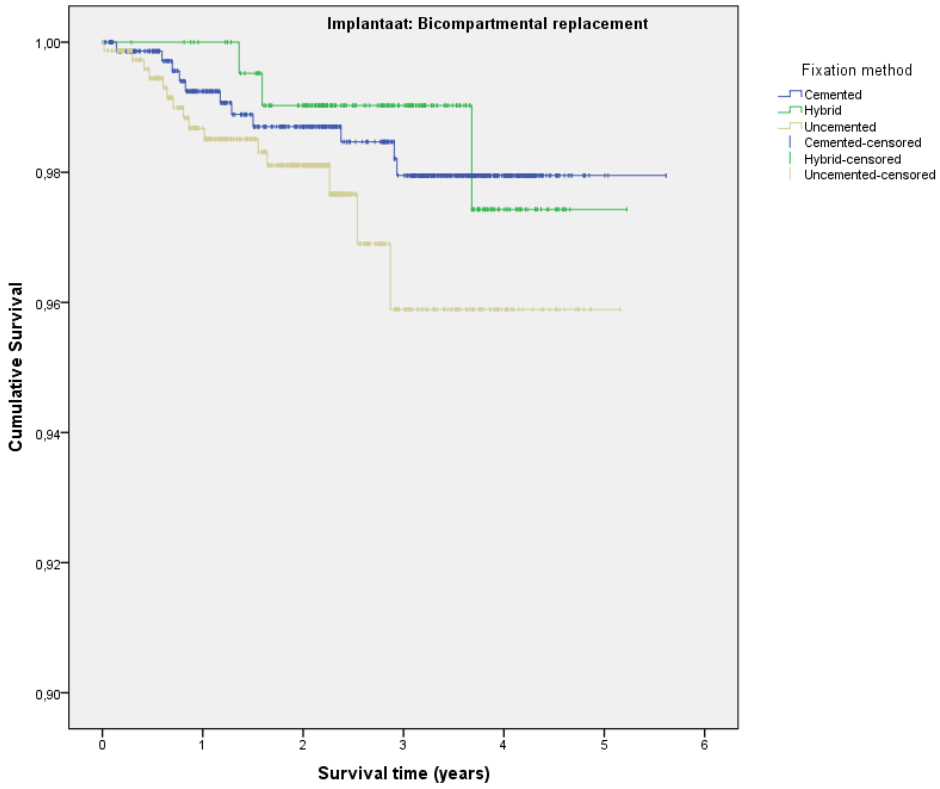
Figure 2.20 Kaplan-Meier curve for type of implant for total knee prostheses at primary knee replacement

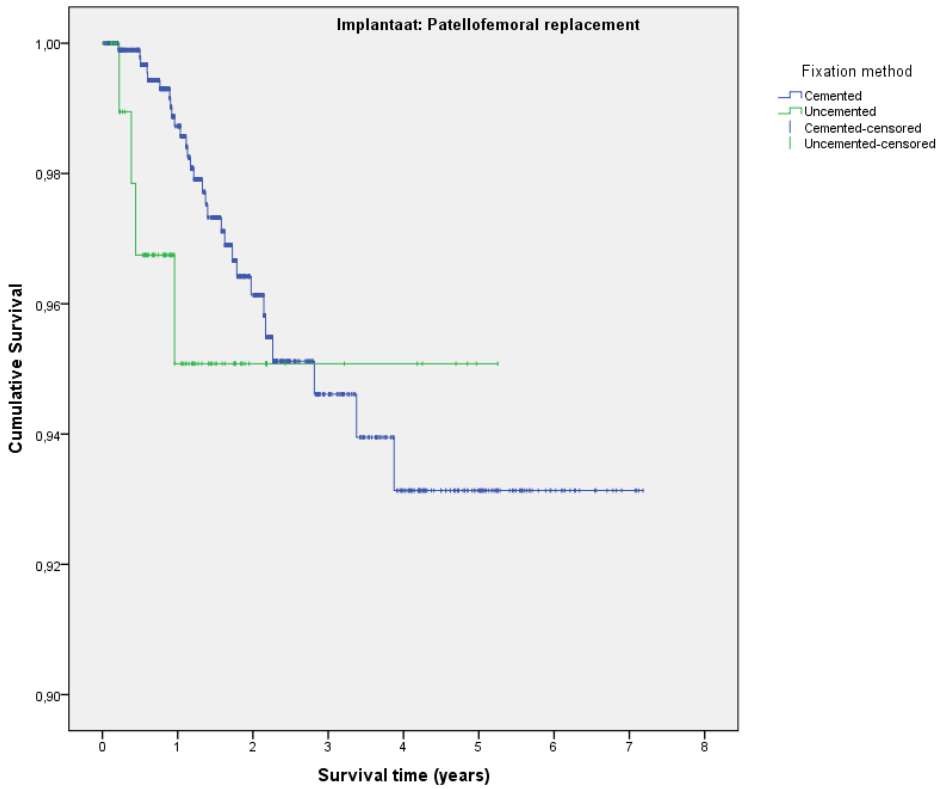


Number of events/Number at risk								
	0	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Total knee Posterior cruciate retaining	52/12677	38/9117	14/5490	10/2953	3/1930	1/1014	0/435	0/99
Total knee Posterior-stabilised	210/36986	165/24952	39/14090	12/7748	11/5182	5/2856	2/1135	0/320
Total knee Constrained Condylar	3/538	1/295	1/110	0/66	1/51	0/22	0/4	0/1
Total knee Ultra-congruent	39/7354	32/4570	4/1870	1/600	0/354	0/171	0/39	0/2
Total knee Hinge	10/622	3/414	3/218	0/95	0/37	0/8	0/2	0/1
Total knee Bicruciate retaining	6/171	1/72	0/2	0/0	0/0	0/0	0/0	0/0
Other	15/2042	11/1373	6/893	1/544	2/308	0/166	0/64	0/3

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

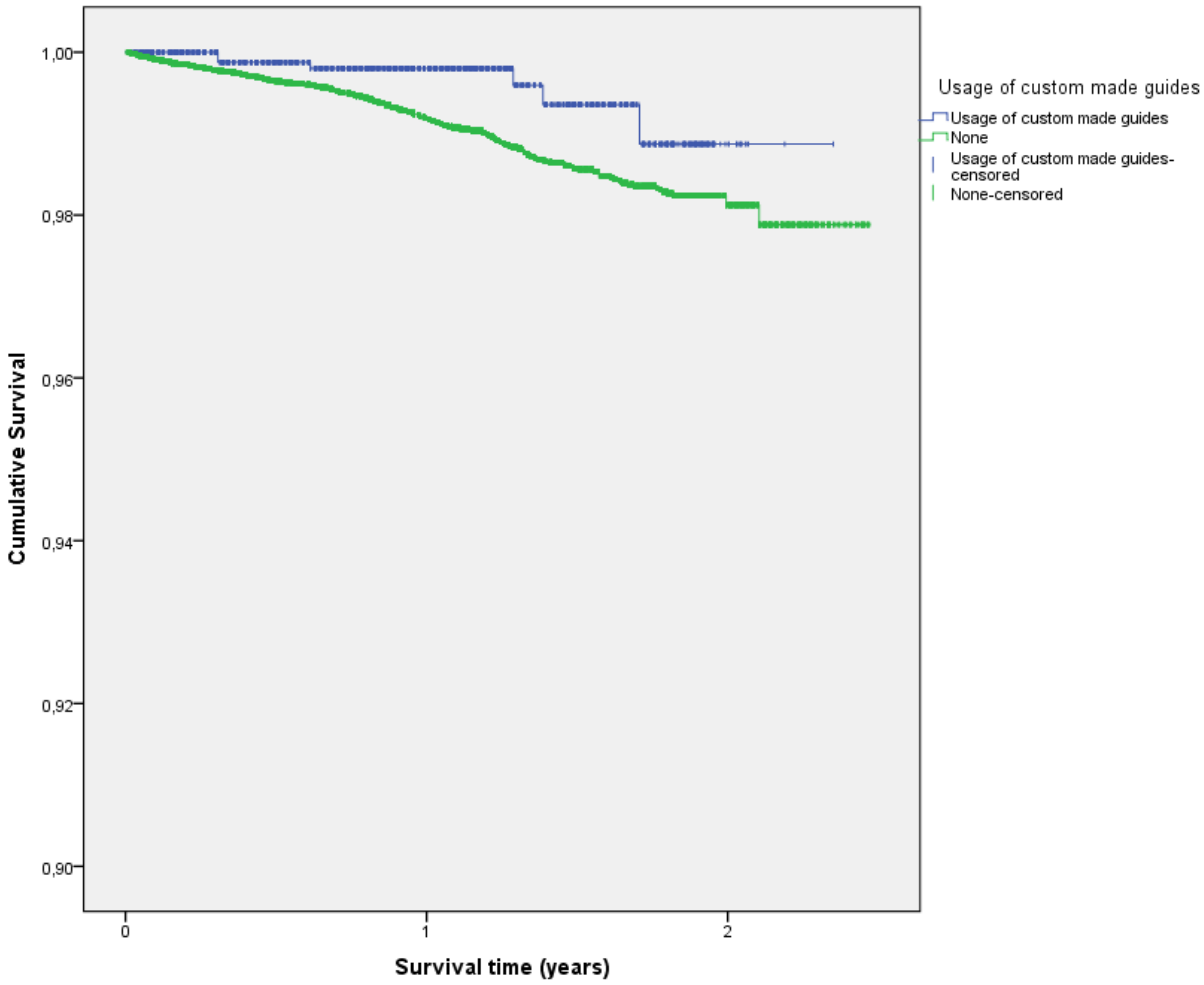



Implantaat: Bicompartmental replacement
Cumulative Survival
1,00
0,98
0,96
0,94
0,92
0,90
0
1
2
3
4
5
6
Survival time (years)
Fixation method
Cemented
Hybrid
Uncemented
Cemented-censored
Hybrid-censored
Uncemented-censored


Implantaat: Patellofemoral replacement
Cumulative Survival
1,00
0,98
0,96
0,94
0,92
0,90
0
1
2
3
4
5
6
7
8
Survival time (years)
Fixation method
Cemented
Uncemented
Cemented-censored
Uncemented-censored

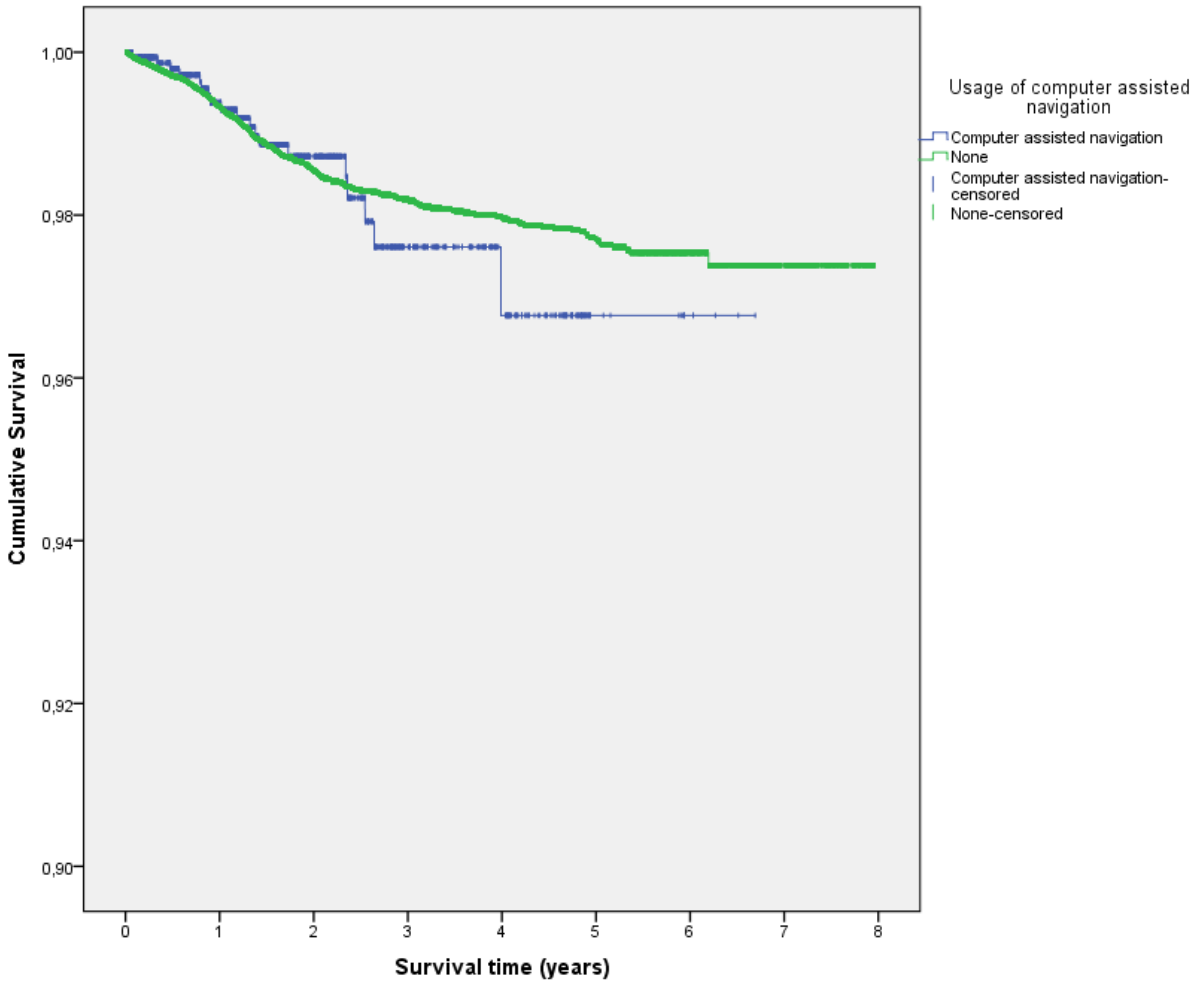
Number of events/Number at risk									
		0	1	2	3	4	5	6	7
Unicompartmental replacement	Cemented	61/4049	32/2817	15/1735	5/1052	4/729	1/391	0/145	0/33
	Hybrid	6/321	0/212	0/167	0/117	0/83	1/28	0/0	0/0
	Uncemented	13/956	5/497	2/215	0/38	0/6	0/2	0/2	0/1
Total knee replacement	Cemented	282/53183	210/35353	51/19142	21/9863	14/6347	6/3386	2/1346	0/338
	Hybrid	20/3327	16/2505	4/1719	1/1286	1/1001	0/604	0/239	0/77
	Uncemented	26/2894	15/1956	5/844	1/256	0/167	0/69	0/27	0/6
Bicompartmental replacement	Cemented	5/741	3/597	3/485	0/376	0/130	0/4	0/0	0/0
	Hybrid	0/217	2/212	0/191	1/110	0/32	0/1	0/0	0/0
	Uncemented	9/759	3/587	3/390	0/85	0/26	0/1	0/0	0/0
Patellofemoral replacement	Cemented	10/1015	13/661	4/338	2/168	0/107	0/56	0/18	0/4
	Uncemented	4/105	0/56	0/25	0/7	0/6	0/1	0/0	0/0

