Orthopride

Belgian Hip and Knee Arthroplasty Registry

Annual Report

2017

April 2017

CONTENT

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1 GENERAL INTRODUCTION

Table 1.1 Total joint replacement procedures entered in Orthopride during 2017

	Knee procedures	Hip procedures
Primary procedure	22981	26505
Revision with new prosthesis	1838	2530
Resection with spacer	126	131
Resection without spacer	6	12
Total per joint	**24951**	**29178**

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*
Antwerp	3568	14,3%	194	46%	25%
Brussels	1393	5,6%	117	36%	18%
East-Flanders	3929	15,8%	263	47%	25%
Flemish Brabant	2085	8,4%	185	47%	25%
Hainaut	3040	12,2%	227	45%	24%
Liège	2158	8,7%	196	45%	24%
Limburg	2075	8,3%	239	49%	26%
Luxembourg	677	2,7%	240	43%	22%
Namur	1012	4,1%	206	45%	24%
Walloon Brabant	786	3,2%	197	46%	24%
West-Flanders	3763	15,1%	317	51%	29%
Other Country	385	1,5%			
Total **[Missing]**	**24871** **[80]**	**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)
Antwerp	3292	92,3	68,1 +/- 10,1	276	7,7	66,6 +/- 11,0
Limburg	1936	93,3	66,9 +/- 10,4	139	6,7	65,6 +/- 12,2
Liège	1989	92,2	67,2 +/- 10	169	7,8	66,3 +/- 11,7
Namur	952	94,1	67,9 +/- 9,6	60	5,9	65,6 +/- 13,9
Luxembourg	618	91,3	67,1 +/- 10	59	8,7	66,3 +/- 9,9
Hainaut	2807	92,3	67,4 +/- 9,6	233	7,7	66,4 +/- 11,0
West-Flanders	3510	93,3	67,8 +/- 10,2	253	6,7	65,1 +/- 11,3
East-Flanders	3515	89,5	66,7 +/- 10,7	414	10,5	62,8 +/- 12,3
Flemish Brabant	1959	94	68,9 +/- 9,9	126	6	67,6 +/- 11,4
Walloon Brabant	734	93,4	68,6 +/- 9,5	52	6,6	74,2 +/- 10,7
Brussels	1254	90	68,3 +/- 10,2	139	10	68,8 +/- 10,9
Other Country	340	88,3	65 +/- 10,1	45	11,7	64,8 +/- 10,2
Total	**22906**	**92,1**	**67,6 +/- 10,1**	**1965**	**7,9**	**65,8 +/- 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*
Antwerp	4703	16,2%	256	46%	25%
Brussels	1780	6,1%	149	36%	18%
East-Flanders	3950	13,6%	264	47%	25%
Flemish Brabant	2543	8,7%	225	47%	25%
Hainaut	3505	12,1%	262	45%	24%
Liège	2571	8,8%	233	45%	24%
Limburg	2313	8%	267	49%	26%
Luxembourg	778	2,7%	276	43%	22%
Namur	1284	4,4%	261	45%	24%
Walloon Brabant	1056	3,6%	265	46%	24%
West-Flanders	4089	14,1%	345	51%	29%
Other Country	502	1,7%			
Total [Missing]	**29074 [104]**	**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)
Antwerp	4319	91,9%	70,6 +/- 12,8	383	8,1%	71,2 +/- 13,4
Brussels	1600	89,9%	72,4 +/- 13,3	180	10,1%	72,7 +/- 12,9
East-Flanders	3596	91%	69,8 +/- 13,3	354	9%	71,6 +/- 12,3
Flemish Brabant	2360	92,8%	70,7 +/- 12,7	183	7,2%	71,6 +/- 13,3
Hainaut	3126	89,2%	69,2 +/- 12,9	379	10,8%	70,2 +/- 12,2
Liège	2340	91%	69,7 +/- 13	231	9%	70,3 +/- 14,6
Limburg	2145	92,7%	68,8 +/- 12,7	168	7,3%	71,2 +/- 12,5
Luxembourg	676	86,9%	69,7 +/- 13,5	102	13,1%	71,6 +/- 12,7
Namur	1146	89,3%	69,5 +/- 12,7	138	10,7%	71,6 +/- 12
Walloon Brabant	969	91,8%	69,8 +/- 12,5	87	8,2%	72,8 +/- 12,1
West-Flanders	3693	90,3%	70,1 +/- 12,7	396	9,7%	71,2 +/- 12
Other Country	445	88,6%	71,1 +/- 12,9	57	11,4%	66 +/- 19,1
Total	**26416**	**90,9%**	**69,9 +/- 13**	**2658**	**9,1%**	**71,1 +/- 12,9**

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=41774	
	Mean	**SD**
Age (yrs)	67,6	10,1
	Count	**N %**
Age categories		
<45	350	1,5%
45-59	4715	20,5%
60-69	7492	32,6%
70-79	7736	33,7%
>=80	2681	11,7%
Gender		
Female	14462	62,9%
Male	8518	37,1%
Indication		
Osteoarthritis	21768	94,7%
Avascular necrosis	322	1,4%
Fracture	80	0,3%
Inflammatory arthropathy	137	0,6%
Post trauma	479	2,1%
Previous infection	18	0,1%
Indication other	177	0,8%

Figure 2.1 Age distribution by gender for primary knee replacement patients

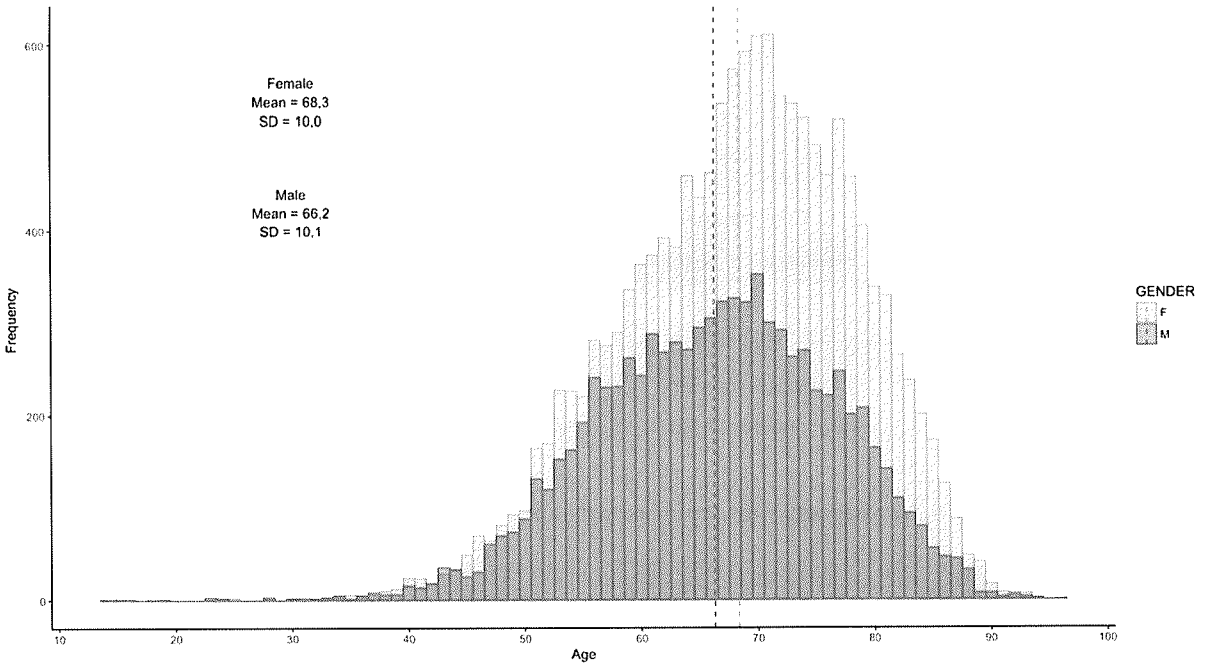


Figure 2.2 Age distribution by indication for primary knee replacement patients

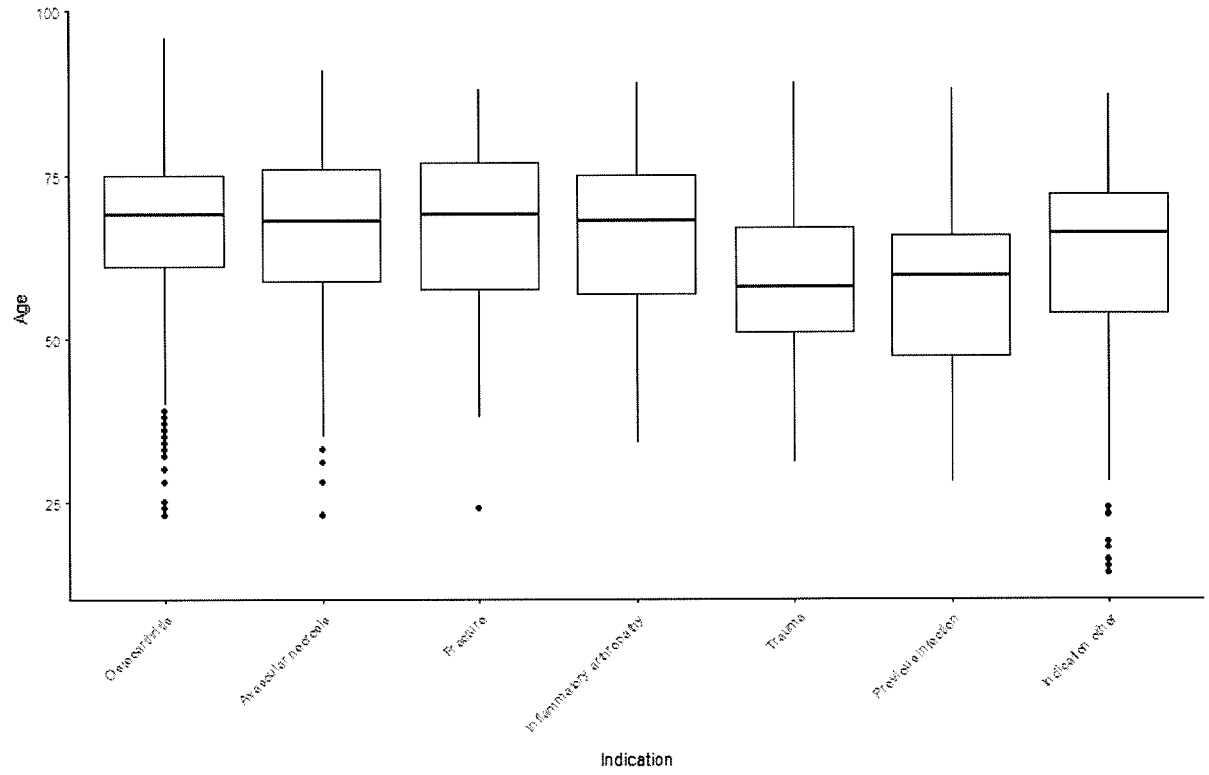


Table 2.2 Indications for primary knee replacements based on gender

	Male	Female
	N= 8518	N= 14462
	N (%)	**N (%)**
Osteoarthritis	7940 (93,2)	13827 (95,6)
Post trauma	275 (3,2)	204 (1,4)
Avascular necrosis	120 (1,4)	202 (1,4)
Fracture	28 (0,3)	52 (0,4)
Inflammatory arthropathy	53 (0,6)	84 (0,6)
Previous infection	12 (0,1)	6 (0,0)
Indication other	90 (1,1)	87 (0,6)

Table 2.3 Medical history of primary knee replacement patients

	Count	Percentage of total
No pre-operative surgeries	16286	70,9%
Pre-op Osteosynthesis of the tibia	236	1,0%
Pre-op Osteosynthesis of the femur	221	1,0%
Pre-op Osteotomy	295	1,3%
Pre-op Synovectomy	98	0,4%
Pre-op Meniscectomy	5013	21,8%
Pre-op ACL reconstruction	343	1,5%
Pre-op Other	978	4,3%

Table 2.4 Pre-operative alignment of primary knee replacement patients

	Count	Percentage of total
Normal	6699	29,1%
Valgus	4539	19,8%
Varus	11743	51,1%

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	20060	87,3%
Unicompartmental replacement	2131	9,3%
Bicompartmental replacement	347	1,5%
Patellofemoral replacement	432	1,9%
Partial resurfacing femoral condyle	11	0,1%
Total	**22981**	**100%**

Figure 2.3 Distribution of primary total knee prosthesis types

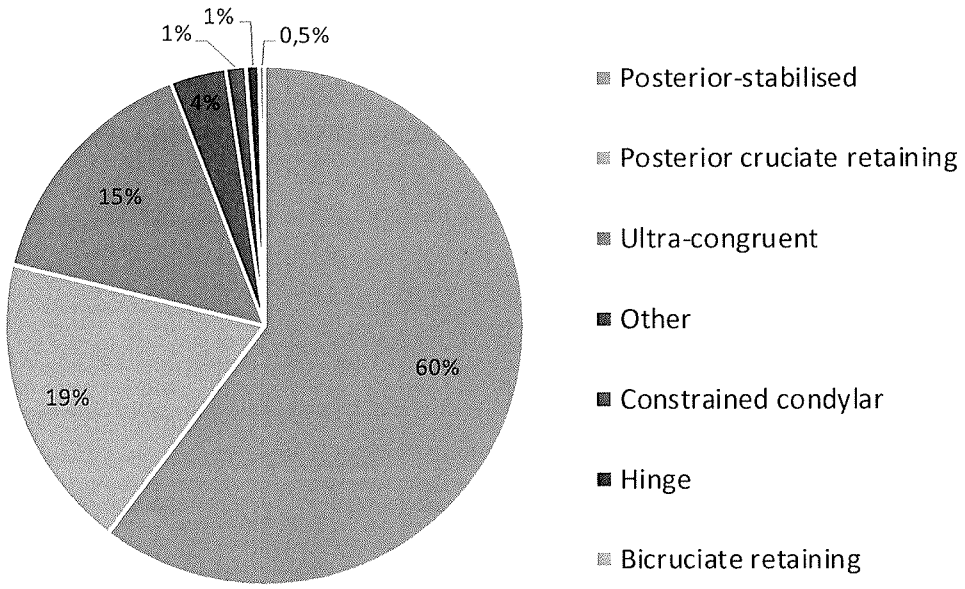


Table 2.6 Age and gender of primary knee replacement patients by type of replacement