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



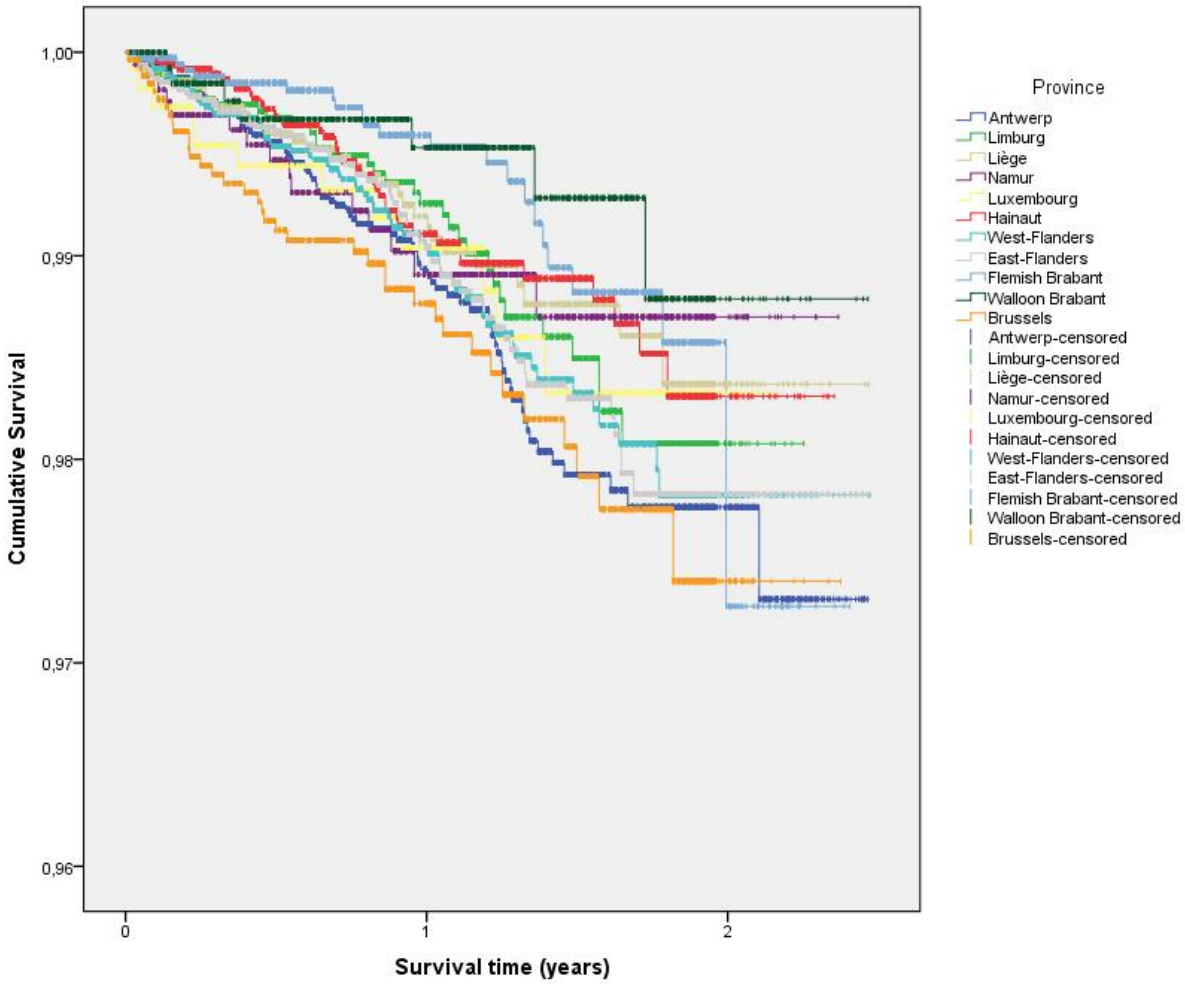
Number of events/Number at risk			
	0	**1**	**2**
Usage of custom made guides	3/1938	3/891	0/14
None	216/36287	98/17853	1/835

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**
Computer assisted navigation	8/1599	6/1098	4/544	1/222	0/115	0/13	0/5	0/0
None	321/57891	237/38801	57/21244	22/11240	15/7439	6/4058	2/1610	0/423

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



Number of events/Number at risk			
	0	**1**	**2**
Antwerp	53/6616	25/3309	1/362
Limburg	21/3741	13/1856	0/18
Liège	22/3659	8/1765	0/60
Namur	14/1671	1/841	0/26
Luxembourg	9/1126	3/603	0/16
Hainaut	31/4980	8/2368	0/49
West-Flanders	45/6464	21/3026	0/119
East-Flanders	43/6246	21/2995	0/183
Flemish Brabant	11/3666	10/1770	0/74
Walloon Brabant	5/1393	2/691	0/20
Brussels	27/2641	10/1357	0/38

2.4 NINETY-DAYS MORTALITY AFTER KNEE REPLACEMENT PROCEDURES

Table 2.16 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	41695	99,8%	79	0,2%
Revision with new prosthesis	3260	99,3%	24	0,7%
Resection with spacer	213	97,7%	5	2,3%
Resection without spacer	8	100,0%	0	0,0%
Total	**45176**	**99,8%**	**108**	**0,2%**

3 HIP REPLACEMENT

3.1 INTRODUCTION

3.2 PRIMARY HIP REPLACEMENT

3.2.1 Demographics

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

	N=47303	
	Mean	**SD**
Age (yrs)	70,3	12,9
	Count	**N %**
Age categories		
<45	1603	3,4%
45-59	7852	16,6%
60-69	11817	25,0%
70-79	13528	28,6%
>=80	12493	26,4%
Gender		
Female	28651	60,6%
Male	18650	39,4%
Undefined	2	0,0%
Indication		
Primary osteoarthritis	31541	66,7%
Secondary osteoarthritis	896	1,9%
Avascular necrosis	2517	5,3%
Rheumatoid arthritis	143	0,3%
Fracture	11368	24,0%
Tumor	114	0,2%
Hip dysplasia	437	0,9%
Indication other	287	0,6%

Figure 3.1 Age distribution by gender for primary hip replacement patients

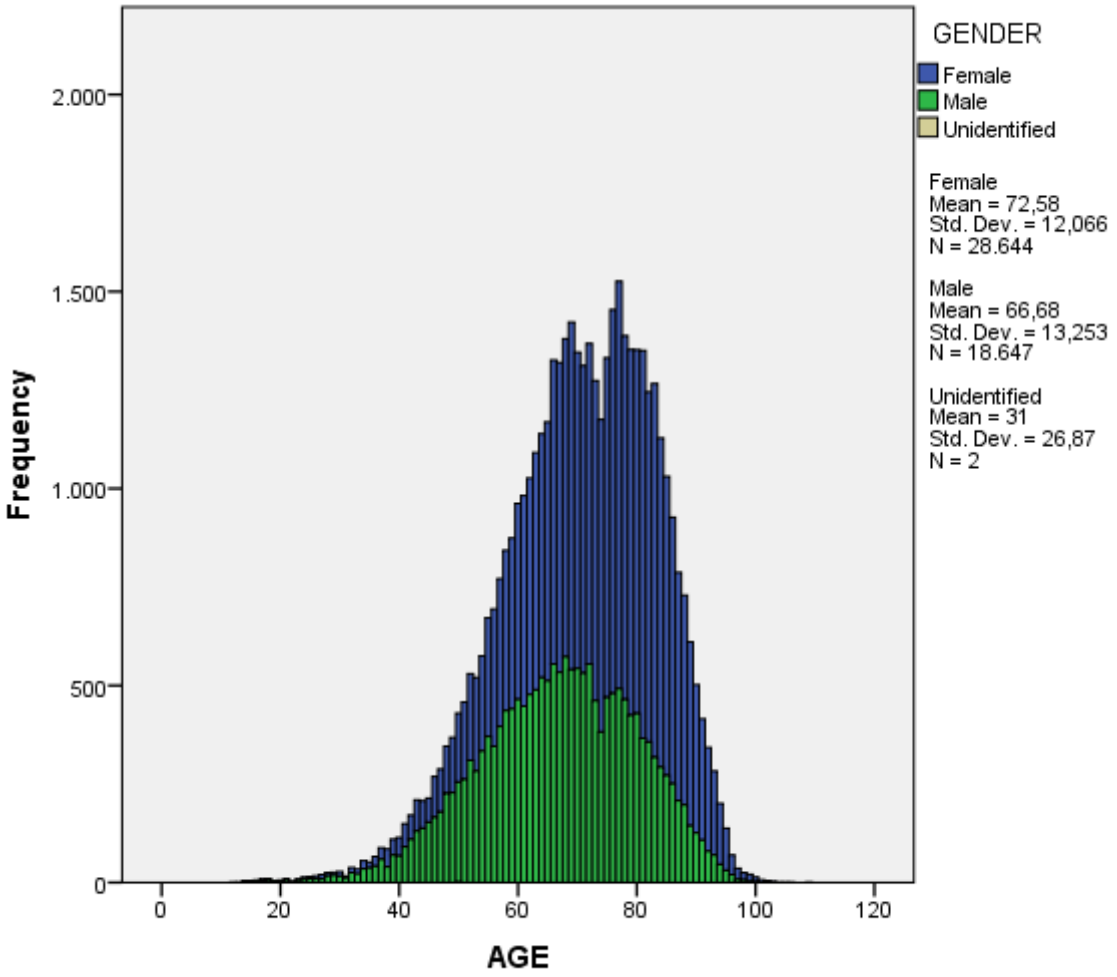


Figure 3.2 Age distribution by indication for primary hip replacement patients

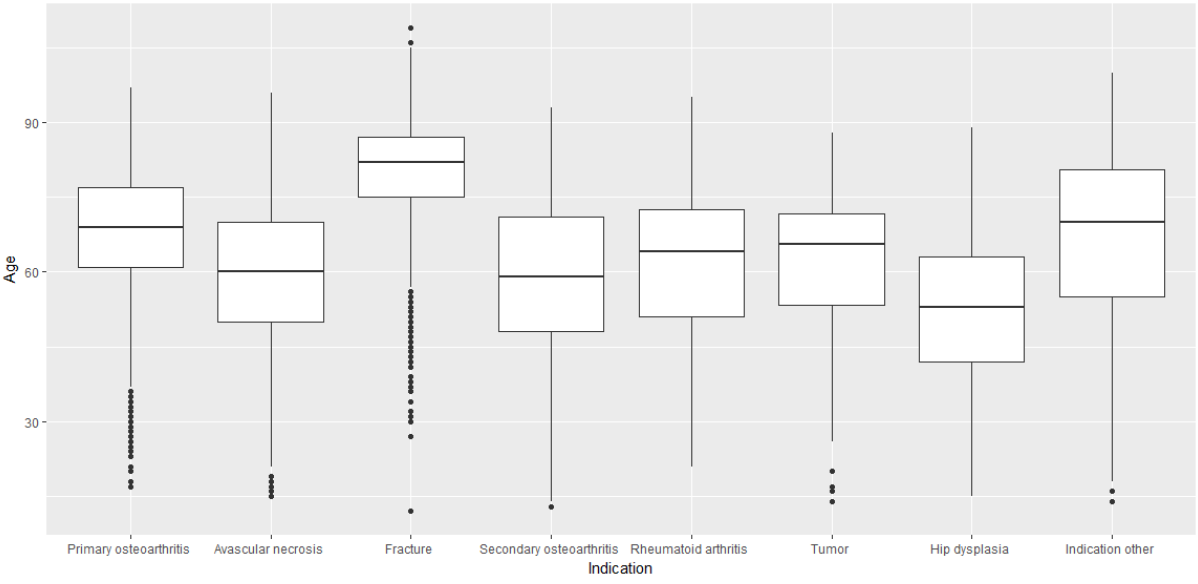
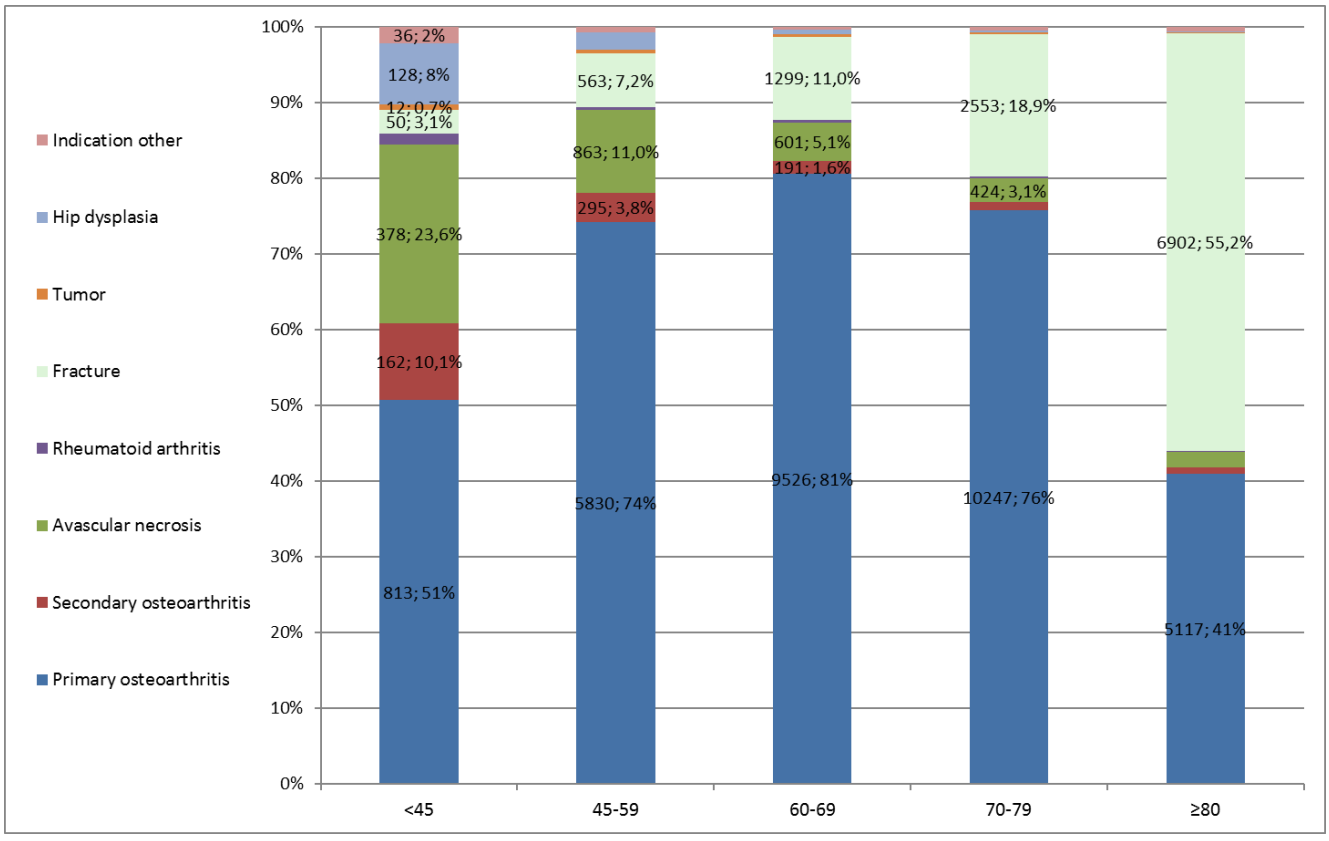


Table 3.2 Indications for primary hip replacements based on gender

	Male	Female
	N=18650	N=28651
	% (N)	% (N)
Primary osteoarthritis	69,9 (13037)	64,6 (18503)
Secondary osteoarthritis	2,6 (483)	1,4 (413)
Avascular necrosis	8,2 (1521)	3,5 (996)
Rheumatoid arthritis	0,2 (31)	0,4 (112)
Fracture	17,5 (3264)	28,3 (8103)
Tumor	0,3 (58)	0,2 (56)
Hip dysplasia	0,8 (147)	1 (290)
Indication other	0,6 (109)	0,6 (178)

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.