	Total knee replacement	Unicompartmental replacement	Bicompartmental replacement	Patellofemoral replacement	Partial Resurfacing femoral condyle
	N=20060	**N=2131**	**N=347**	**N=432**	**N=11**
Mean age (years) (SD)	68,3 (9,8)	63,0 (10,4)	67,2 (9,7)	55,4 (11,4)	46,0 (9,0)
Age groups [Missing]	**% (N)[7]**	**% (N)**	**% (N)**	**% (N)**	**% (N)**
<45	1,1 (212)	2,6 (56)	1,4 (5)	17,1 (74)	27,3 (3)
45-59	18,2 (3649)	35,9 (766)	21,6 (75)	50,2 (217)	72,7 (8)
60-69	32,6 (6545)	34,7 (739)	33,1 (115)	21,5 (93)	0 (0)
70-79	35,6 (7143)	20,6 (439)	34,9 (121)	7,6 (33)	0 (0)
>=80	12,5 (2504)	6,1 (131)	8,9 (31)	3,5 (15)	0 (0)
Gender [Missing]	**% (N)**	**% (N) [1]**	**% (N)**	**% (N)**	**% (N)**
Female	63,9 (12825)	50 (1065)	64,3 (223)	79,4 (343)	54,5 (6)
Male	36,1 (7235)	50 (1065)	35,7 (124)	20,6 (89)	45,5 (5)

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

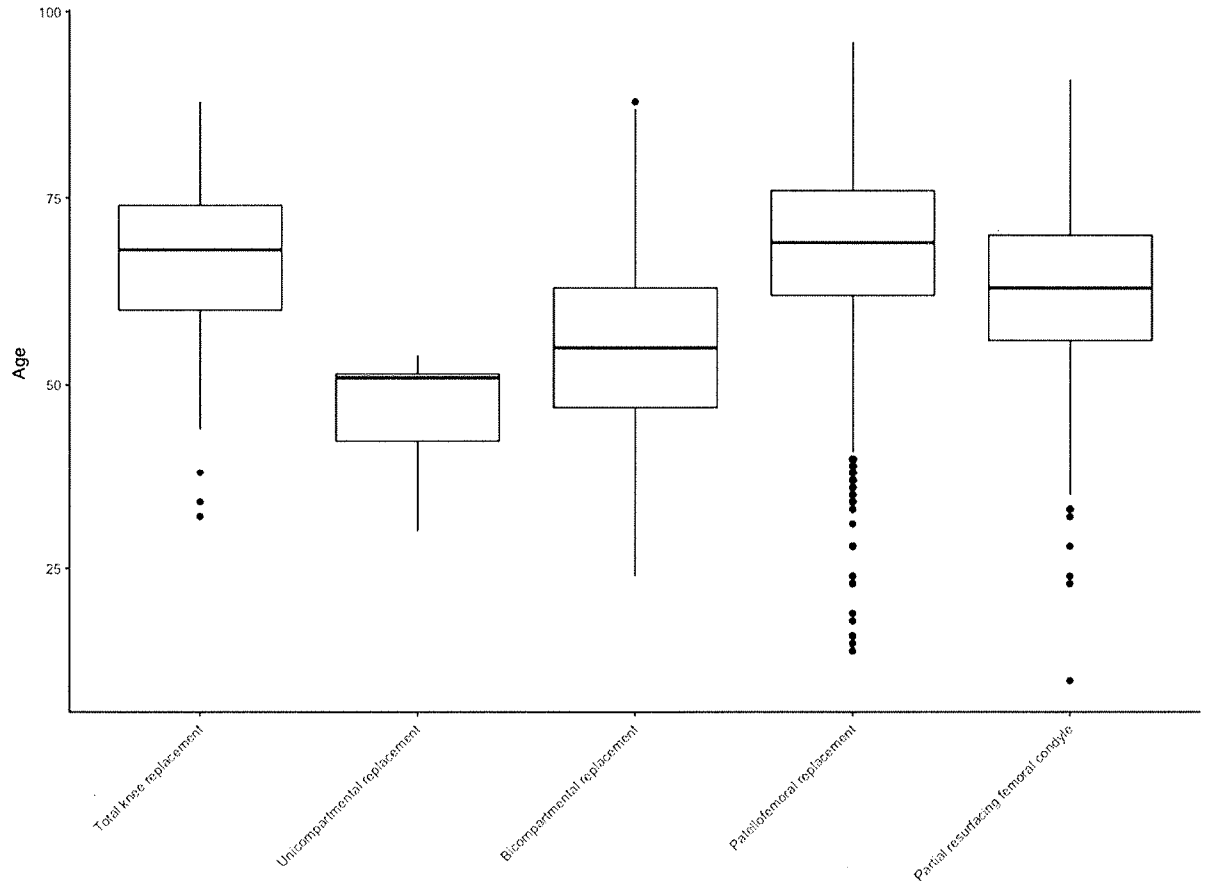


Table 2.7 Numbers and percentages of primary knee prosthesis fixation by type of prosthesis

	Total knee replacement	Unicompartmental replacement	Bicompartmental replacement	Patellofemoral replacement
	N=20060	**N=2131**	**N=347**	**N=432**
	% (N)	**% (N)**	**% (N)**	**% (N)**
Cemented	91,4 (18336)	68,8 (1466)	40,1 (139)	92,1 (398)
Revers hybrid	0,2 (36)	0,8 (17)	1,4 (5)	0 (0)
Hybrid	3,7 (733)	3,5 (75)	4,3 (15)	0 (0)
Uncemented	4,8 (955)	26,9 (573)	54,2 (188)	7,9 (34)

Figure 2.5 Method of fixation by primary knee prosthesis type

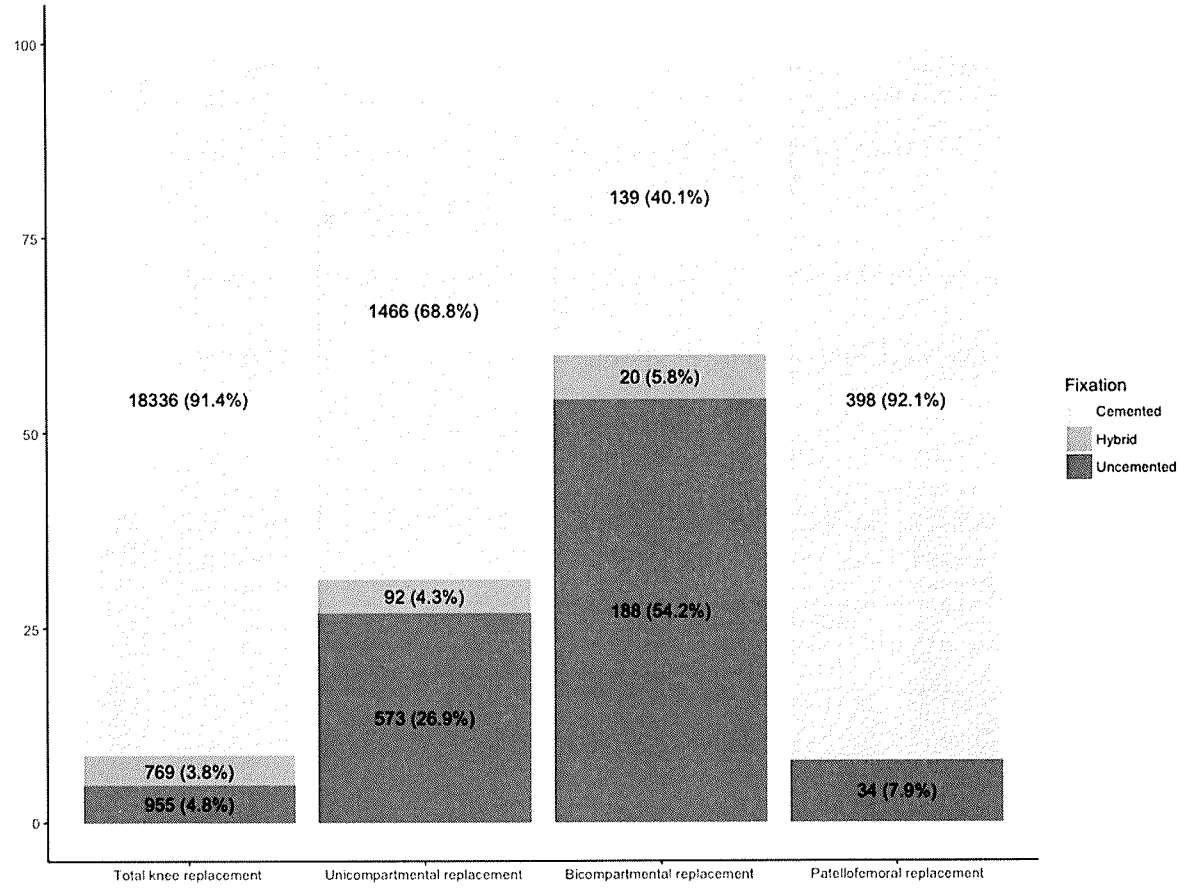
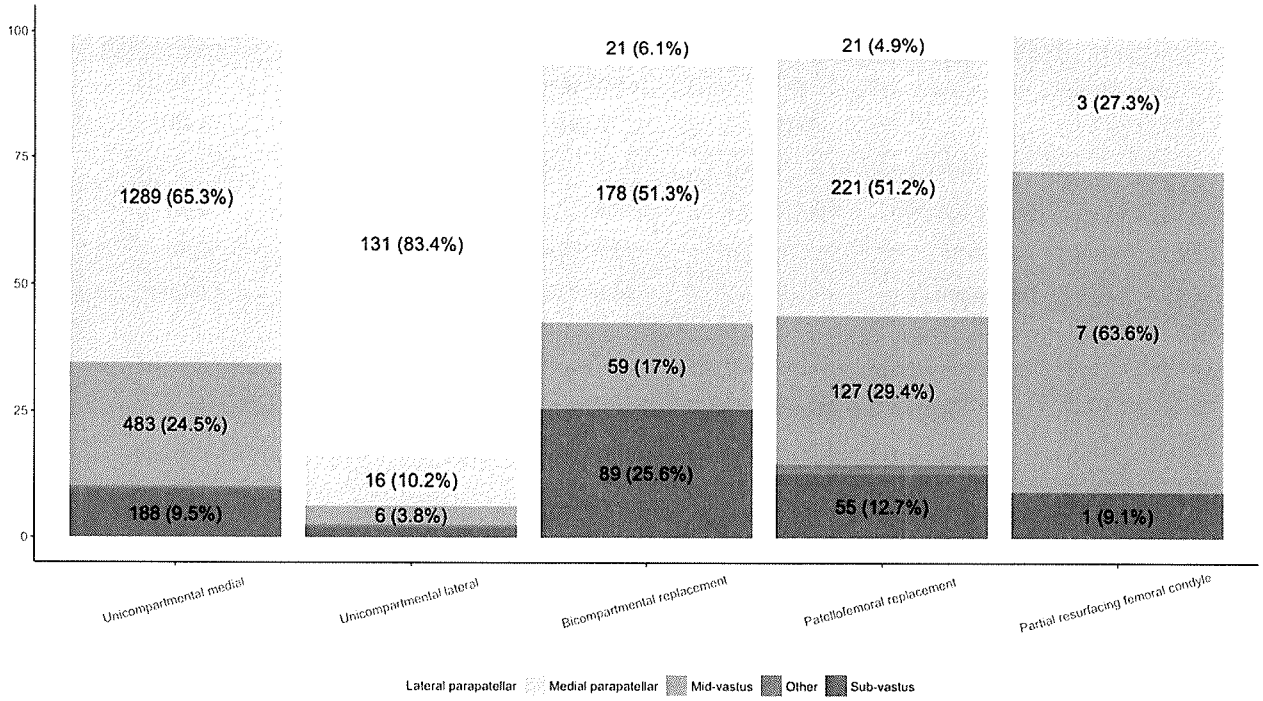
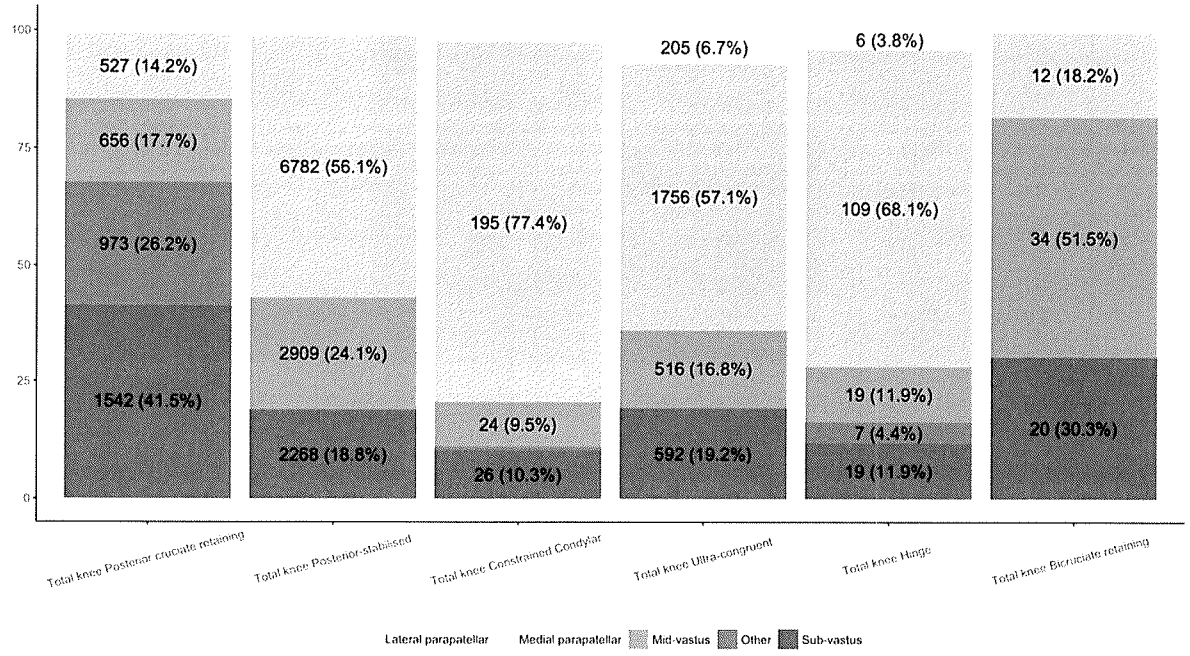