3.2.2 Surgical technique and implant characteristics

Table 3.3 Numbers and percentages of primary hip replacement types

	Number	Percentage of total
Total hip replacement	36278	76,7%
Total dual-mobility prosthesis	2975	6,3%
Hemi - Unipolar	120	0,3%
Hemi - Bipolar	7524	15,9%
Resurfacing Femoral (Hemi)	3	0,0%
Resurfacing Femoral + Cup	402	0,8%
Resurfacing Partial (Punaise)	1	0,0%
Total	**47303**	**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=36277	**N=2975**	**N=120**	**N=7523**	**N=406**
Mean age (years) (SD)	67,4 (11,9)	75,1 (11)	81,5 (11,1)	82,9 (8,7)	52,8 (9,2)
Age groups [Missing]	**% (N)[7]**	**% (N)[1]**	**% (N)**	**% (N)**	**% (N)**
<45	4,1 (1469)	1,2 (37)	0,8 (1)	0,3 (20)	18,7 (76)
45-59	20 (7236)	8,4 (250)	4,2 (5)	1,7 (127)	57,6 (234)
60-69	29,7 (10777)	17,9 (531)	5 (6)	5,5 (414)	21,9 (89)
70-79	30,5 (11071)	31,8 (946)	25 (30)	19,6 (1475)	1,5 (6)
>=80	15,8 (5717)	40,7 (1210)	65 (78)	72,9 (5487)	0,2 (1)
Gender	**% (N)**	**% (N)**	**% (N)**	**% (N)**	**% (N)**
Male	42,1 (15263)	29,5 (879)	40 (48)	27,5 (2069)	96,3 (391)
Female	57,9 (21014)	70,5 (2096)	60 (72)	72,5 (5454)	3,7 (15)

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

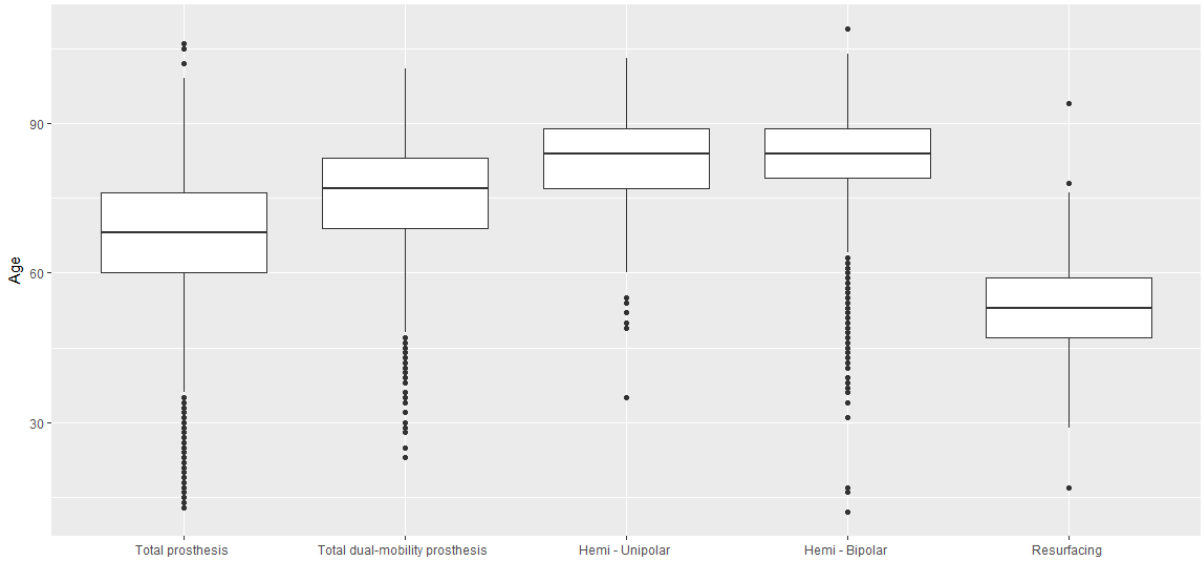
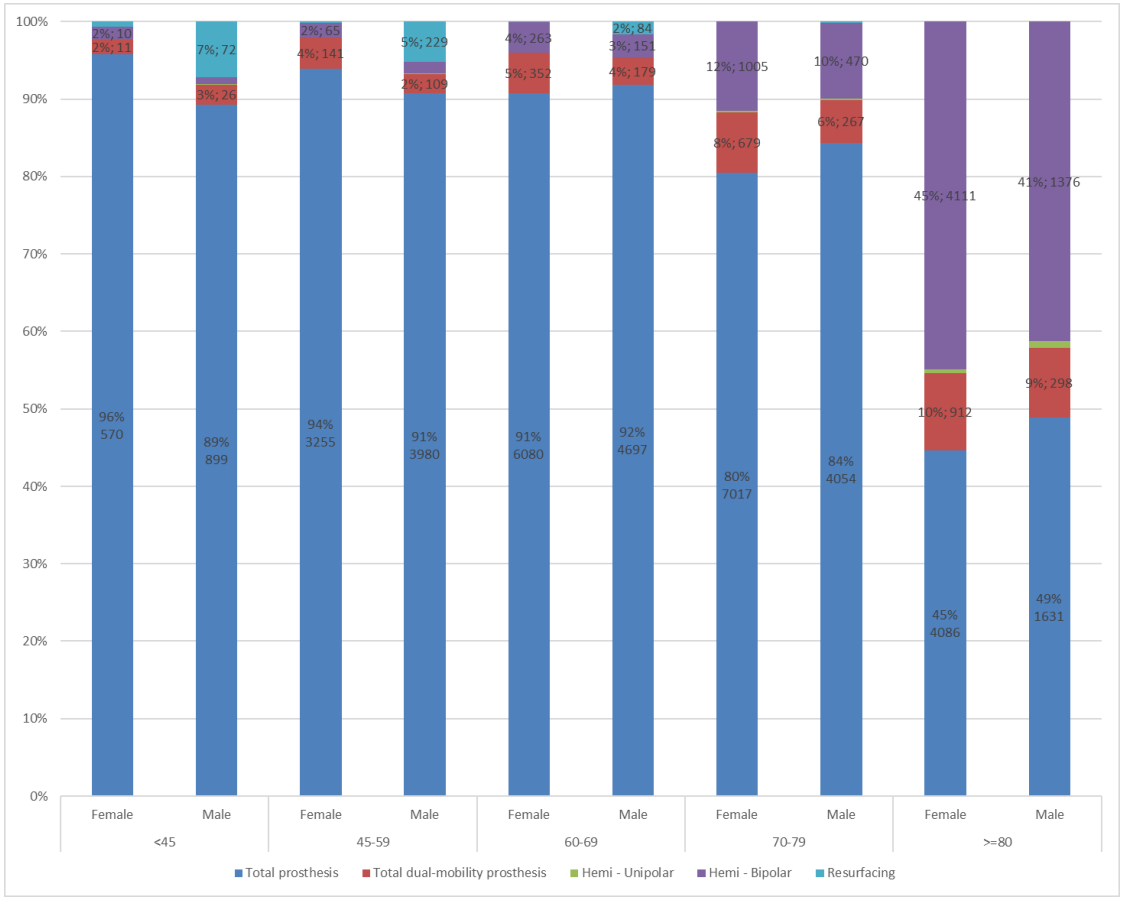
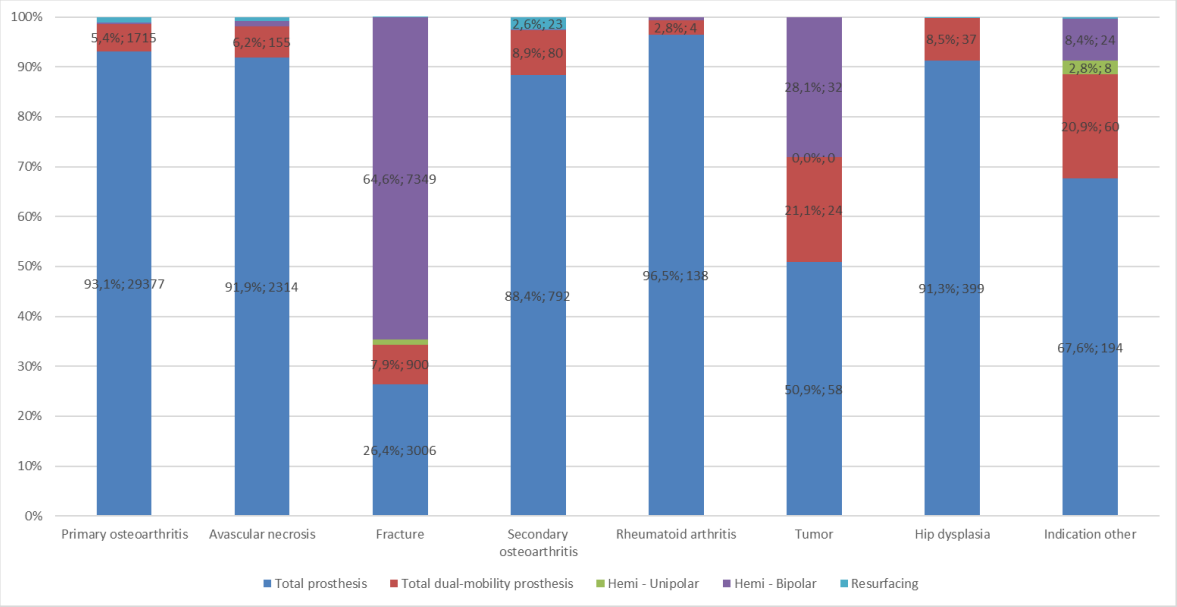


Figure 3.5 Type of primary hip replacement procedures by age groups and gender



Note: For readability of the figure, labels with values and percentages smaller than 2% 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 2% 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=36278	**N=2975**	**N=2975**	**N=7524**	**N=403**
	% (N)	**% (N)**	**% (N)**	**% (N)**	**% (N)**
Metal - Polyethylene	6,9 (2509)	55,2 (1642)	93,8 (2791)	70,7 (5319)	2,7 (11)
Ceramic - Polyethylene	31,5 (11412)	40,9 (1217)	0 (0)	22,9 (1725)	0 (0)
Metal - Metal	0,5 (172)	0 (0)	0 (0)	0,8 (61)	96,5 (389)
Ceramic - Ceramic	58,9 (21356)	0 (0)	0 (0)	1,6 (122)	0,7 (3)
Other	2,3 (829)	3,9 (116)	6,2 (184)	3,9 (297)	0 (0)

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

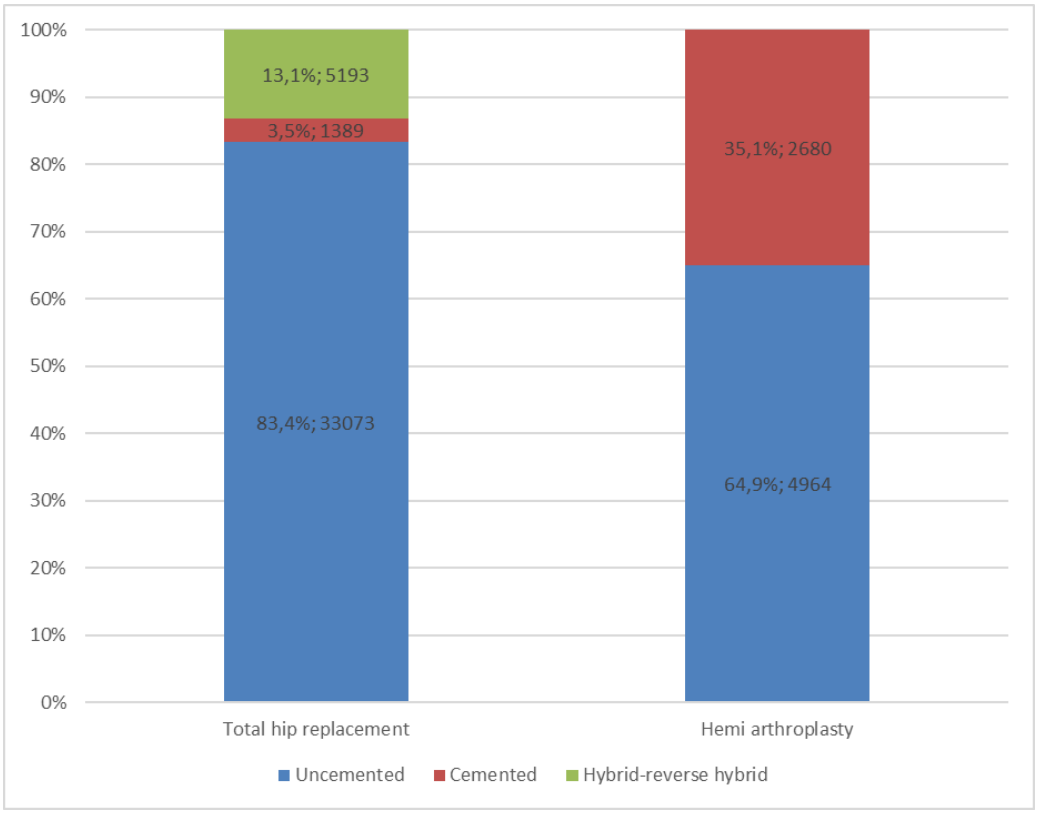


Figure 3.8 Fixation of total primay hip prosthesis according to age category

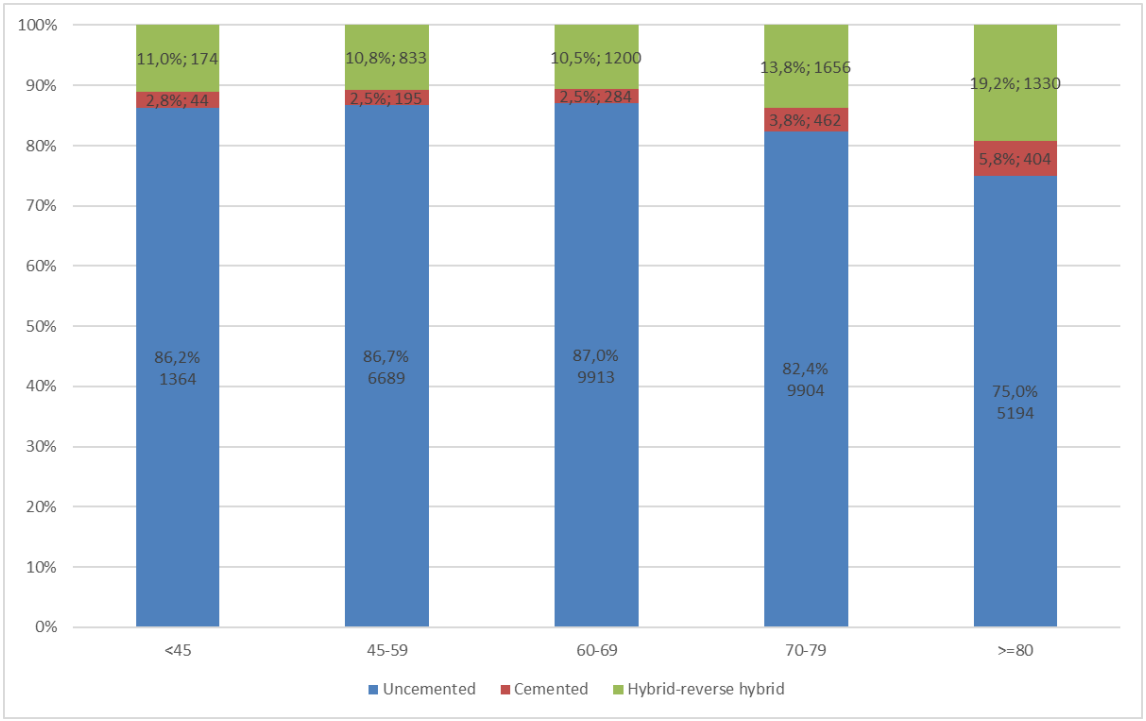


Figure 3.9 Approach used during primary hip replacement according to gender

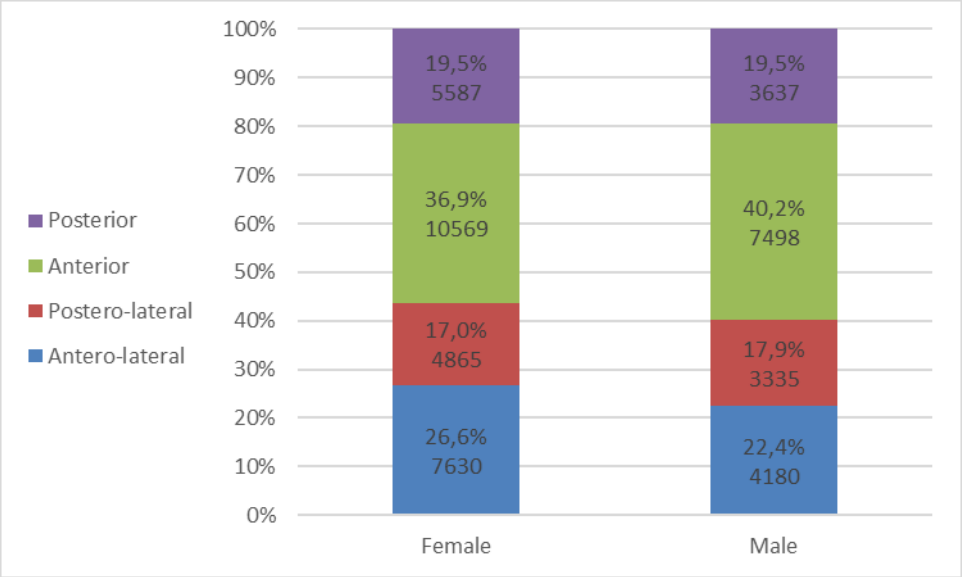


Figure 3.10 Approach used during primary hip replacement according to prosthesis type

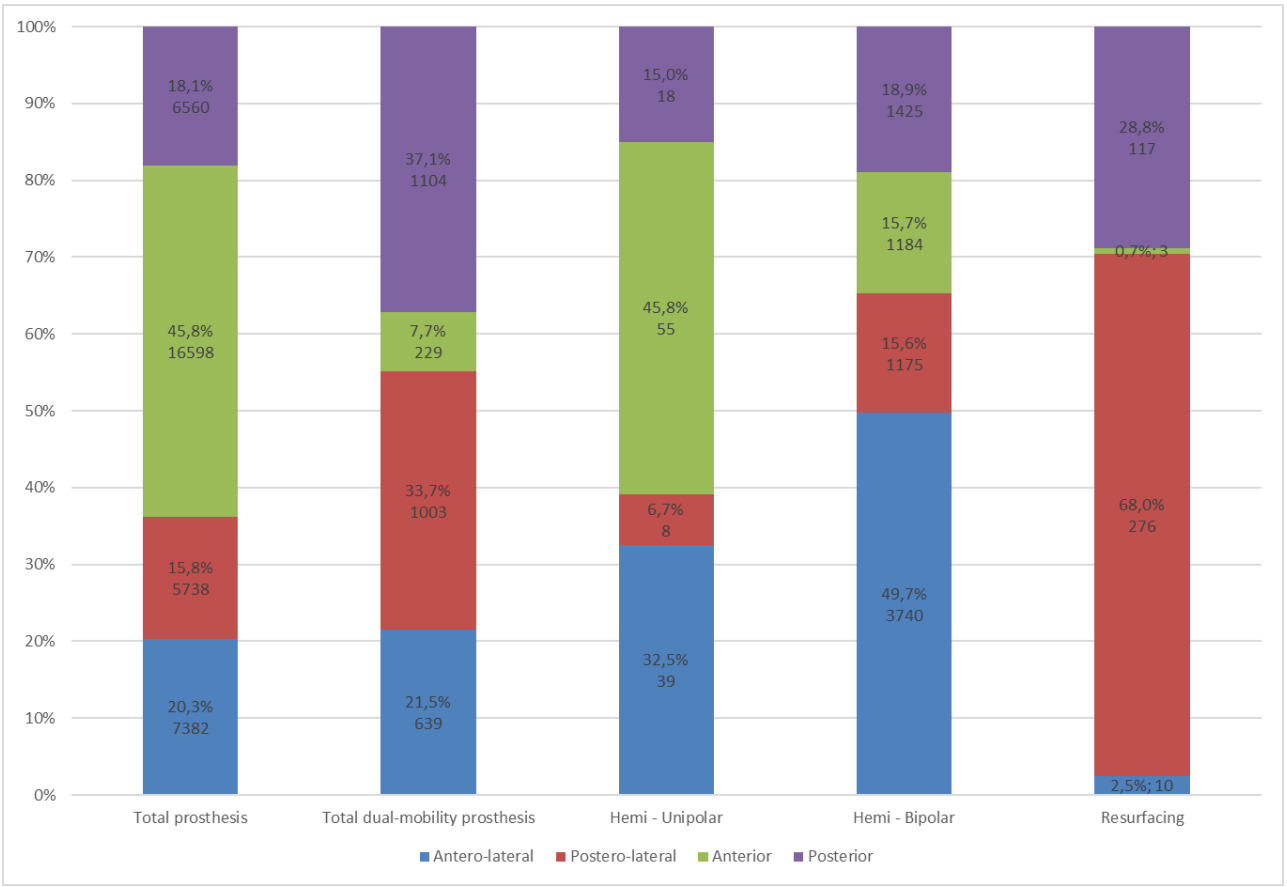


Table 3.6 Usage of custom made guides, computer assisted navigation and bone grafts during primary hip procedures

	Count	Percentage of total
Custom made guides	153	0,3%
Computer assisted navigation	31	0,1%
Bone grafts	850	1,8%
Autografts	752	1,6%
Allografts	73	0,2%
Auto and allografts	25	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	3777	10,4%
Total dual-mobility prosthesis	289	9,7%
Hemi - Bipolar	864	11,5%
Total	**4931**	**10,5%**

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

		Count	Percentage of total modular necks used
Frontal	**Valgus**	109	2,2%
	Varus	953	19,3%
	Neutral	3869	78,5%
Lateral	**Anteversion**	968	19,6%
	Retroversion	198	4,0%
	Neutral	3765	76,4%
Offset	**Extended**	1180	23,9%
	Standard	3751	76,1%

Table 3.9 Top 5 hip prosthesis brands for different parts according to primary hip prosthesis type for notified material

		Producer	Brand	Amount	Percentage of total
Total hip prosthesis	Steel	Depuy	Corail	6324	18,1%
		Zimmer	Avenir	4796	13,7%
		Smith & Nephew	Polarstem	3219	9,2%
		Medacta	AMIStem	3188	9,1%
		Biomet	Taperloc	2627	7,5%
		Total		**34993**	
	Head	Depuy	Ceramax	6459	18,5%
		Biomet	Delta Ceramic	3756	10,8%
		Ceramtec	Biolox Delta	3147	9,0%
		Smith & Nephew	Oxinium head	2138	6,1%
		Smith & Nephew	Delta head	1738	5,0%
		Total		**34934**	
	Cup	Depuy	Pinnacle	6494	18,6%
		Smith & Nephew	R3	3507	10,0%
		Biomet	Bonemaster LTD ACET	2519	7,2%
		Medacta	Versafitcup	2232	6,4%
		Wright/Microport	Procotyl	1678	4,8%
		Total		**34971**	
Hemi bipolar replacement	Steel	Depuy	Corail	1299	18,1%
		Zimmer	Avenir	1046	14,6%
		Smith & Nephew	Polarstem	668	9,3%
		Mathys	Twinsys	528	7,4%
		Biomet	Taperloc	479	6,7%
		Total		**7158**	
	Head	Depuy	Self Cent	984	13,7%
		Smith & Nephew	Tandem Bipolar	540	7,5%
		Biomet	CoCr	410	5,7%
		Depuy	Articuleze	402	5,6%
		Mathys	Bipolar head	382	5,3%
		Total		**7184**	

3.3 REVISIONS AFTER PRIMARY HIP REPLACEMENT

3.3.1 Demographics

Table 3.10 Age, gender and indications for hip revision procedures

	N=4985	
	Mean	**SD**
Age (yrs)	70,7	13
	Count	**N %**
Age categories		
<45	194	3,9
45-59	752	15,1
60-69	1098	22,0
70-79	1512	30,3
>=80	1429	28,7
Gender		
Female	2949	59,2
Male	2036	40,8
Indication		
Aseptic loosening	1869	37,5
Infection	653	13,1
Instability	740	14,8
Periprosthetic fracture	967	19,4
Pain	614	12,3
Wear	573	11,5
Other indication	573	11,5