Figure 2.6 Approach used during primary partial knee replacements



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)	586 (2,5%)	1081 (4,7%)
Amount of hospitals (% of all hospitals)	20/102 (19,6%)	32/102 (31,4%)

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

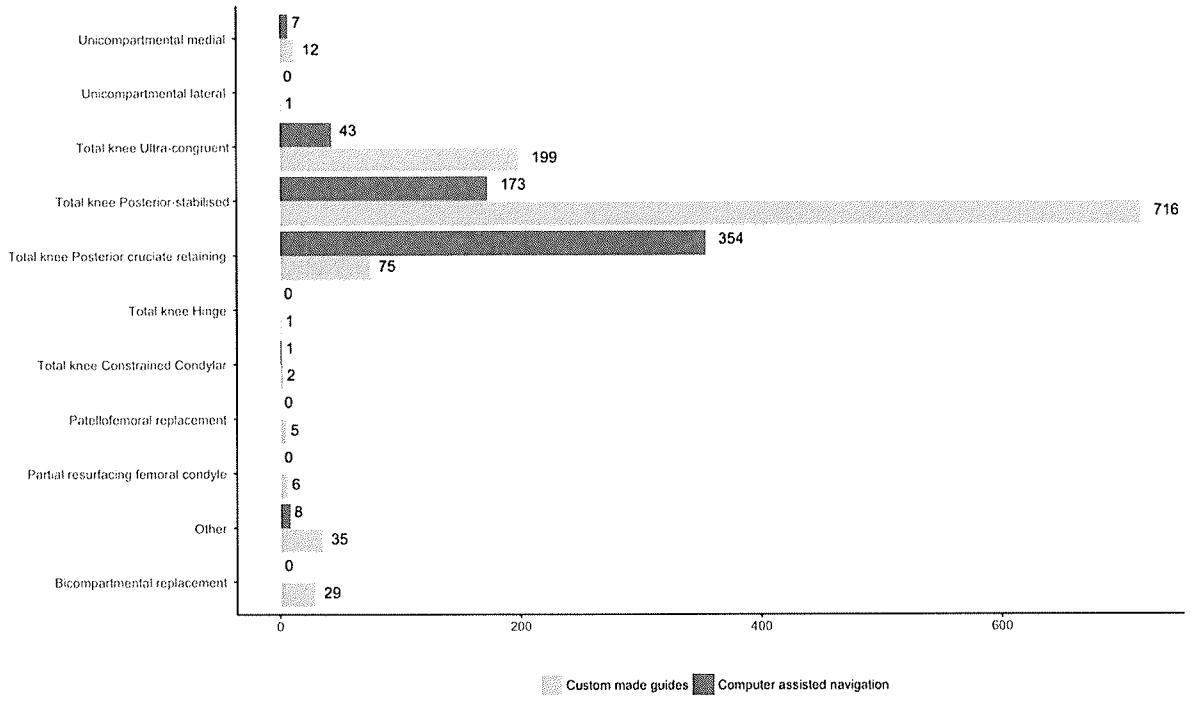
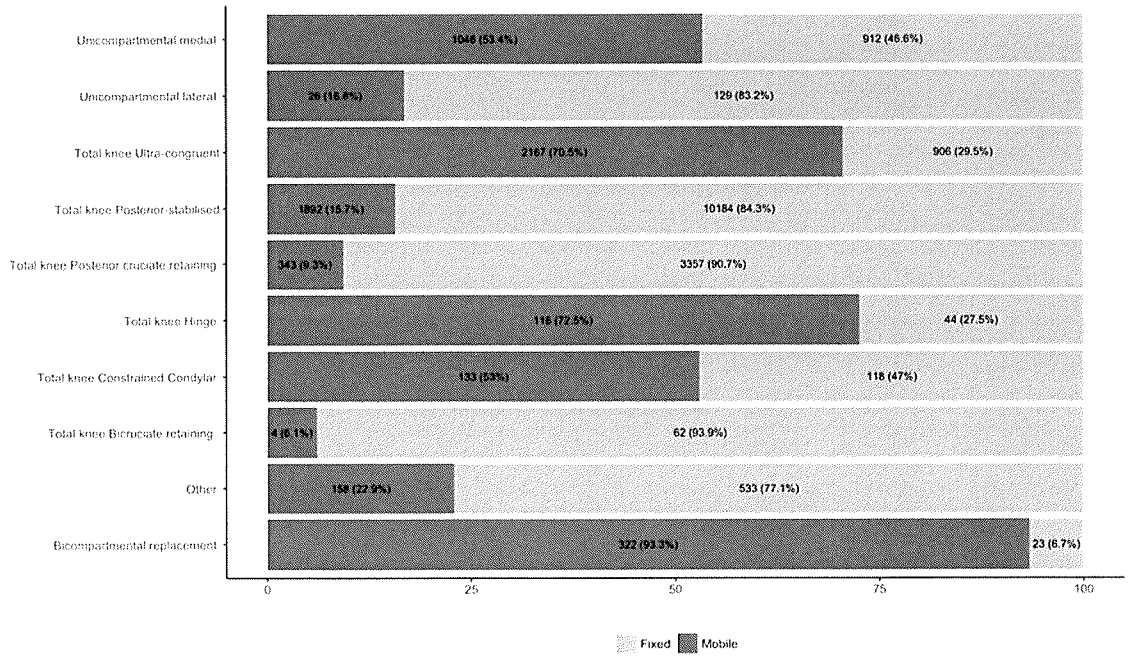


Figure 2.9 Insert type according to primary knee replacement type



2.2 REVISIONS AFTER PRIMARY KNEE REPLACEMENT

2.2.1 Demographics

Table 2.9 Age, gender and indications for knee revision procedures

	N=1970	
	Mean	**SD**
Age (yrs)	65,8	11,7
	Count	**N %**
Age categories		
<45	78	4,0
45-59	521	26,4
60-69	582	29,5
70-79	562	28,5
>=80	227	11,5
Gender		
Female	1128	62,3
Male	742	37,7
Indication		
Aseptic loosening	555	28,2
Wear of polyethylene component	110	5,6
Instability	352	17,9
Infection	387	19,6
Periprosthetic fracture	74	3,8
Pain	428	21,7
Stiffness	101	5,1
Malalignment	93	4,7
Implant fracture	20	1,0
Progressive osteoarthritis in non-replaced component	222	11,3
Indication other	192	9,7

Figure 2.10 Knee revision burden according to age category

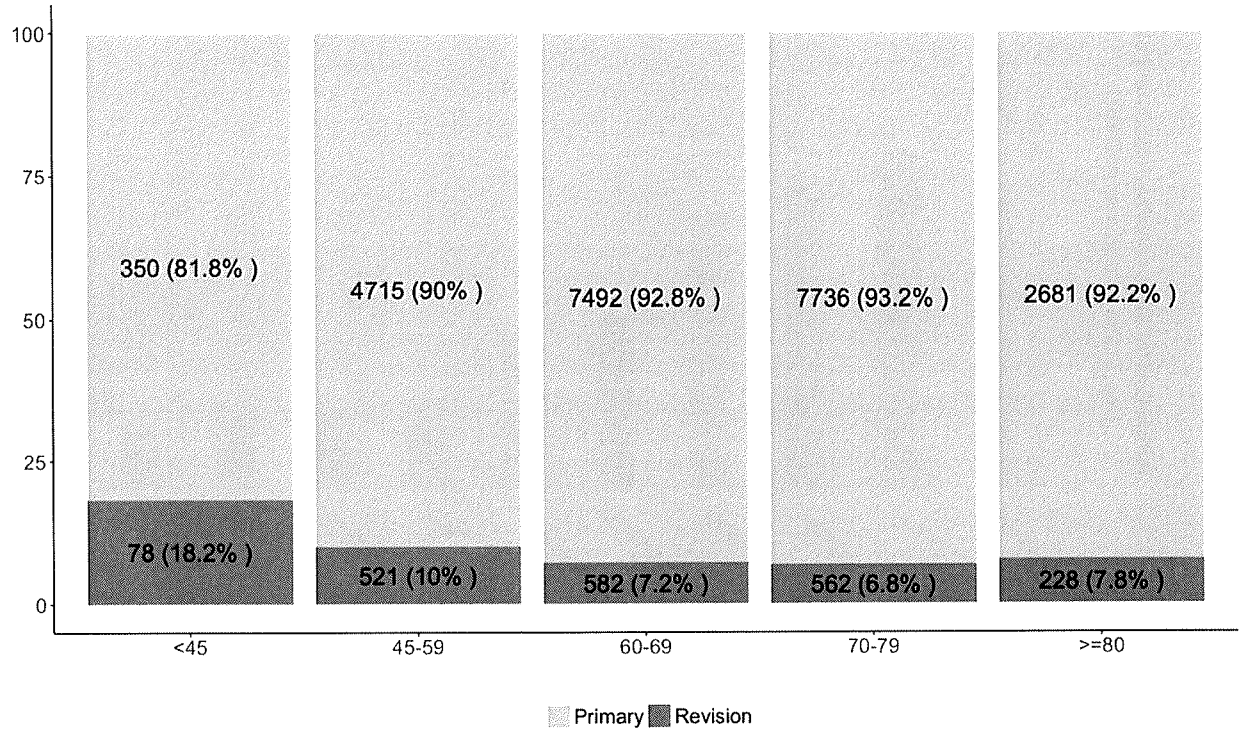


Figure 2.11 Age and gender by number of knee revision procedures

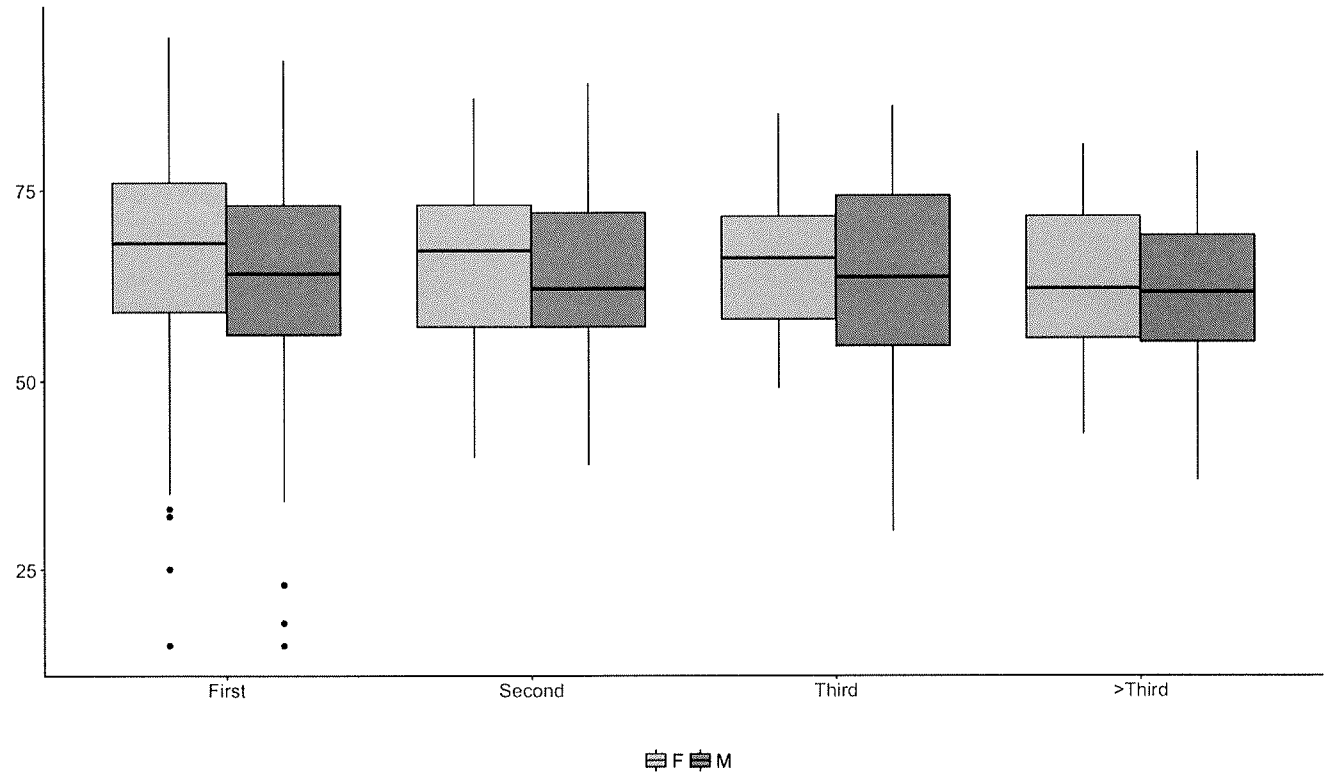
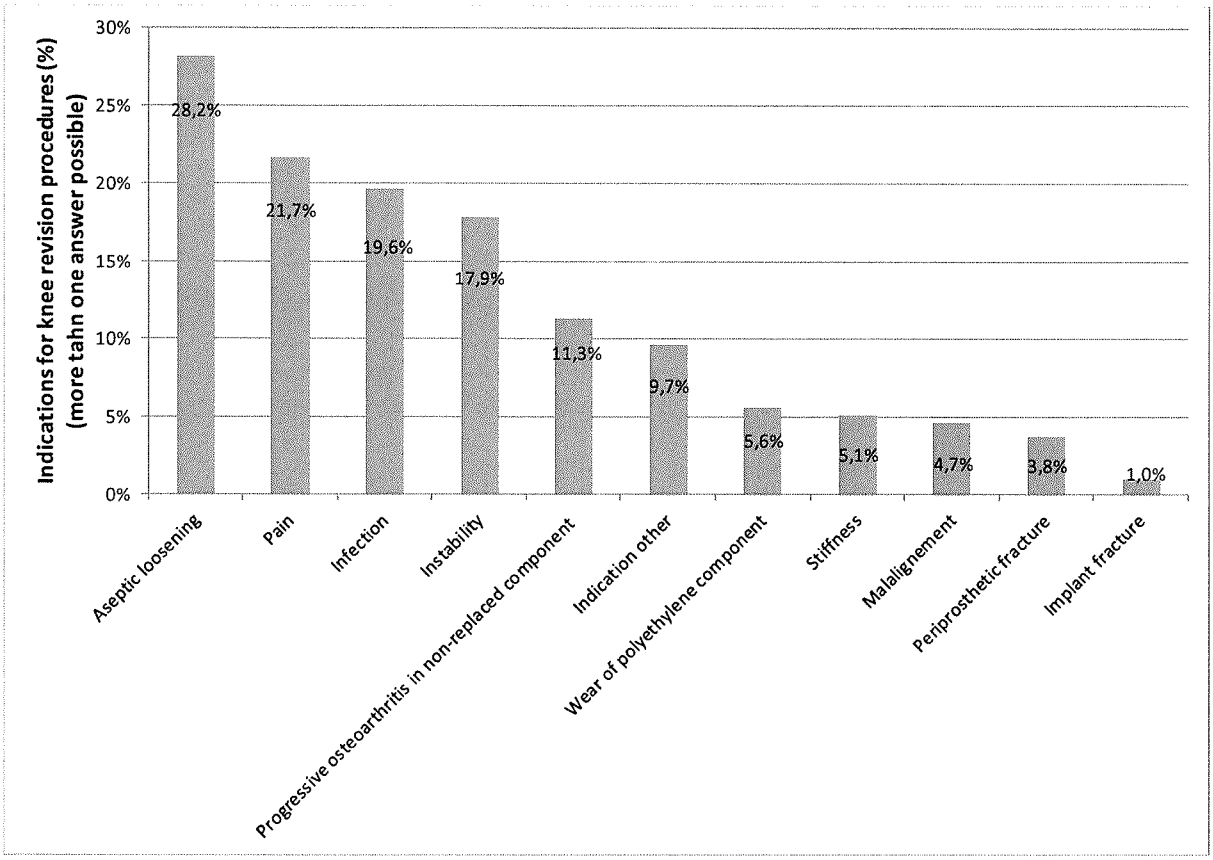


Figure 2.12 Indications for knee revision procedures



2.2.2 Surgical technique and implant characteristics

Table 2.10 Components removed during knee revision procedures

	Number	Proportion (%)[1]
Tibia	1223	66,5
Femur	1169	63,6
Patella	836	45,5
Insert	1581	86,0
Total number of procedures	**1838**	

[1]More 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	1126	61,3
Tibia and Insert	90	4,9
Patella and insert	42	2,3
Femur and insert	22	1,2
Insert only	284	15,5
Patella only	246	13,4
Femur only	5	0,3
Other combination	23	1,3
Total number of procedures	**1838**	**100,0**

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

	Number	Percentage of total (%)
Total knee replacement	1448	93,2
Unicompartmental	4	0,3
Bicompartmental replacement	25	1,6
Patellofemoral replacement	77	5,0
Total number of procedures	**1554**	**100,0**

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

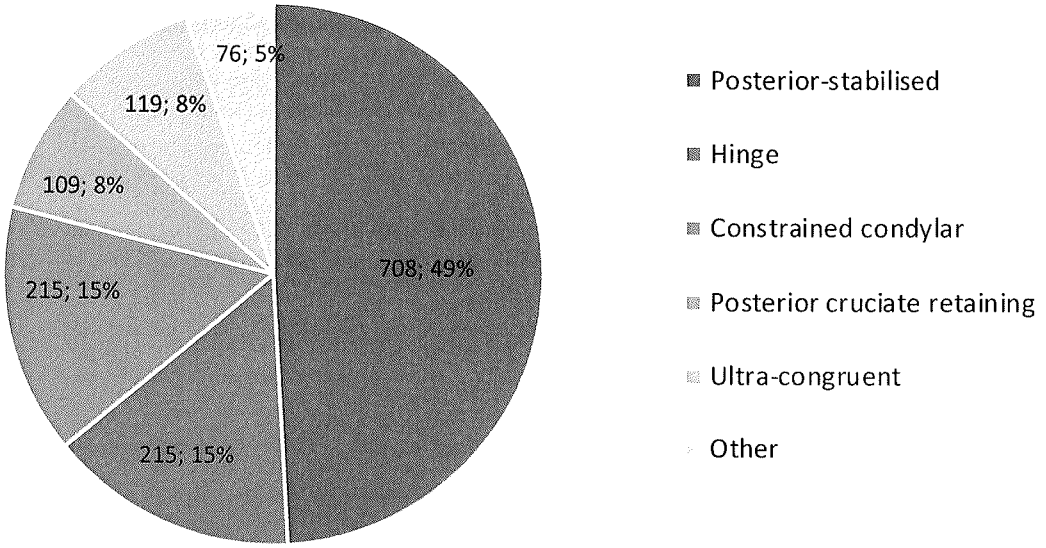
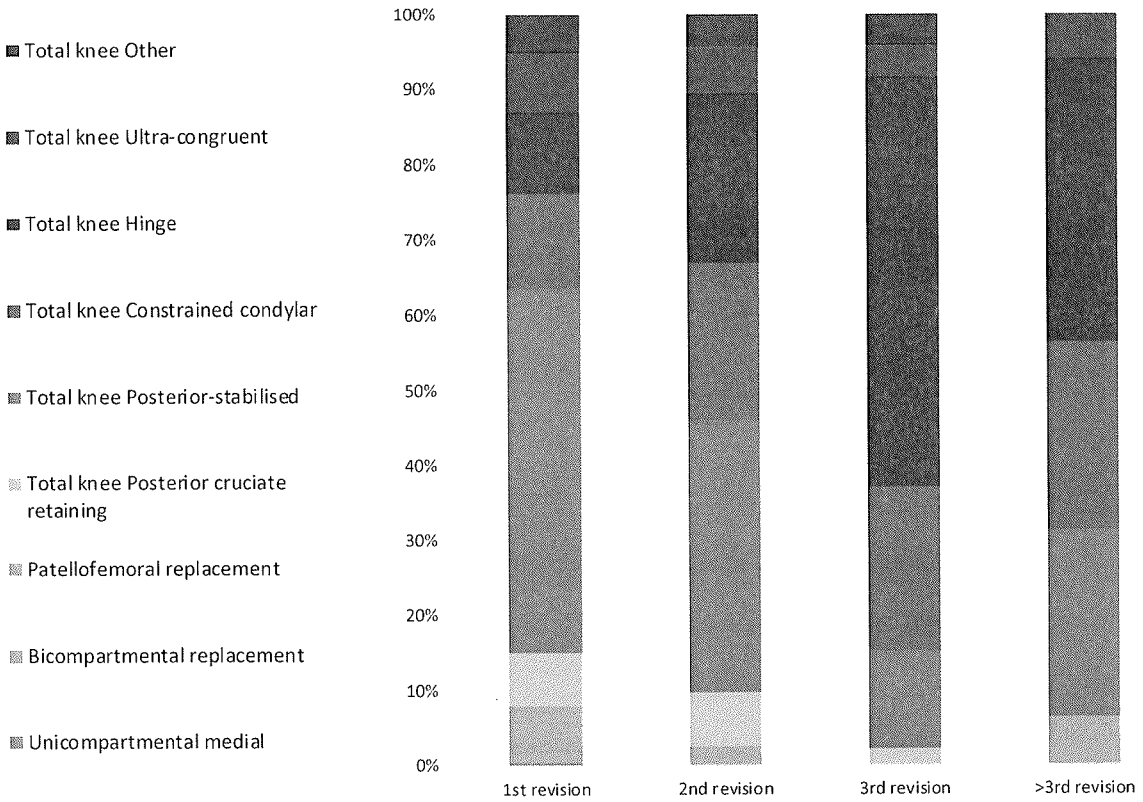


Figure 2.14 Type of implanted knee prosthesis during revision procedures according to the number of revisions



	1st revision	2nd revision	3rd revision	>3rd revision
	N (%)	N (%)	N (%)	N (%)
Total knee Other	66 (5,1)	8 (4,6)	2 (4,3)	0 (0)
Total knee Ultra-congruent	104 (8)	11 (6,3)	2 (4,3)	2 (6,3)
Total knee Hinge	139 (10,7)	39 (22,4)	25 (54,3)	12 (37,5)
Total knee Constrained condylar	161 (12,4)	36 (20,7)	10 (21,7)	8 (25)
Total knee Posterior-stabilised	631 (48,8)	63 (36,2)	6 (13)	8 (25)
Total knee Posterior cruciate retaining	93 (7,2)	13 (7,5)	1 (2,2)	0 (0)
Patellofemoral replacement	74 (5,7)	2 (1,1)	0 (0)	1 (3,1)
Bicompartmental replacement	22 (1,7)	2 (1,1)	0 (0)	1 (3,1)
Unicompartmental medial	4 (0,3)	0 (0)	0 (0)	0 (0)
Total amount	**1294 (100)**	**174 (100)**	**46 (100)**	**32 (100)**