Figure 3.11 Hip revision burden according to age category

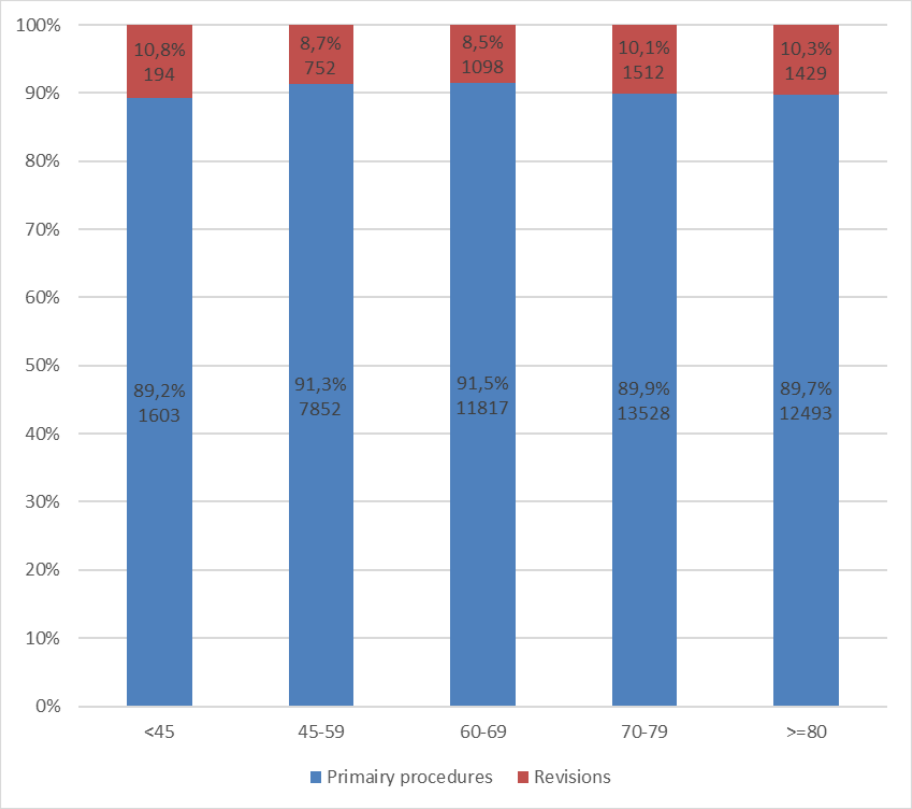


Figure 3.12 Age and gender by number of hip revision procedures

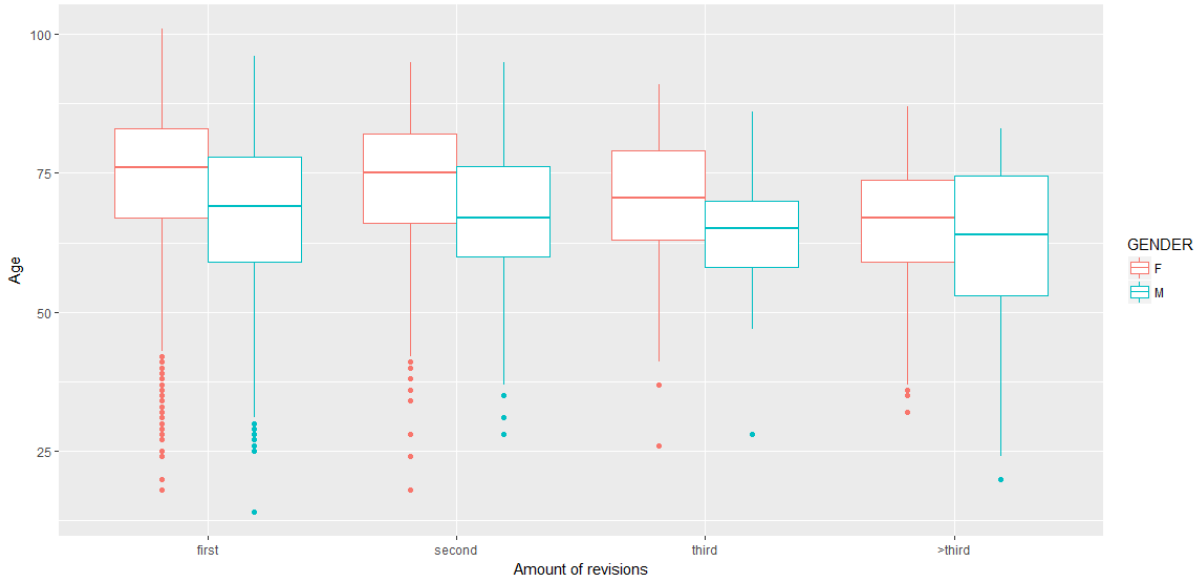
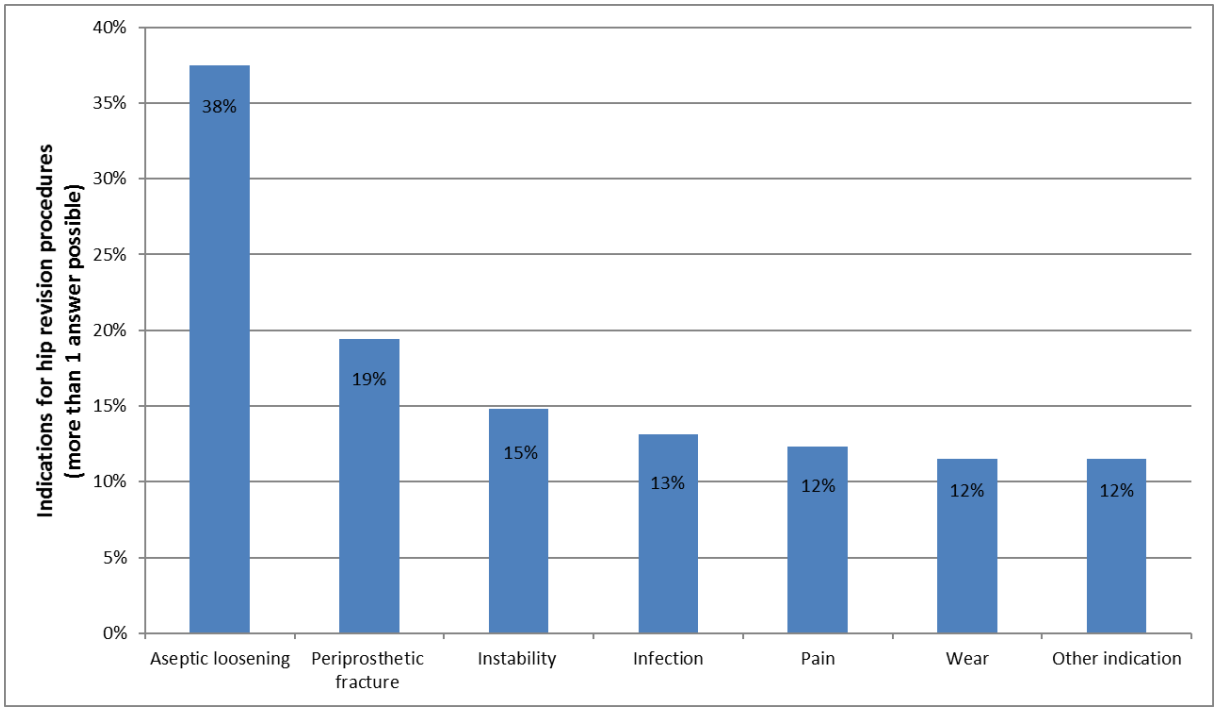


Figure 3.13 Indications for hip revision procedures



3.3.3 Surgical technique and implant characteristics

Figure 3.14 Combinations of revised components during hip revision procedures

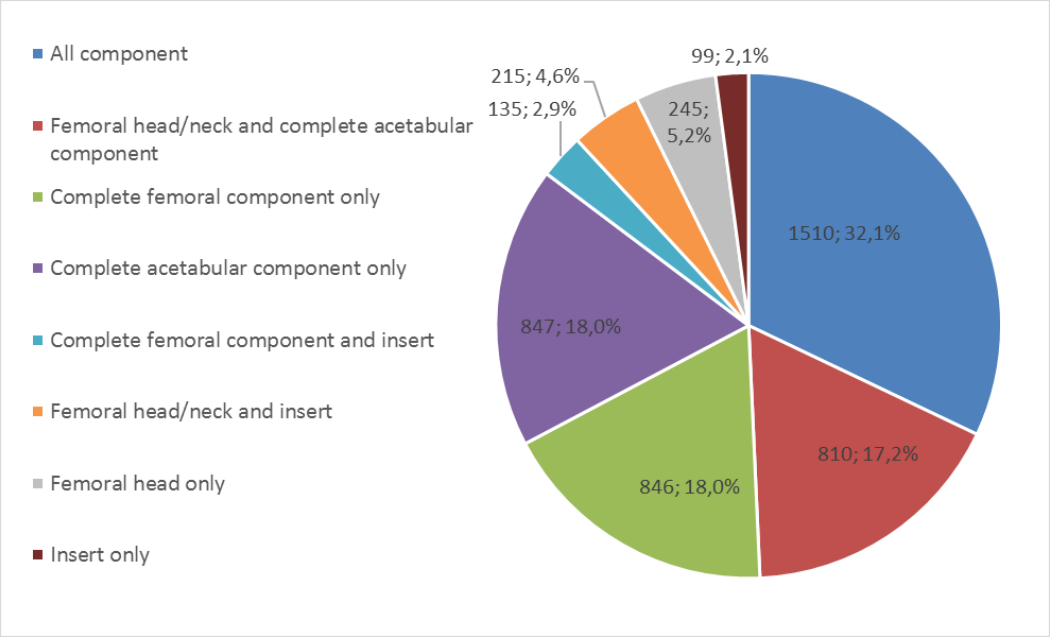


Table 3.11 Numbers and percentages of implanted hip types during hip revision procedures

	Number	Percentage of total
Total prosthesis	3192	67,8%
Total dual-mobility prosthesis	1298	27,6%
Hemi - Unipolar	15	0,3%
Hemi - Bipolar	103	2,2%
Insert only	99	2,1%
Total number of procedures	**4707**	**100%**

Table 3.12 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=3185	**N=1295**	**N=1295**	**N=101**
	% (N)	**% (N)**	**% (N)**	**% (N)**
Metal - Polyethylene	21,9 (698)	60,2 (779)	93,7 (1214)	68,3 (69)
Ceramic - Polyethylene	46,2 (1472)	35,1 (454)	0 (0)	26,7 (27)
Metal - Metal	0,5 (17)	0 (0)	0 (0)	0 (0)
Ceramic - Ceramic	29,1 (928)	0 (0)	0 (0)	1 (1)
Other	2,2 (70)	4,8 (62)	6,3 (81)	4 (4)

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

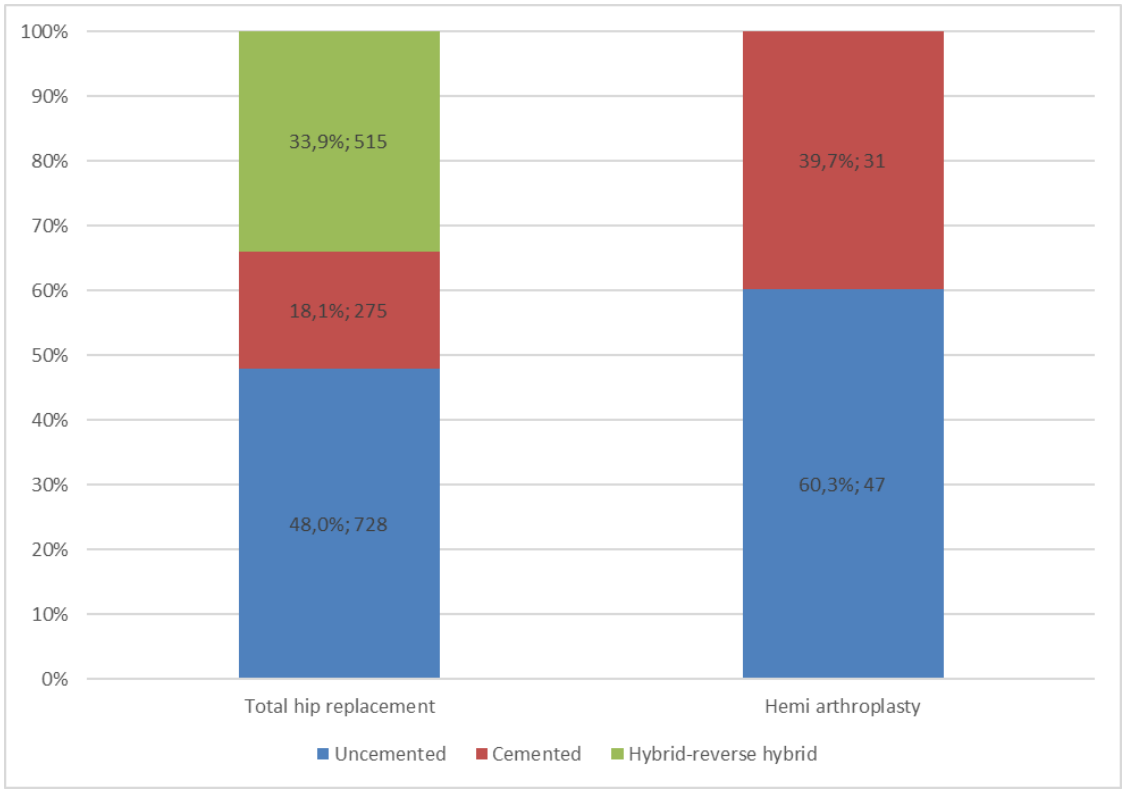


Figure 3.16 Approach used during revision hip replacement according to prosthesis type

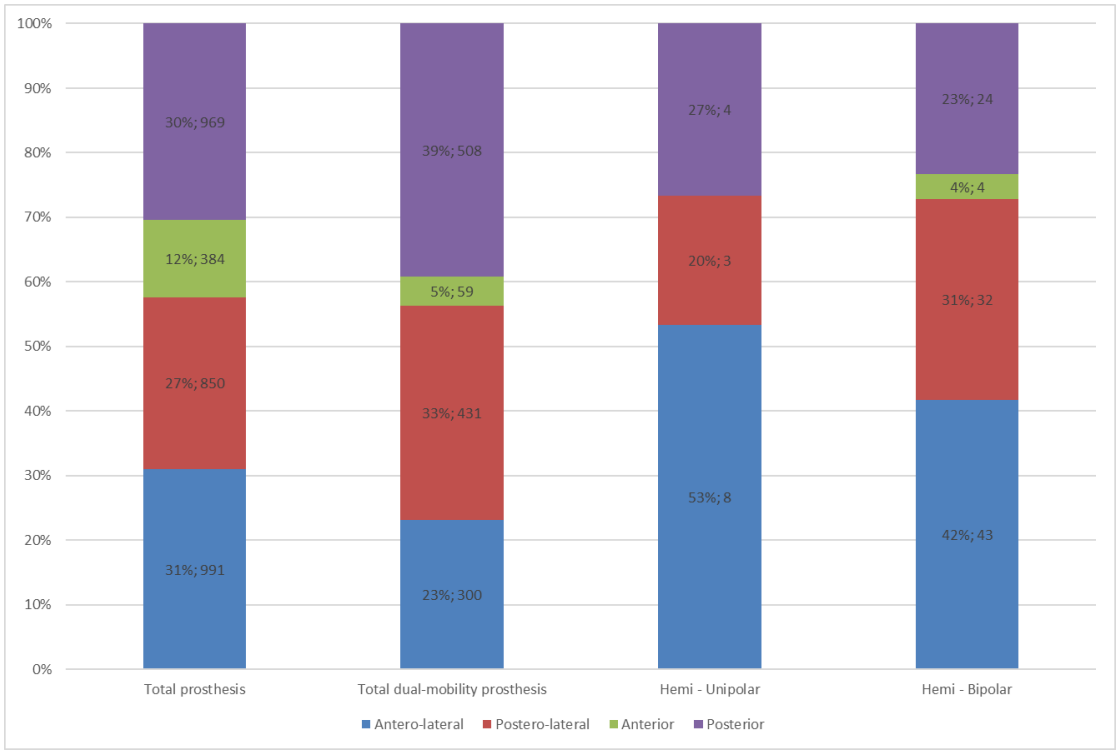


Table 3.13 Usage of custom made guides, computer assisted navigation and bone grafts during hip revision procedures

	Count	Percentage of total
Custom made guides	42	0,9%
Computer assisted navigation	3	0,1%
Bone grafts	1215	26,4%
Autografts	153	3,3%
Allografts	1010	21,9%
Auto and allografts	52	1,1%

Table 3.14 Usage of modular femoral neck according to type of prosthesis during hip revision procedures

	Count	Percentage of total
Total prosthesis	539	19,8%
Total dual-mobility prosthesis	178	19,6%
Hemi - Bipolar	24	23,8%
Total	**741**	**19,6%**