Figure 2.15 Approach during knee revision procedures

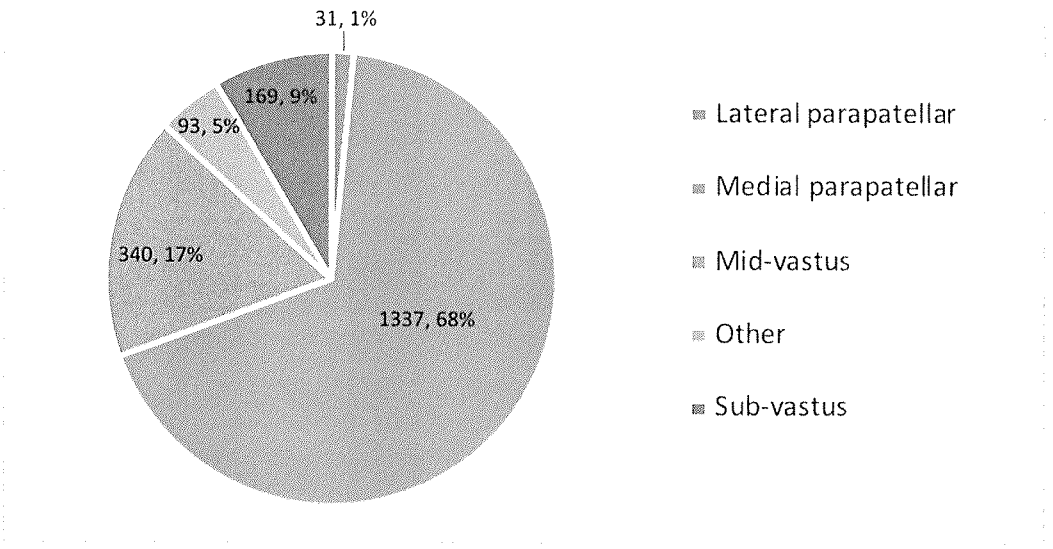


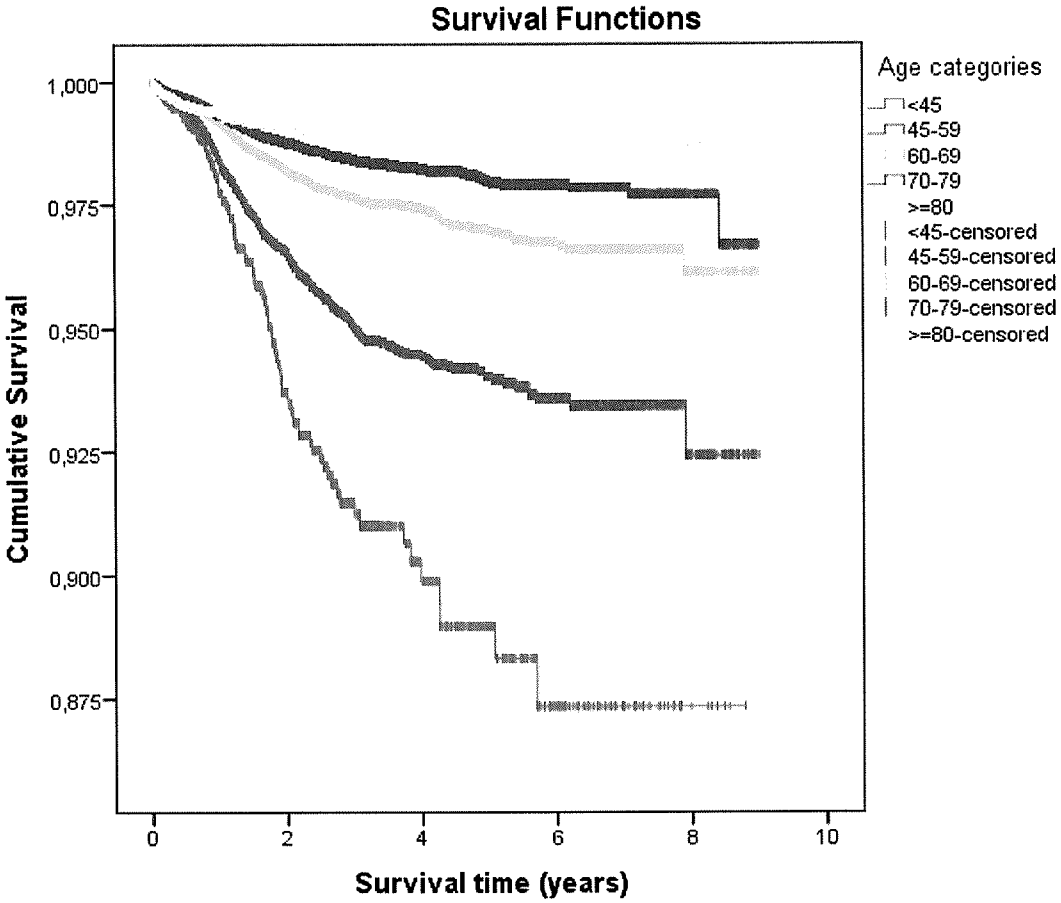
Table 2.14 Numbers and percentages of knee revisions by fixation

	Number	Percentage of total
Cemented	1205	96,9%
Reverse hybrid	3	0,2%
Hybrid	19	1,5%
Uncemented	17	1,4%
Total number of procedures	**1244**	**100,0%**

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

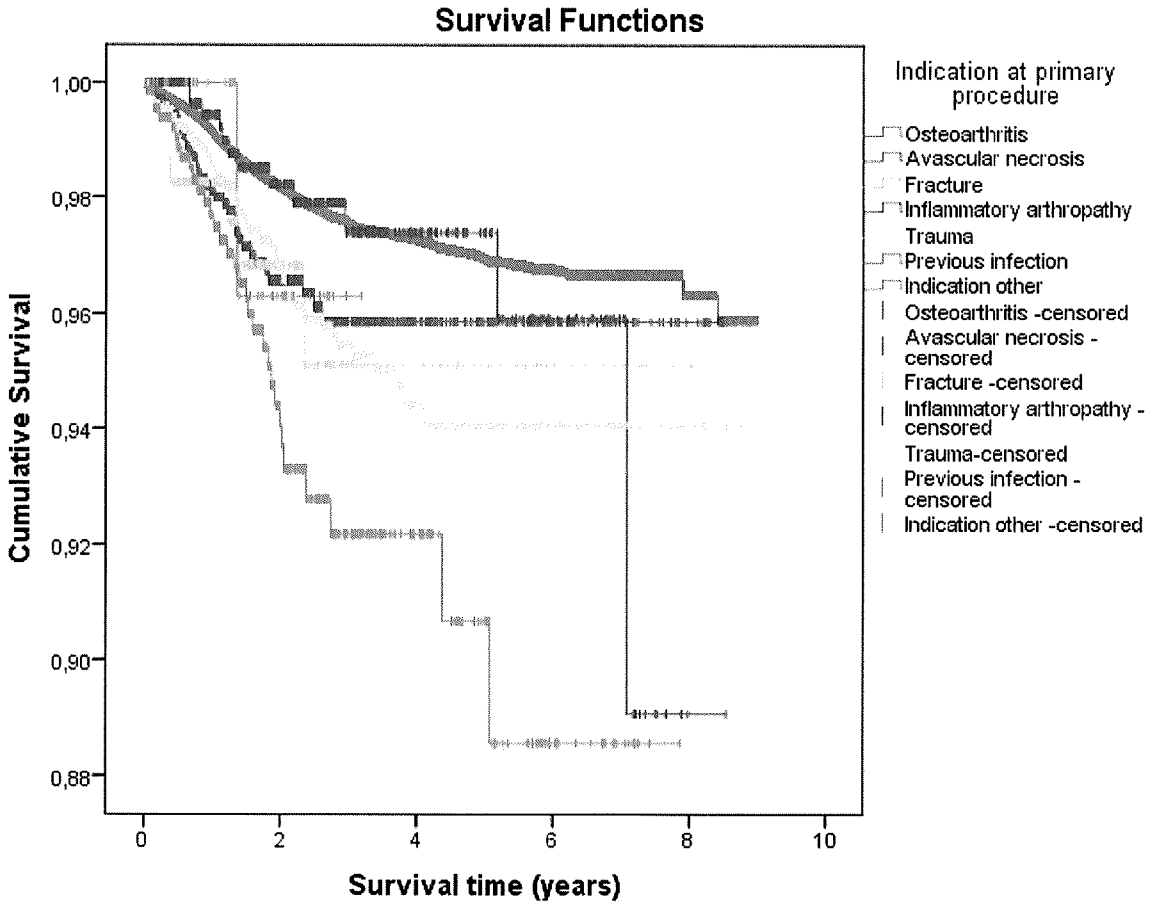
2.2.3 Implant survival after primary procedures

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



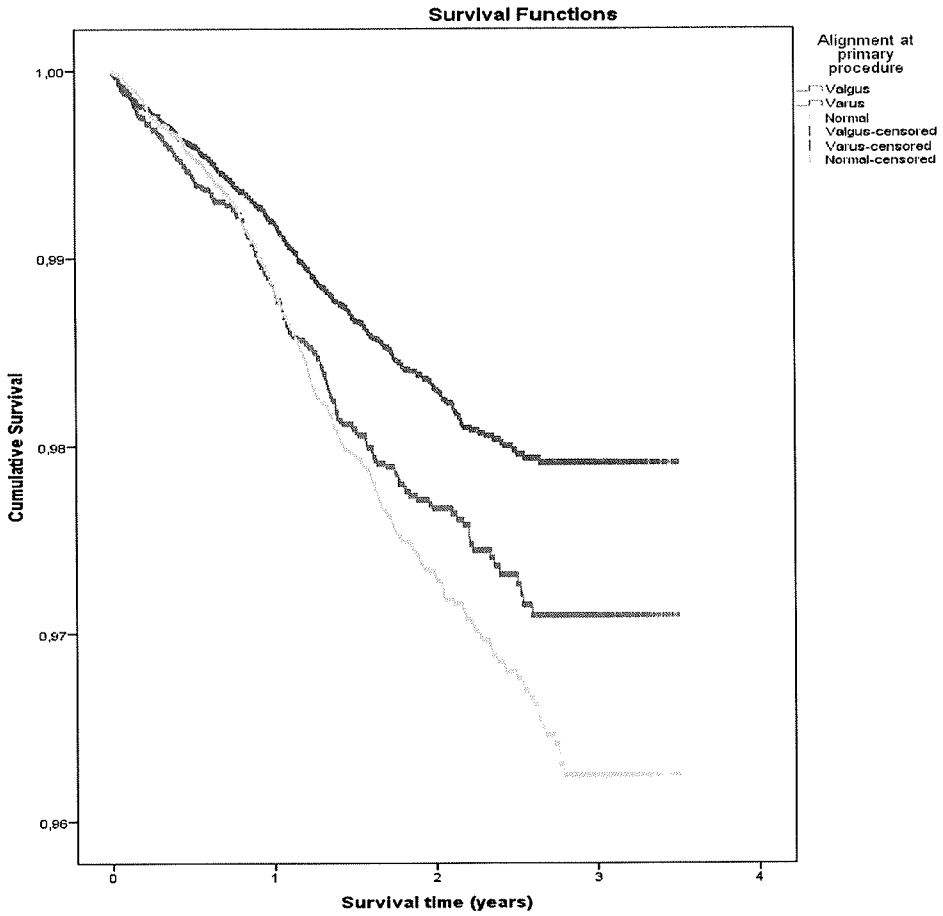
	Number of events/Number at risk								
	0	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
<45	29/1583	44/1206	14/774	5/403	2/221	2/142	0/69	0/30	0/6
45-59	253/18925	230/13957	108/8897	24/4908	9/2456	6/1561	1/824	1/332	0/74
60-69	214/31061	203/23336	65/15229	17/8584	17/4521	6/2876	2/1504	1/593	0/147
70-79	187/31814	116/23794	45/15722	12/9119	10/5034	2/3295	1/1786	1/720	1/191
>=80	65/11332	19/8472	8/5544	4/3273	0/1737	0/1091	0/549	0/195	0/47

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



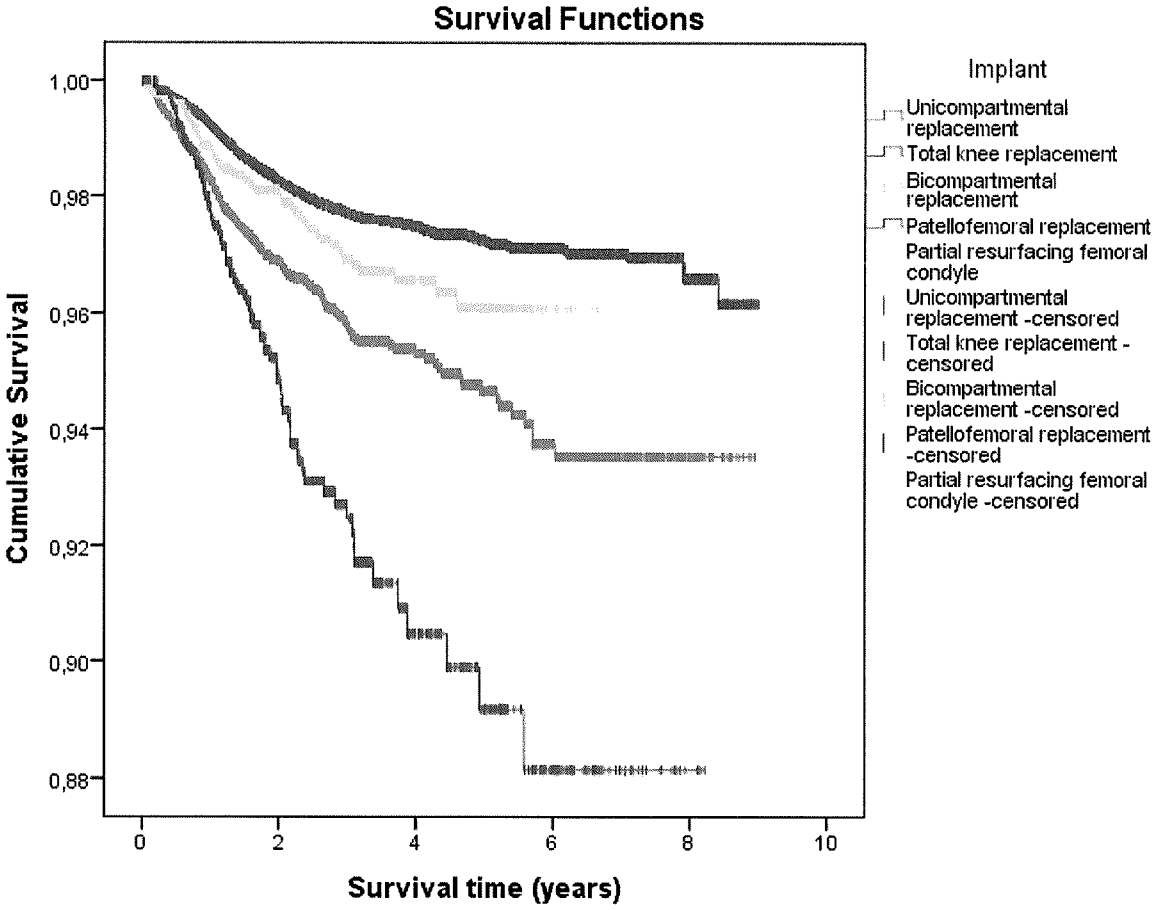
	Number of events/Number at risk								
	0	1	2	3	4	5	6	7	8
Osteo-arthritis	683/89927	555/67267	220/44003	58/25139	36/13361	13/8580	4/4547	2/1784	1/442
Avascular necrosis	21/1267	12/921	3/555	0/274	0/153	0/102	0/58	0/23	0/9
Fracture	4/255	2/167	1/78	0/24	0/17	0/11	0/5	0/3	0/1
Inflammatory arthropathy	3/614	5/472	2/319	0/187	0/108	1/72	0/38	1/17	0/1
Post trauma	24/1974	23/1466	11/951	4/545	1/273	0/177	0/85	0/38	0/12
Previous infection	0/50	1/32	0/18	0/1	0/0	0/0	0/0	0/0	0/0
Other indication	13/654	13/459	4/258	0/129	1/79	1/48	0/22	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