Table 3.15 Usage of modular femoral neck types

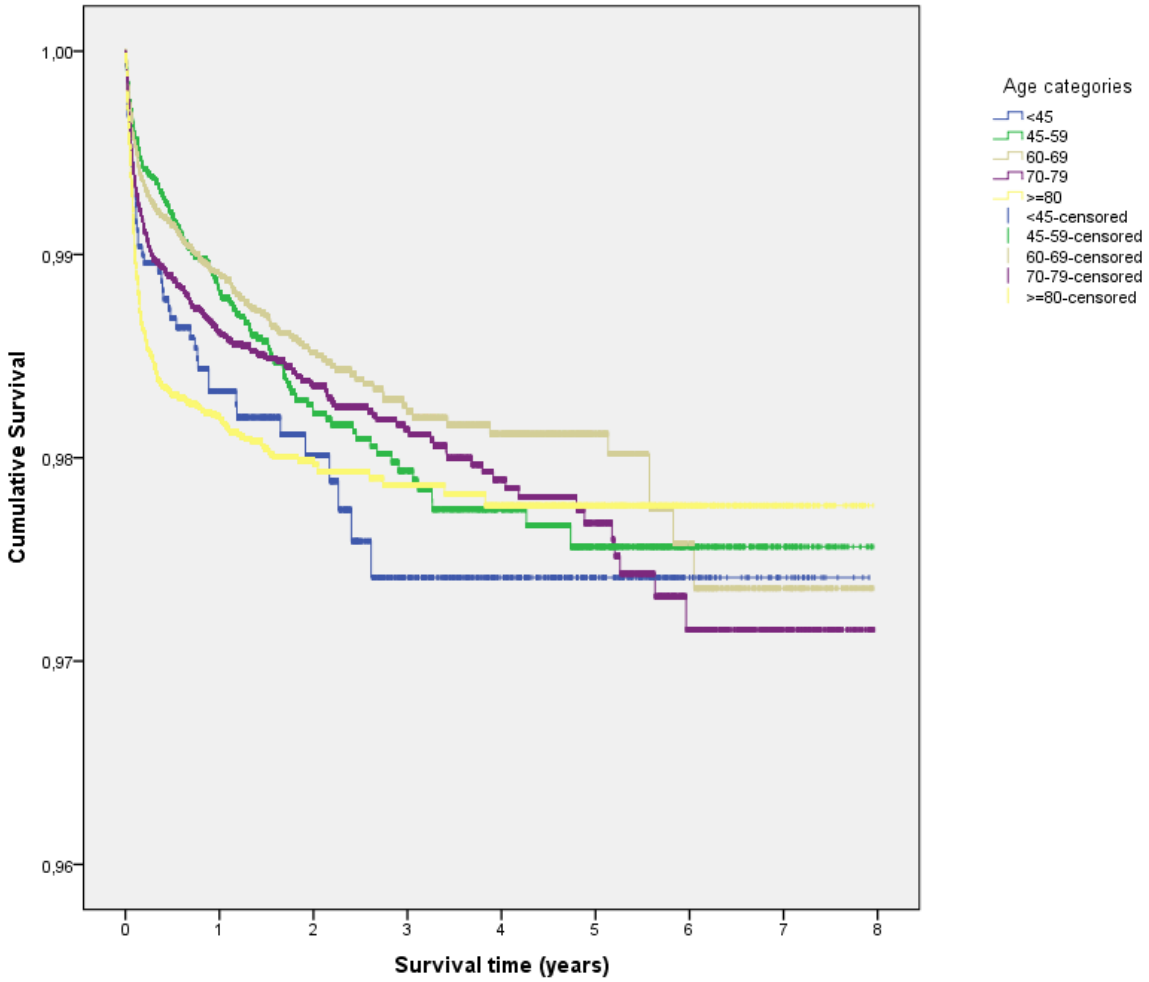
		Count	Percentage of total modular necks used
Frontal	**Valgus**	20	2,7%
	Varus	118	15,9%
	Neutral	604	81,4%
Lateral	**Anteversion**	233	31,4%
	Retroversion	19	2,6%
	Neutral	490	66,0%
Offset	**Extended**	274	36,9%
	Standard	468	63,1%

Table 3.16 Top 5 total hip revision brands for notified material

	Producer	Brand	Amount	Percentage of total
Total hip prosthesis Steel	Zimmer	Revitan	199	11,0%
	Biomet	Arcos	177	9,8%
	Depuy	Corail	136	7,5%
	Wright/Microport	Profemur	134	7,4%
	Zimmer	Avenir	125	6,9%
	Total		**1809**	
Total hip prosthesis Head	Zimmer	Biolox	696	23,9%
	Biomet	Delta Ceramic	323	11,1%
	Smith & Nephew	Oxinium head	225	7,7%
	Depuy	Ceramax	214	7,4%
	Stryker	V40	176	6,0%
	Total		**2911**	
Total hip prosthesis Cup	Zimmer	Continuum	375	20,0%
	Depuy	Pinnacle	211	11,2%
	Smith & Nephew	R3	160	8,5%
	Zimmer	TM	128	6,8%
	Stryker	Tritanium	98	5,2%
	Total		**1876**	

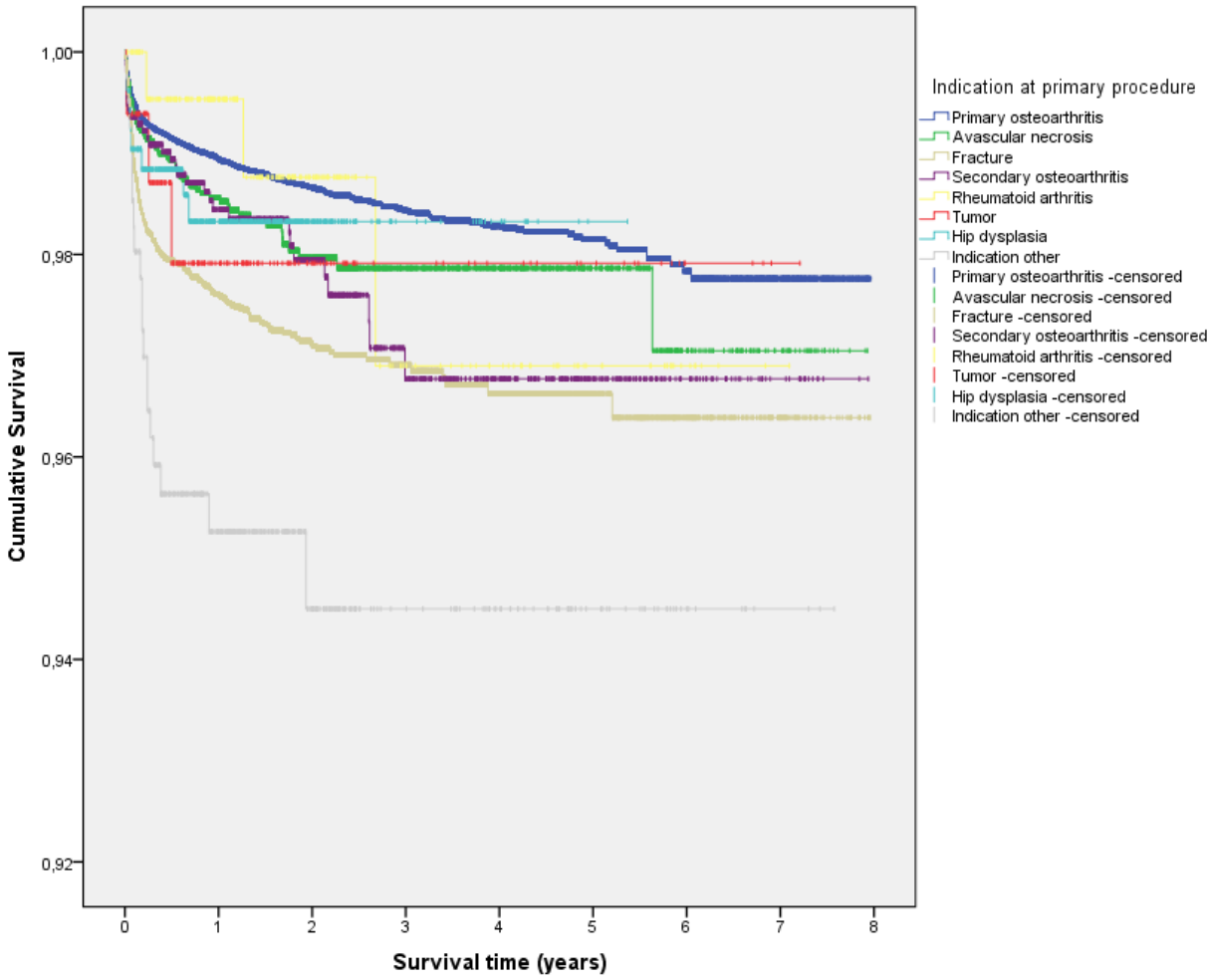
3.3.4 Implant survival after primary procedures

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



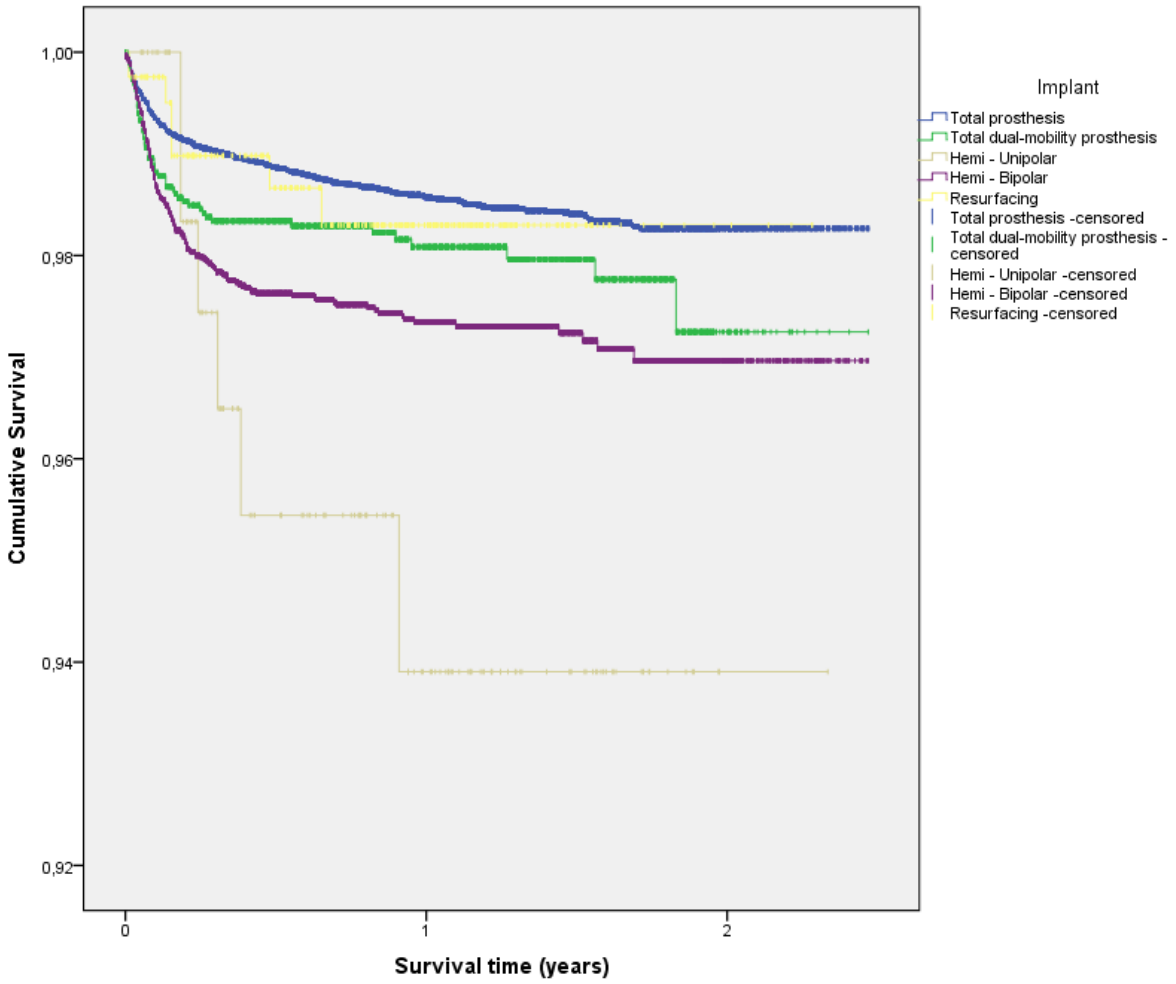
Number of events/Number at risk								
	0	**1**	**2**	**3**	**4**	**5**	**6**	**7**
<45	39/2528	4/1694	4/902	0/460	0/315	0/178	0/62	0/22
45-59	130/12251	36/8099	8/4303	4/2224	2/1431	0/745	0/302	0/94
60-69	189/18617	36/12258	13/6642	3/3345	0/2077	4/1083	1/467	0/174
70-79	274/21457	28/13888	12/7726	8/4028	4/2456	5/1378	0/584	0/196
>=80	304/18208	19/10425	5/5450	2/2594	0/1556	0/785	0/316	0/97

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



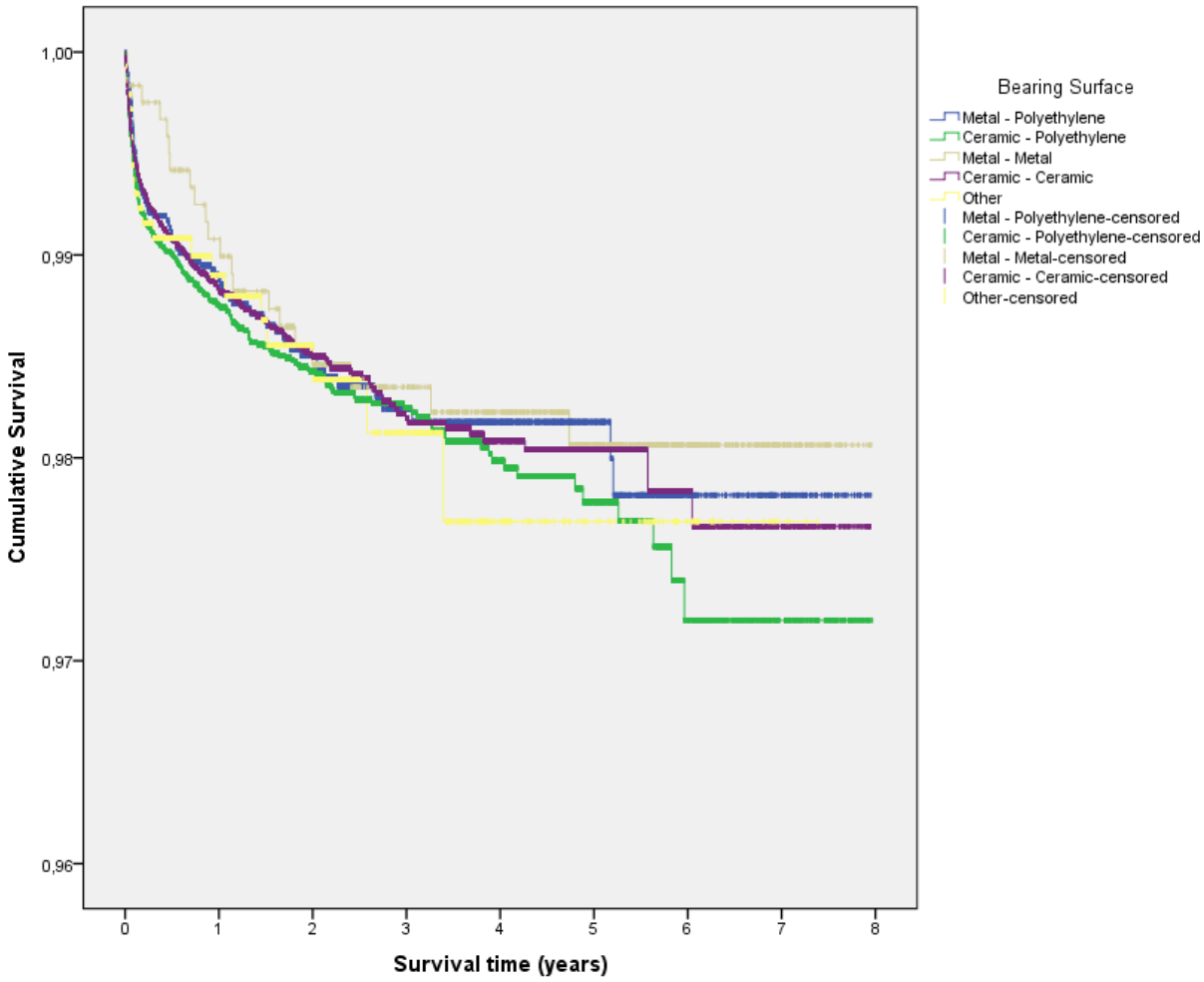
Number of events/Number at risk								
	0	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Primary osteoarthritis	500/50764	75/33788	29/18893	13/9898	6/6125	7/3373	1/1403	0/479
Avascular necrosis	50/3802	11/2445	1/1248	0/614	0/410	1/198	0/73	0/28
Fracture	334/15681	31/8327	6/3974	4/1719	0/1003	1/453	0/191	0/57
Secondary osteoarthritis	22/1553	4/1092	5/639	0/317	0/216	0/108	0/47	0/16
Rheumatoid arthritis	1/230	1/153	1/85	0/46	0/37	0/19	0/7	0/1
Tumor	3/165	0/83	0/42	0/23	0/18	0/13	0/4	0/1
Hip dysplasia	8/524	0/301	0/84	0/23	0/10	0/1	0/0	0/0
Other indication	18/413	1/241	0/119	0/65	0/50	0/26	0/0	0/0