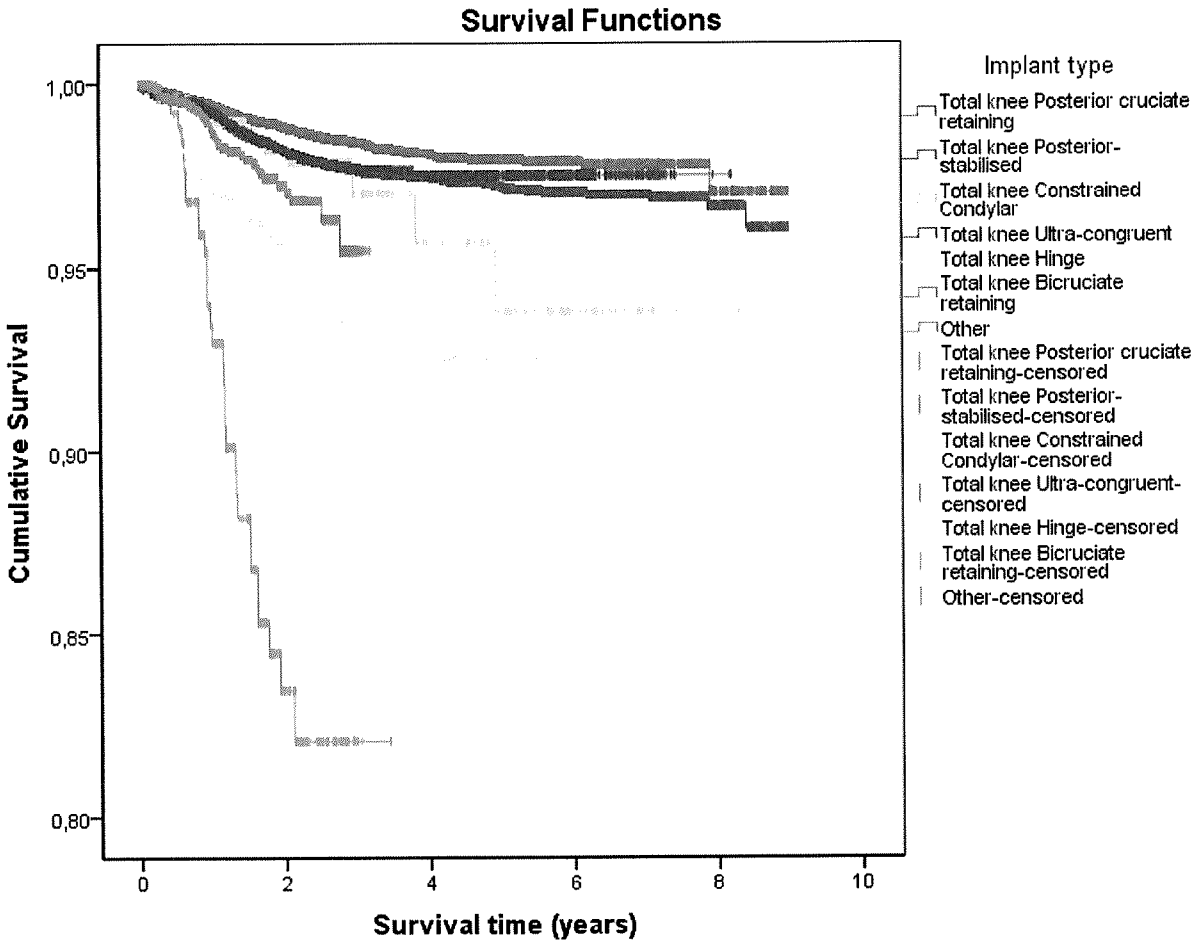
Number of events/Number at risk				
	0	1	2	3
Valgus	123/12834	80/8448	14/3911	0/204
Varus	227/33448	150/21857	28/9978	0/384
Normal	182/19079	150/12547	36/5874	0/453

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



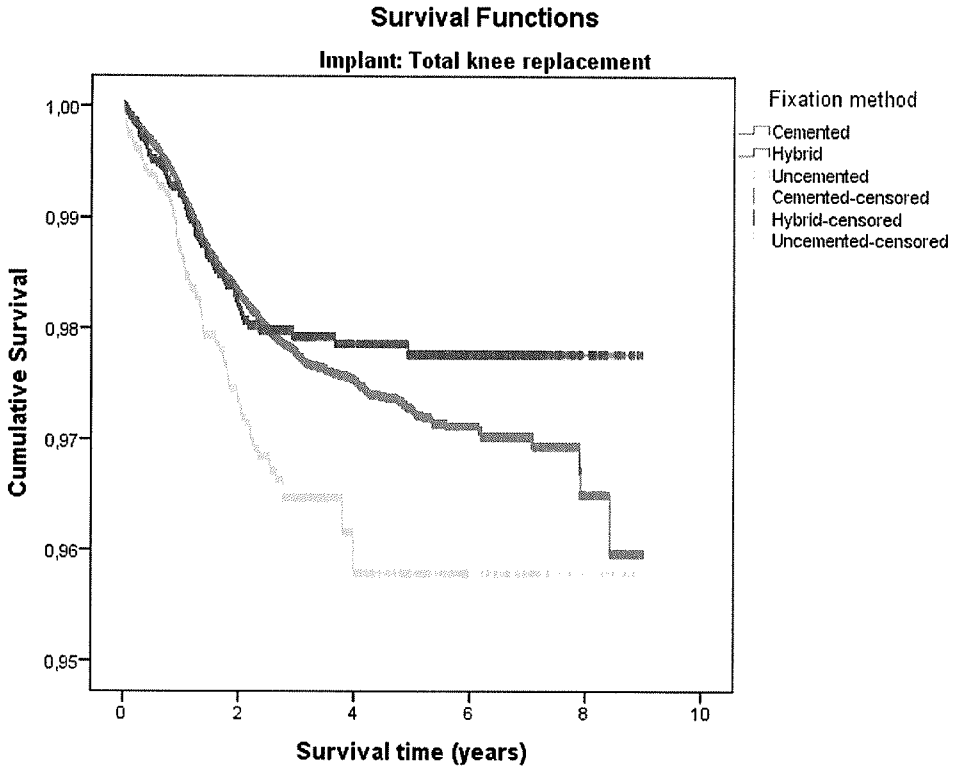
	Number of events/Number at risk								
	0	1	2	3	4	5	6	7	8
Unicompart-mental replacement	116/7768	67/5520	32/3571	9/2177	7/1250	6/824	1/422	0/149	0/34
Total knee replacement	572/82310	495/61448	172/39639	40/21833	23/11463	9/7560	3/4097	3/1642	1/424
Bicompart-mental replacement	23/2125	13/1756	14/1389	3/1067	2/570	0/190	0/6	0/0	0/0
Patello-femoral replacement	31/1640	29/1179	15/725	6/382	2/184	1/121	0/64	0/19	0/4
Partial resurfacing femoral condyle	0/37	0/26	0/10	0/0	0/0	0/0	0/0	0/0	0/0

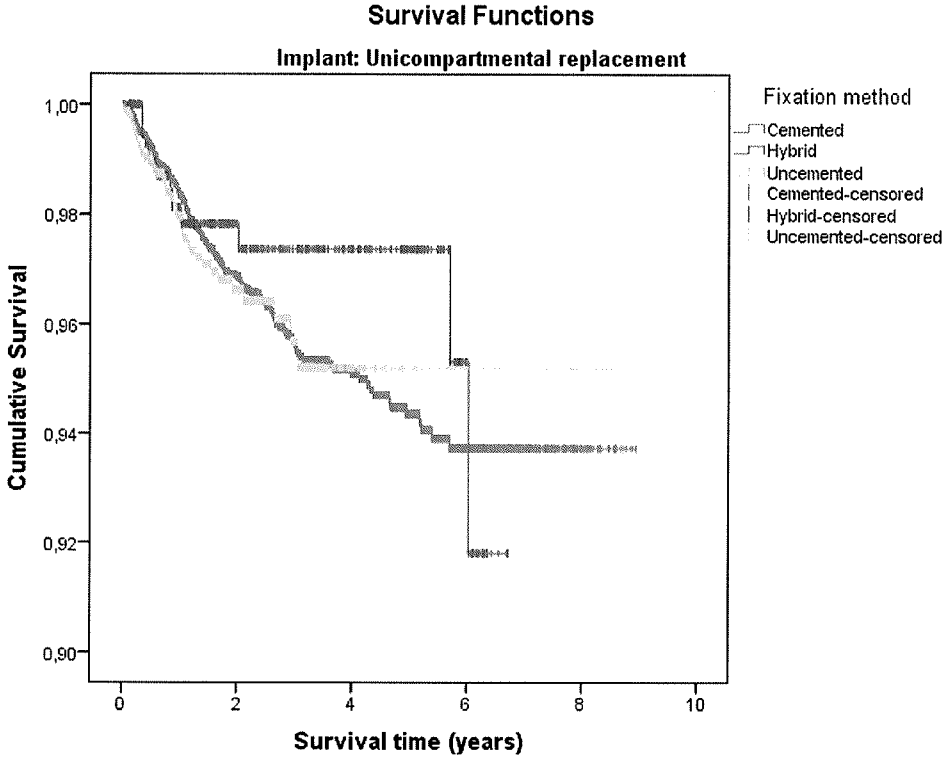
Figure 2.20 Kaplan-Meier curve for type of implant for total knee prostheses at primary knee replacement