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



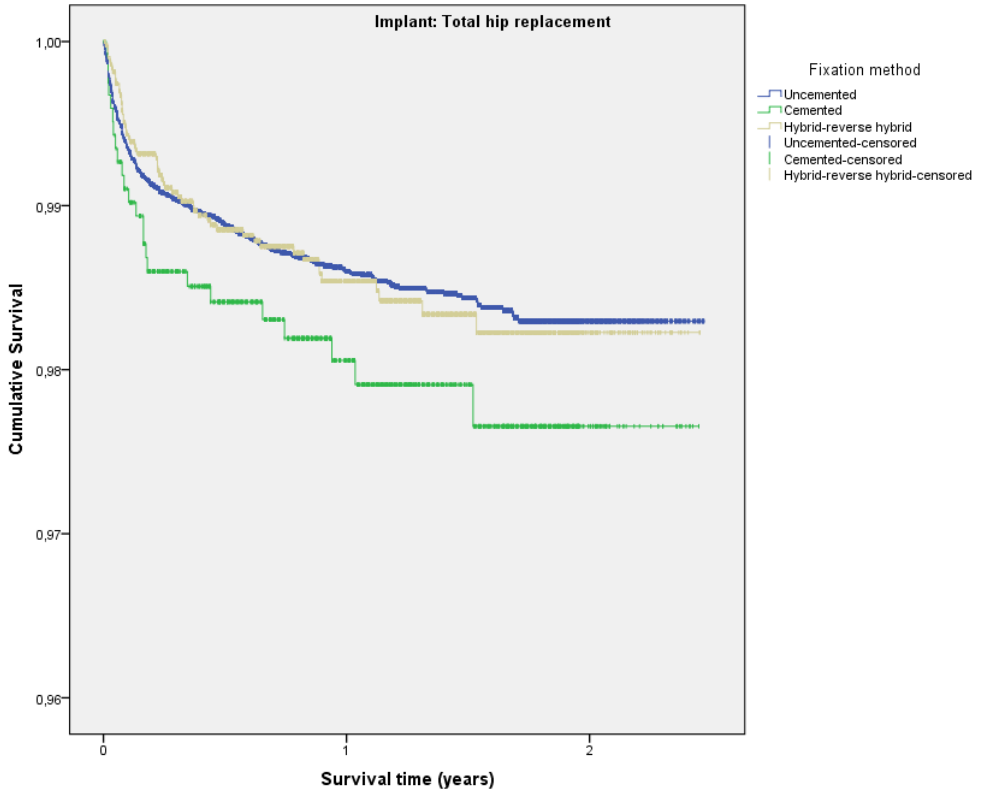
Number of events/Number at risk			
	0	**1**	**2**
Total prosthesis	471/37322	32/17851	0/893
Total dual-mobility prosthesis	52/3026	3/1276	0/42
Hemi - Unipolar	6/132	0/55	0/1
Hemi - Bipolar	178/7849	5/2906	0/195
Resurfacing	6/411	0/173	0/5

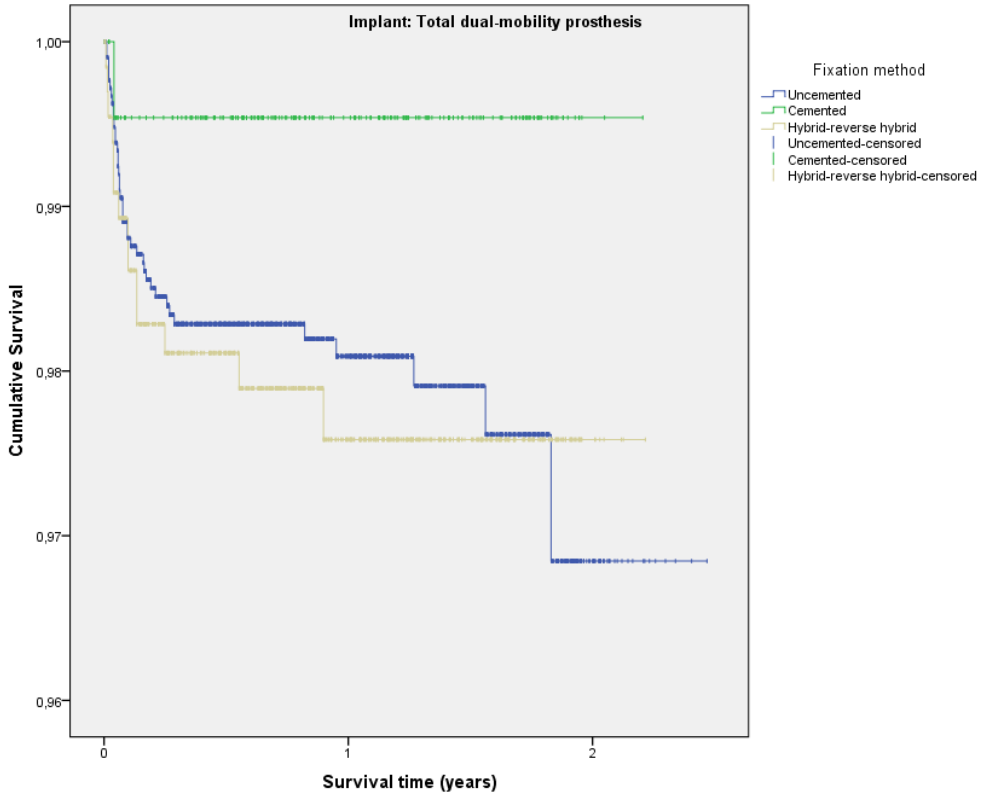
Figure 3.20 Kaplan-Meier curve for bearing surface for total hip prostheses at primary hip replacement

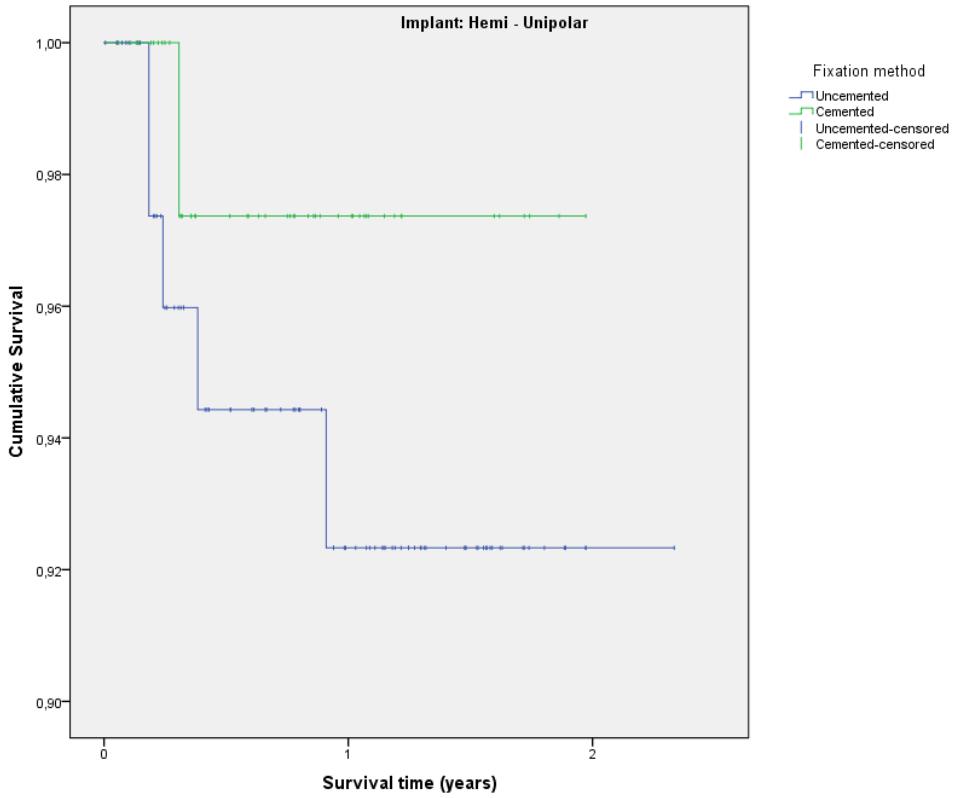


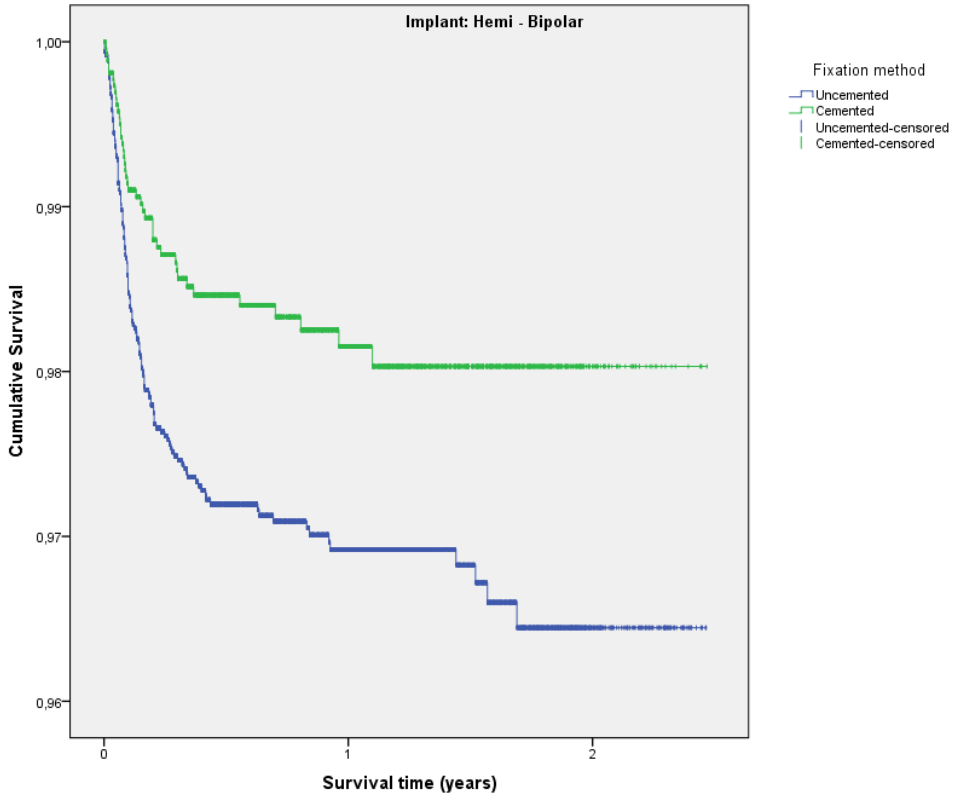
Number of events/Number at risk								
	0	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Metal - Polyethylene	59/5537	14/4244	6/2951	1/1577	0/1072	2/613	0/252	0/105
Ceramic - Polyethylene	231/19826	37/13532	12/8239	10/4722	4/2834	4/1337	0/481	0/162
Metal - Metal	11/1215	7/1165	1/1026	1/821	1/719	0/515	0/240	0/84
Ceramic - Ceramic	340/31649	47/20077	18/10052	4/4452	1/2651	2/1418	1/602	0/195
Other	15/1442	3/995	2/589	1/317	0/149	0/93	0/45	0/4

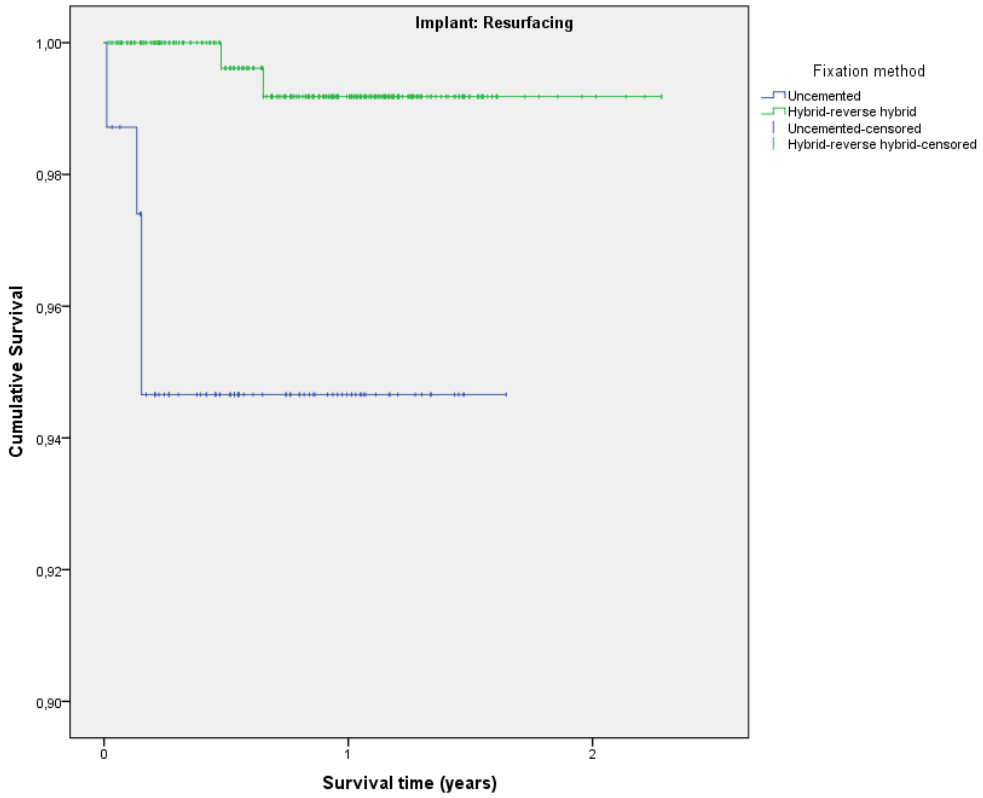
Figure 3.21 Kaplan-Meier curves for method of fixation according to primary hip replacement prosthesis type





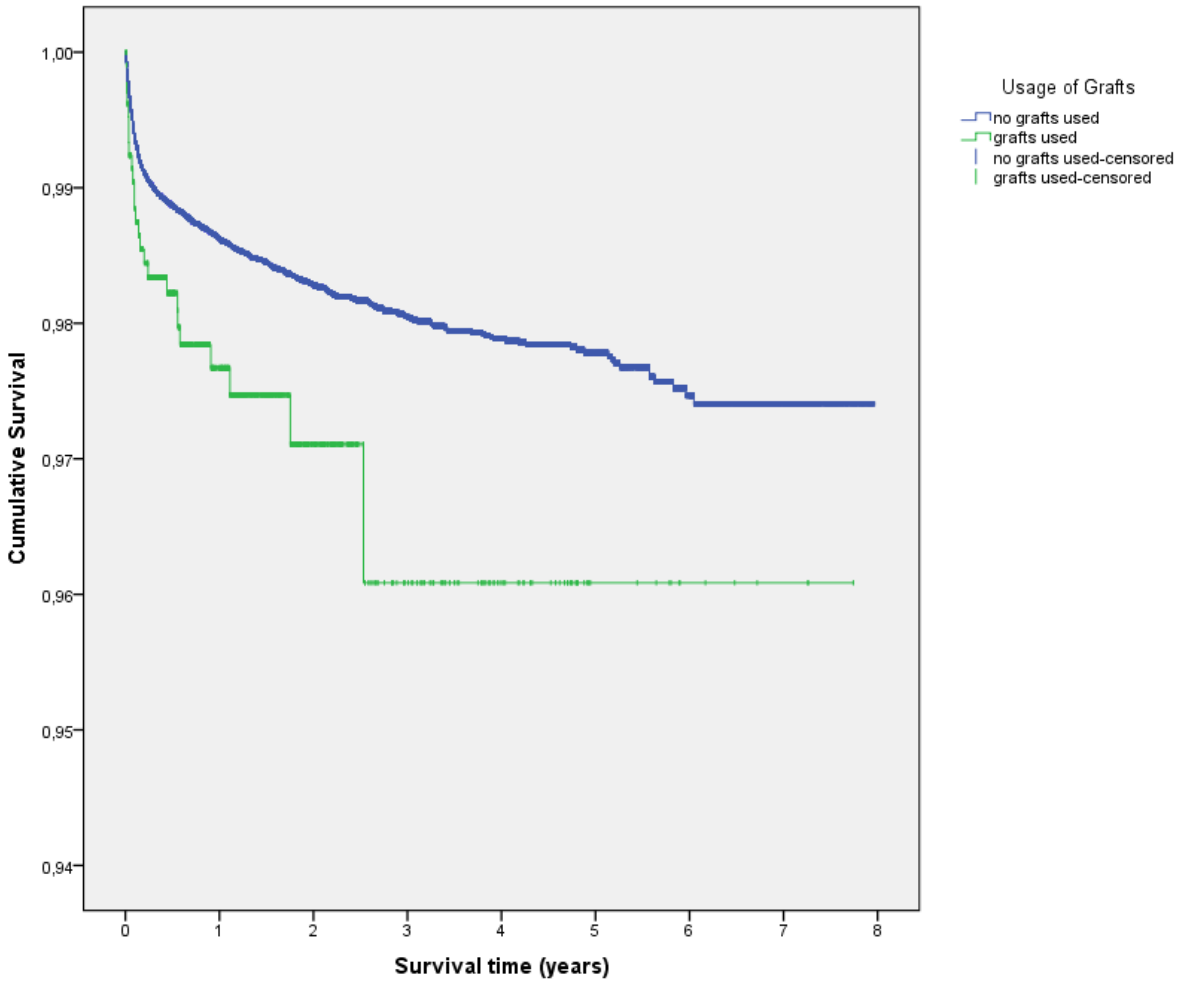

Implant: Hemi - Unipolar
1,00
0,98
0,96
0,94
0,92
0,90
Cumulative Survival
0
1
2
Survival time (years)
Fixation method
Uncemented
Cemented
Uncemented-censored
Cemented-censored


Implant: Hemi - Bipolar
1,00
0,99
0,98
0,97
0,96
Cumulative Survival
0
1
2
Survival time (years)
Fixation method
Uncemented
Cemented
Uncemented-censored
Cemented-censored



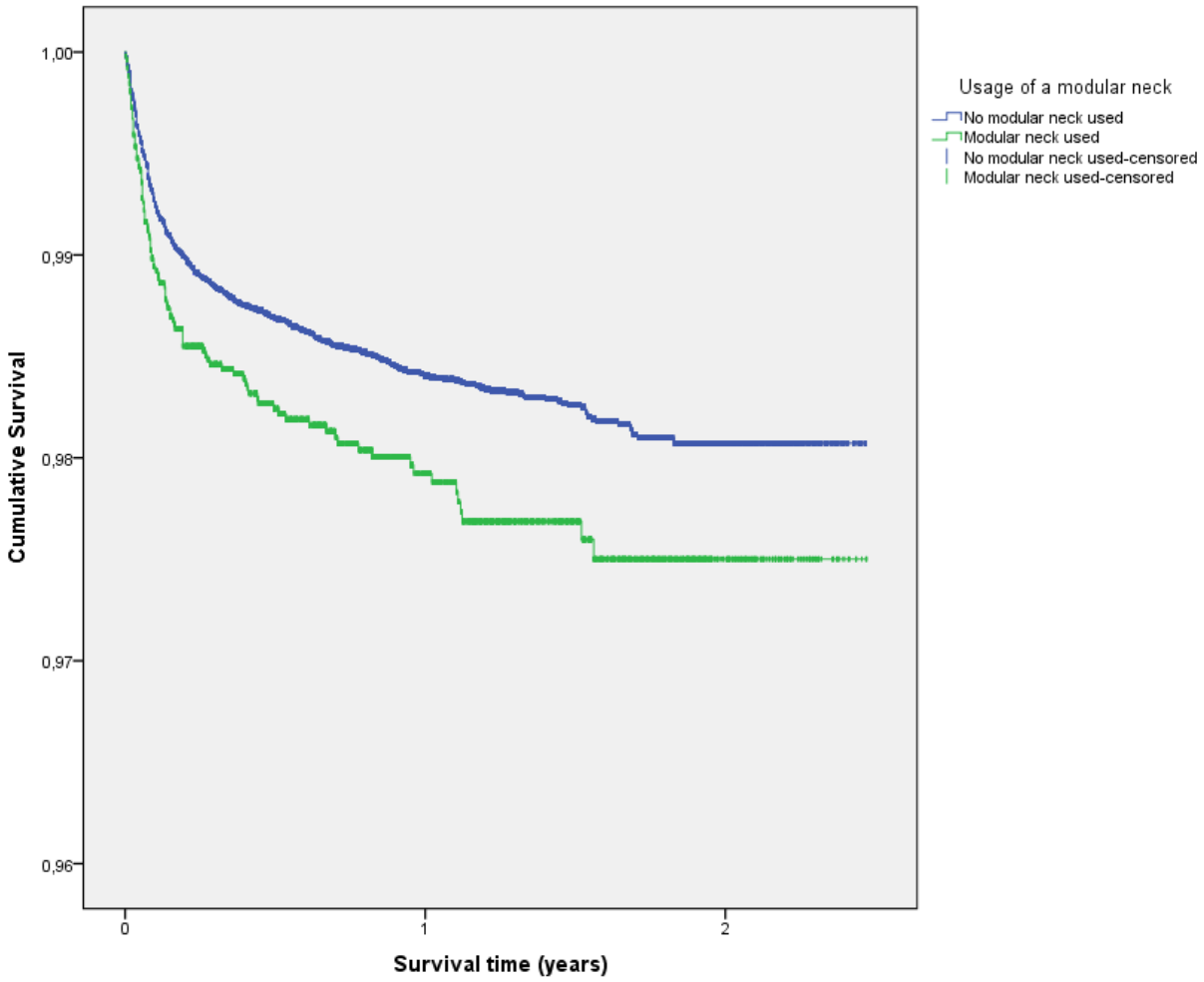
Number of events/Number at risk				
		0	1	2
Total prosthesis	Uncemented	395/31770	26/15175	0/753
	Cemented	22/1231	2/697	0/52
	Hybrid	54/4321	4/1979	0/88
Total dual-mobility prosthesis	Uncemented	37/2139	3/885	0/33
	Cemented	1/222	0/107	0/2
	Hybrid	14/665	0/284	0/7
Hemi - Unipolar	Uncemented	5/84	0/39	0/1
	Cemented	1/48	0/16	0/0
Hemi - Bipolar	Uncemented	137/5159	4/1960	0/150
	Cemented	41/2690	1/946	0/45
Resurfacing	Uncemented	4/78	0/20	0/0
	Hybrid	2/329	0/150	0/5

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



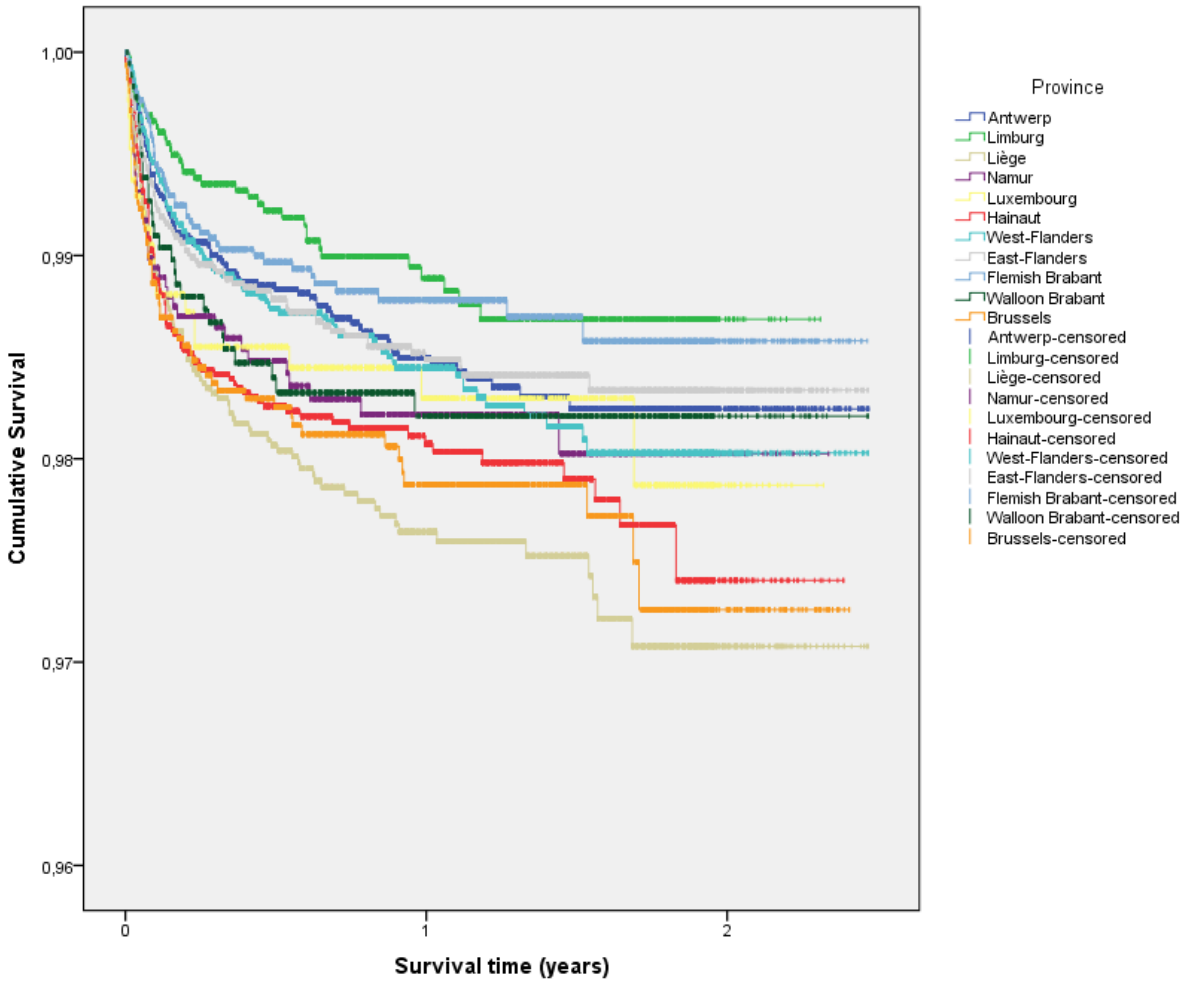
Number of events/Number at risk								
	0	**1**	**2**	**3**	**4**	**5**	**6**	**7**
No grafts used	914/72074	121/45890	41/24886	17/12629	6/7828	9/4179	1/1729	0/582
Grafts used	22/1058	2/540	1/198	0/76	0/41	0/12	0/6	0/3

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**
No modular neck used	605/43013	33/19698	0/917
Modular neck used	96/5185	7/2335	0/213

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



Number of events/Number at risk			
	0	**1**	**2**
Antwerp	96/7412	6/3346	0/241
Limburg	36/3871	3/1774	0/22
Liège	101/4853	6/2239	0/116
Namur	36/2194	1/1027	0/36
Luxembourg	20/1276	1/642	0/32
Hainaut	99/5654	6/2477	0/69
West-Flanders	93/6910	9/3217	0/145
East-Flanders	87/6558	3/3006	0/207
Flemish Brabant	46/4245	2/1873	0/125
Walloon Brabant	29/1805	0/841	0/37
Brussels	59/3143	3/1446	0/94

3.4 NINETY-DAYS MORTALITY AFTER HIP REPLACEMENT PROCEDURES

Table 3.17 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	46129	97,5%	1174	2,5%
Revision with new prosthesis	4569	97,1%	138	2,9%
Resection with spacer	253	95,8%	11	4,2%
Resection without spacer	11	78,6%	3	21,4%
Total	**50962**	**97,5%**	**1326**	**2,5%**