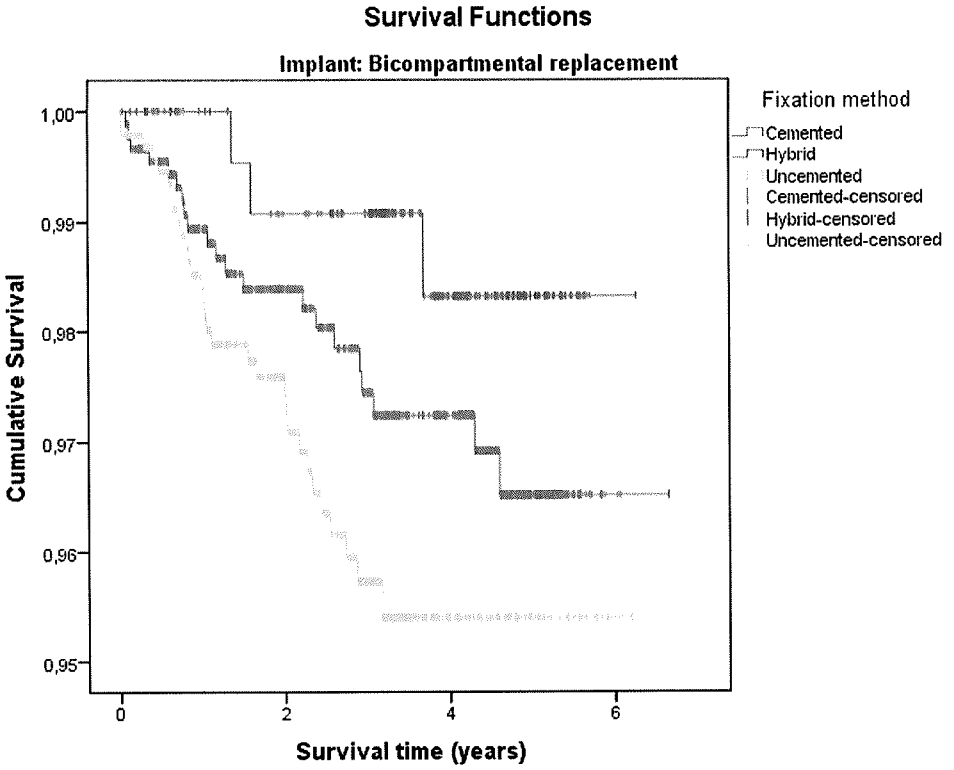


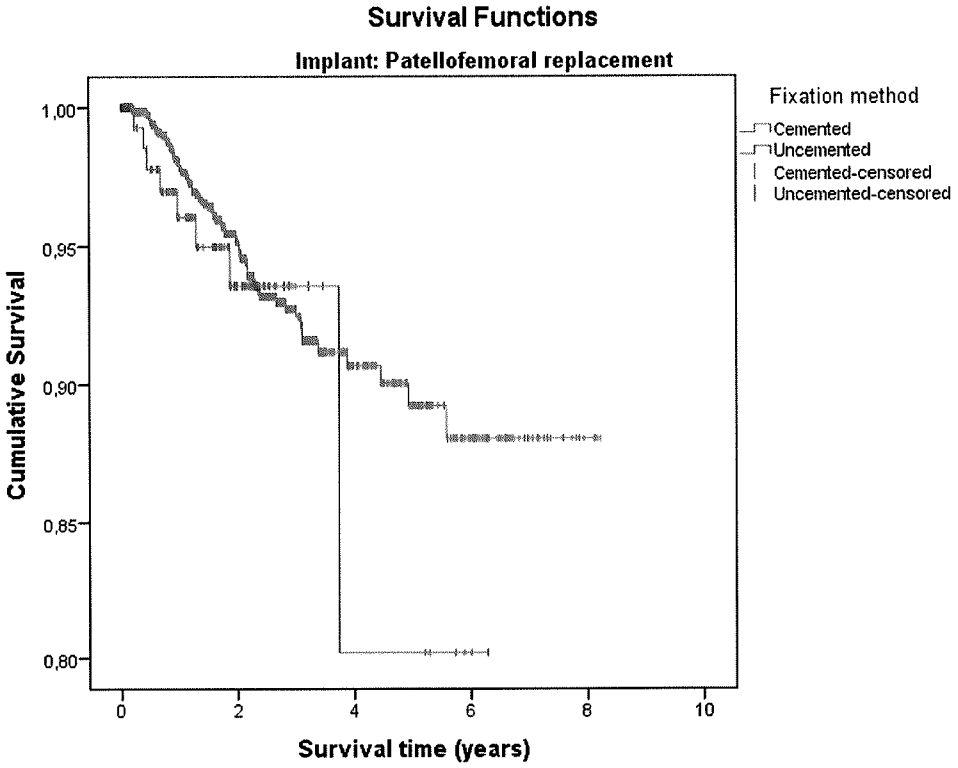
Number of events/Number at risk									
	0	1	2	3	4	5	6	7	8
Total knee Posterior cruciate retaining	79/16889	72/13051	33/9098	14/5508	4/2955	1/1932	1/1023	1/443	0/98
Total knee Posterior-stabilised	362/50833	319/38254	107/24760	23/14102	17/7749	8/5187	2/2870	2/1151	1/322
Total knee Constrained Condylar	7/833	3/569	2/294	1/108	1/65	0/50	0/22	0/5	0/1
Total knee Ultra-congruent	70/10796	64/7611	19/4534	2/1884	0/598	0/354	0/174	0/41	0/2
Total knee Hinge	21/817	9/622	6/399	0/213	1/96	0/37	0/8	0/2	0/1
Total knee Bicruciate retaining	16/264	14/184	1/71	0/2	0/0	0/0	0/0	0/0	0/0
Other	17/1878	14/1157	4/483	0/16	0/0	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



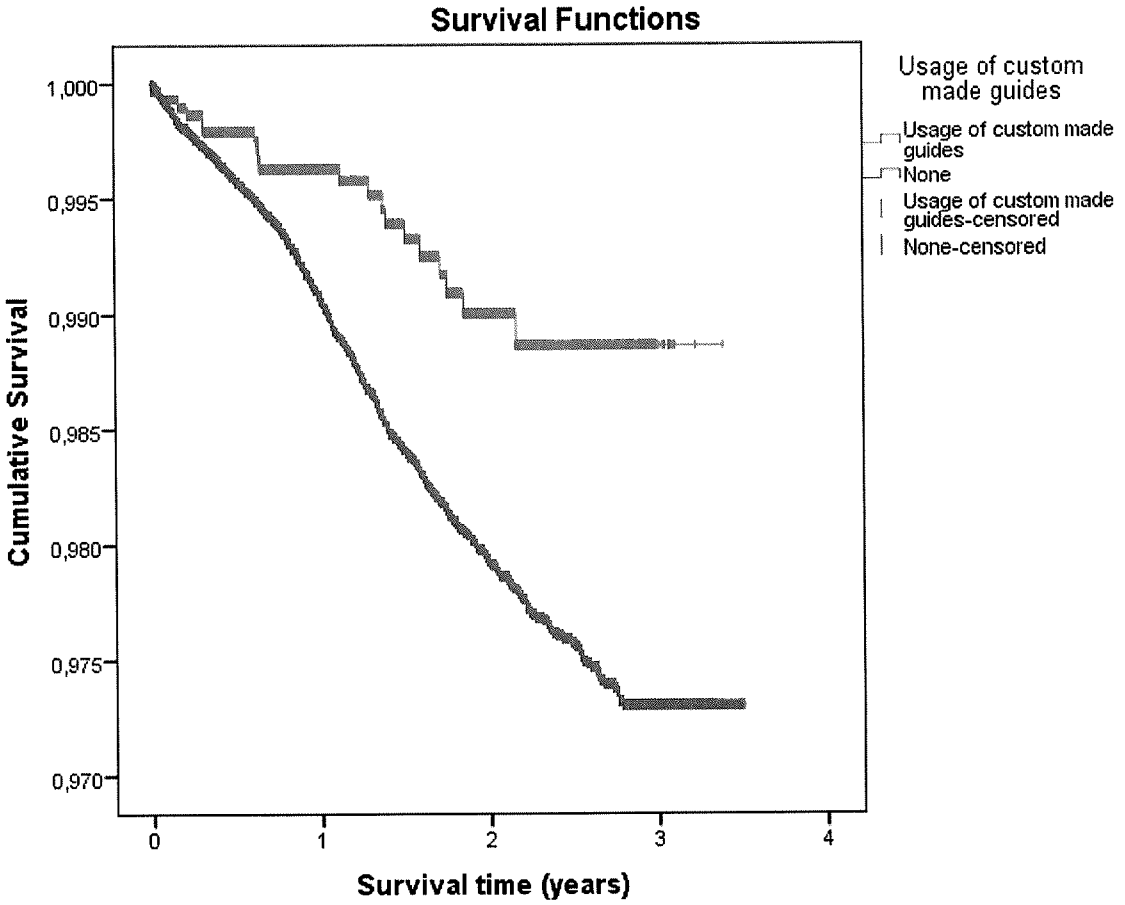



Survival Functions
Implant: Bicompartmental replacement
Fixation method
Cemented
Hybrid
Uncemented
Cemented-censored
Hybrid-censored
Uncemented-censored
Cumulative Survival
1,00
0,99
0,98
0,97
0,96
0,95
0
2
4
6
Survival time (years)


Survival Functions
Implant: Patellofemoral replacement
Fixation method
Cemented
Uncemented
Cemented-censored
Uncemented-censored
Cumulative Survival
1,00
0,95
0,90
0,85
0,80
0
2
4
6
8
10
Survival time (years)

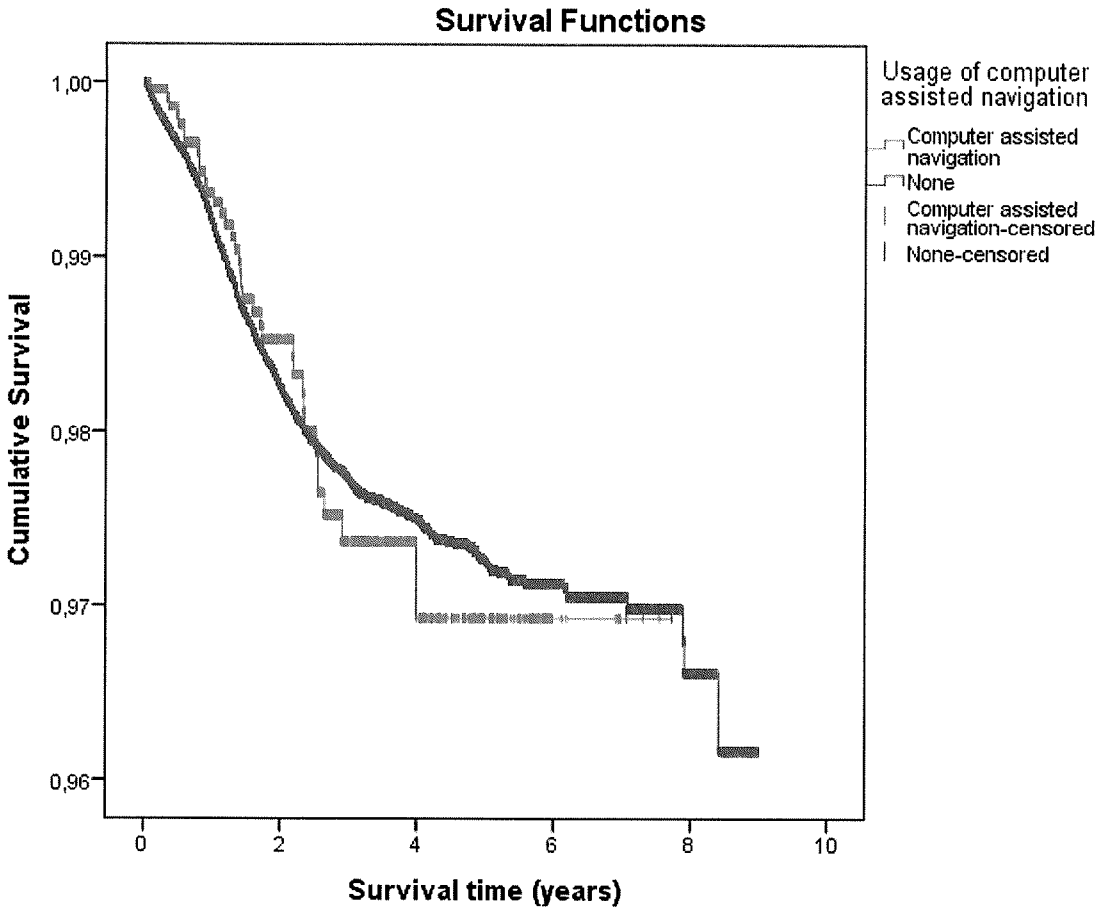
		Number of events/Number at risk								
		0	1	2	3	4	5	6	7	8
Unicompartmental replacement	Cemented	81/5677	54/4125	28/2790	8/1723	7/1049	4/726	0/392	0/147	0/33
	Hybrid	7/426	1/328	1/213	0/166	0/119	1/84	1/28	0/0	0/0
	Un-cemented	27/1589	11/992	3/494	1/214	0/39	0/6	0/2	0/2	0/1
Total knee replacement	Cemented	495/74067	428/55032	151/35157	37/19185	22/9865	9/6352	3/3405	3/1368	1/339
	Hybrid	30/4192	31/3382	6/2480	1/1723	1/1286	0/1002	0/610	0/243	0/77
	Un-cemented	46/3965	33/2949	14/1920	2/844	0/255	0/167	0/69	0/28	0/6
Bicompartmental replacement	Cemented	9/911	4/764	5/596	1/486	2/376	0/131	0/4	0/0	0/0
	Hybrid	0/239	2/219	0/210	1/192	0/109	0/32	0/1	0/0	0/0
	Un-cemented	14/975	7/773	9/583	1/389	0/85	0/27	0/1	0/0	0/0
Patellofemoral replacement	Cemented	25/1470	25/1050	15/644	5/331	2/166	1/108	0/57	0/18	0/4
	Un-cemented	5/141	2/101	0/55	1/25	0/6	0/6	0/2	0/0	0/0

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



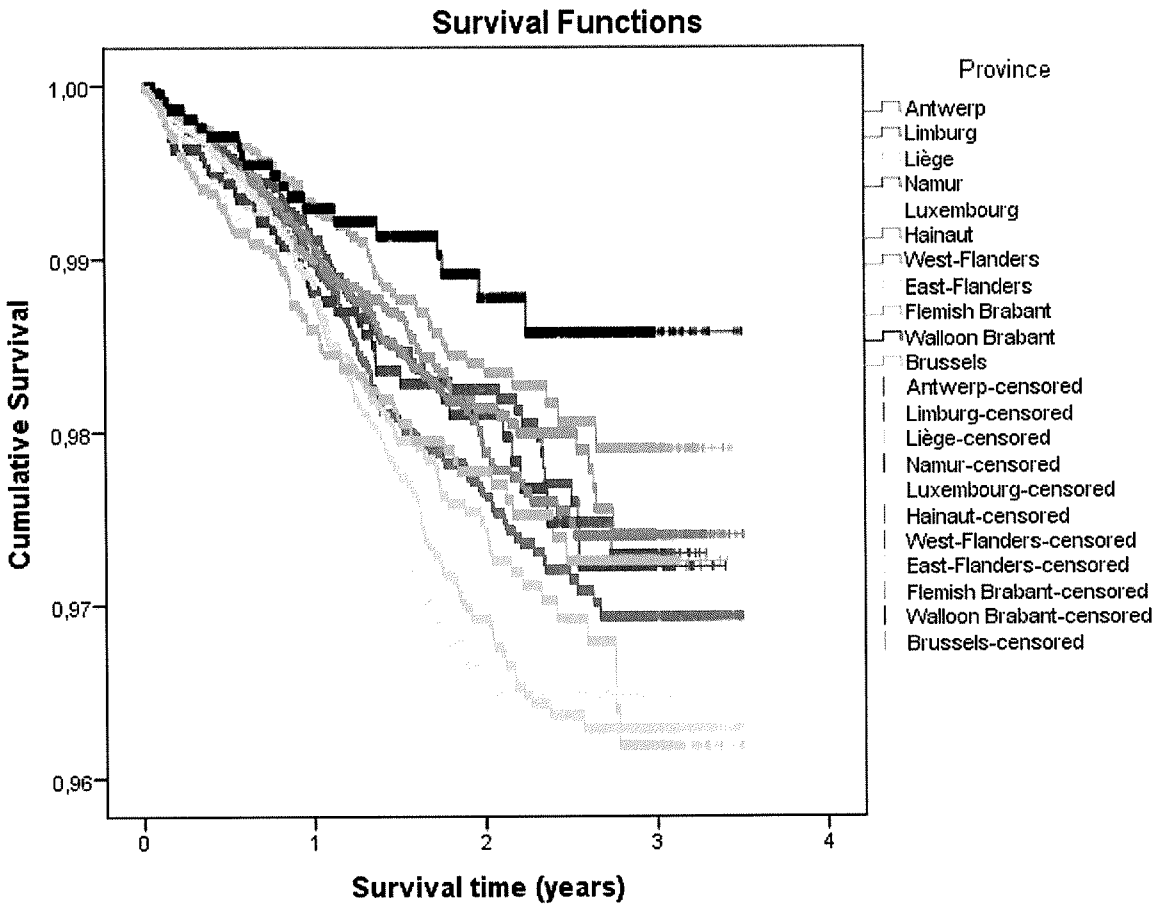
	Number of events/Number at risk			
	0	1	2	3
Usage of custom made guides	10/3054	9/2005	1/903	0/16
None	451/57991	340/38289	65/17728	0/915

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**
Computer assisted navigation	12/2238	12/1633	10/1082	1/537	0/221	0/115	0/13	0/5	0/0
None	560/80072	483/59815	162/38557	39/21296	23/11242	9/7445	3/4084	3/1637	1/424

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



	Number of events/Number at risk			
	0	1	2	3
Antwerp	88/10365	75/6948	15/3257	0/362
Limburg	42/5910	30/3917	10/1886	0/24
Liège	59/5927	41/3835	11/1735	0/74
Namur	28/2811	10/1812	5/834	0/26
Luxembourg	24/1848	18/1199	1/593	0/19
Hainaut	67/8167	33/5253	8/2360	0/49
West-Flanders	79/10309	58/6683	10/3002	0/127
East-Flanders	97/10322	99/6689	15/2949	0/204
Flemish Brabant	33/5852	28/3843	4/1765	0/109
Walloon Brabant	13/2218	5/1462	1/687	0/21
Brussels	49/4036	18/2709	5/1313	0/40

2.3 NINETY-DAYS MORTALITY AFTER KNEE REPLACEMENT PROCEDURES

Table 2.15 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	67745	99,8%	133	0,2%
Revision with new prosthesis	5453	99,3%	38	0,7%
Resection with spacer	381	98,7%	5	1,3%
Resection without spacer	17	100,0%	0	0,0%
Total	**73596**	**99,8%**	**176**	**0,2%**

Table 2.16 90-days mortality after knee replacement by age category

	Alive 90 days post-procedure		Died before 90 days post-procedure	
<45	1362	100,0%	0	0,0%
45-59	15364	99,9%	11	0,1%
60-69	24071	99,9%	24	0,1%
70-79	24183	99,7%	69	0,3%
>=80	8600	99,2%	72	0,8%
Total [Missing]	**73580 [16]**	**99,8%**	**176**	**0,2%**

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=26505	
	Mean	**SD**
Age (yrs)	69,9	13,0
	Count	**N %**
Age categories		
<45	894	3,4%
45-59	4607	17,4%
60-69	6655	25,1%
70-79	7638	28,6%
>=80	6700	25,3%
Gender		
Female	15946	60,2%
Male	10559	39,8%
Indication		
Primary osteoarthritis	17902	67,5%
Secondary osteoarthritis	539	2,0%
Avascular necrosis	1308	4,9%
Rheumatoid arthritis	72	0,3%
Fracture	6179	23,3%
Tumor	56	0,2%
Hip dysplasia	280	1,1%
Indication other	169	0,6%

Figure 3.1 Age distribution by gender for primary hip replacement patients

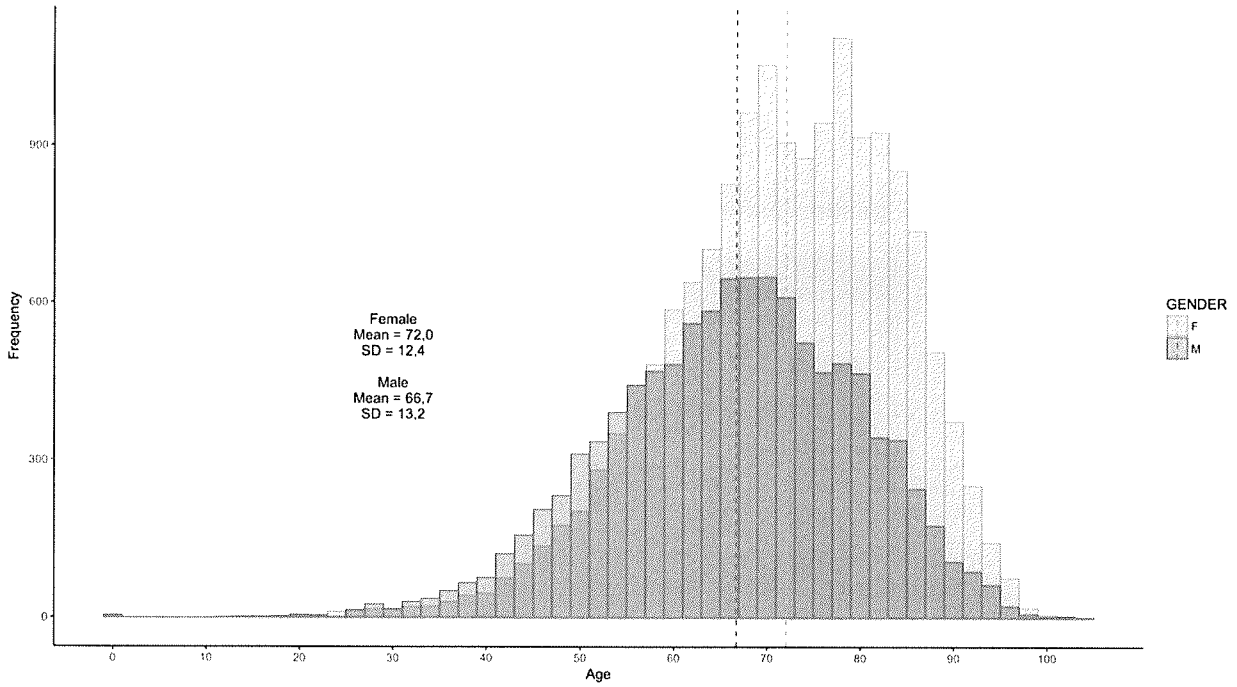


Figure 3.2 Age distribution by indication for primary hip replacement patients

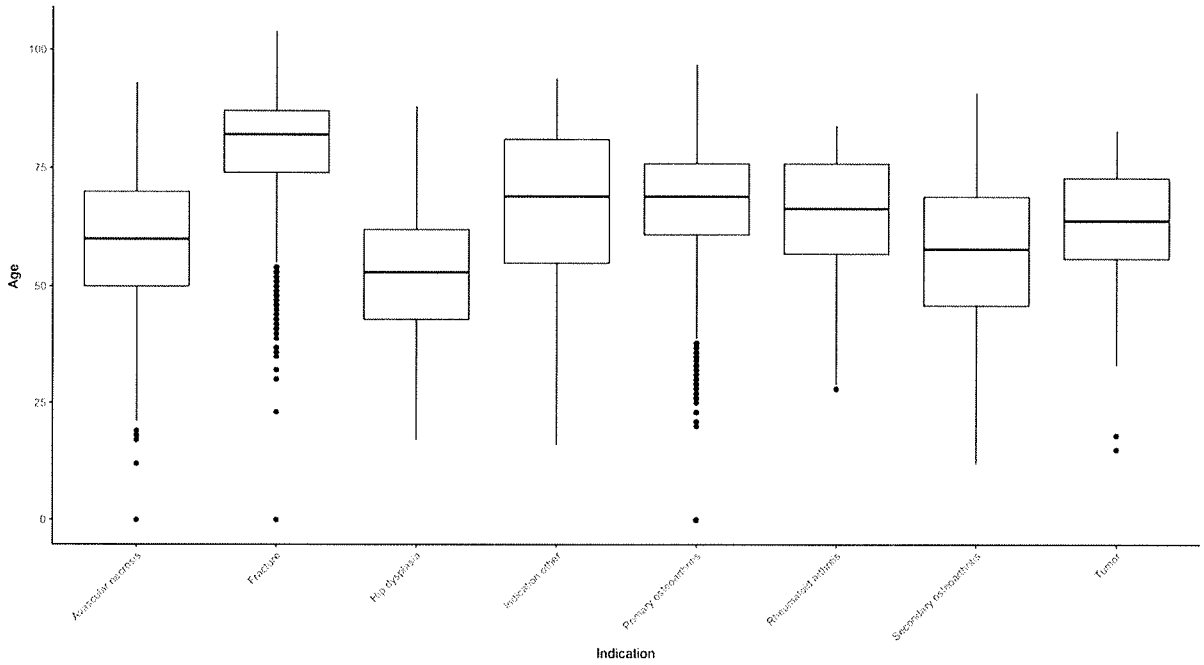
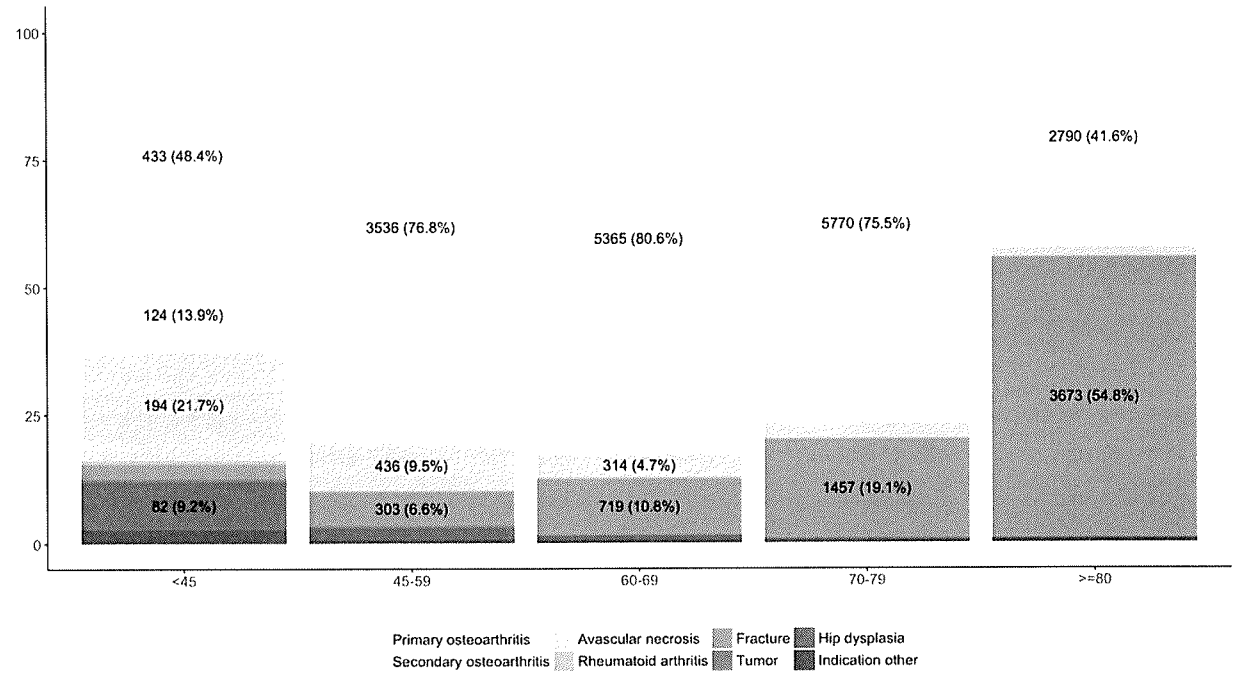


Table 3.2 Indications for primary hip replacements based on gender

	Male	Female
	N=10559	N=15946
	N (%)	N (%)
Primary osteoarthritis	7470 (70,7%)	10432 (65,4%)
Secondary osteoarthritis	285 (2,7%)	254 (1,6%)
Avascular necrosis	776 (7,3%)	532 (3,3%)
Rheumatoid arthritis	13 (0,1%)	59 (0,4%)
Fracture	1851 (17,5%)	4328 (27,1%)
Tumor	21 (0,2%)	35 (0,2%)
Hip dysplasia	75 (0,7%)	205 (1,3%)
Indication other	68 (0,6%)	101 (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 4% 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	20592	77,7
Total dual-mobility prosthesis	1611	6,1
Hemi - Bipolar	4012	15,1
Hemi Modular	26	0,1
Hemi Monoblock	13	0
Resurfacing Femoral (Hemi)	1	0
Resurfacing Femoral + Cup	249	0,9
Resurfacing Partial (Punaise)	1	0
Total	**26505**	**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=20592	**N=1611**	**N=39**	**N=4011**	**N=251**
Mean age (years) (SD)	67,3 (12,0)	74,1 (11,2)	82,6 (10,0)	83,0 (8,9)	51,6 (8,8)
Age groups	**% (N)**	**% (N)**	**% (N)**	**% (N)**	**% (N)**
<45	3,9 (808)	1,7 (27)	0 (0)	0,3 (14)	17,9 (45)
45-59	20,6 (4246)	8,1 (130)	2,6 (1)	1,6 (65)	65,7 (165)
60-69	29,4 (6048)	21,4 (344)	5,1 (2)	5,6 (226)	13,9 (35)
70-79	30,6 (6300)	32,8 (528)	23,1 (9)	19,8 (795)	2,4 (6)
>=80	15,4 (3180)	36,1 (582)	69,2 (27)	72,6 (2911)	0 (0)
Gender	**% (N)**	**% (N)**	**% (N)**	**% (N)**	**% (N)**
Male	42 (8641)	32,8 (528)	38,5 (15)	28,3 (1136)	94,8 (238)
Female	58 (11950)	67,2 (1083)	61,5 (24)	71,7 (2876)	5,2 (13)

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

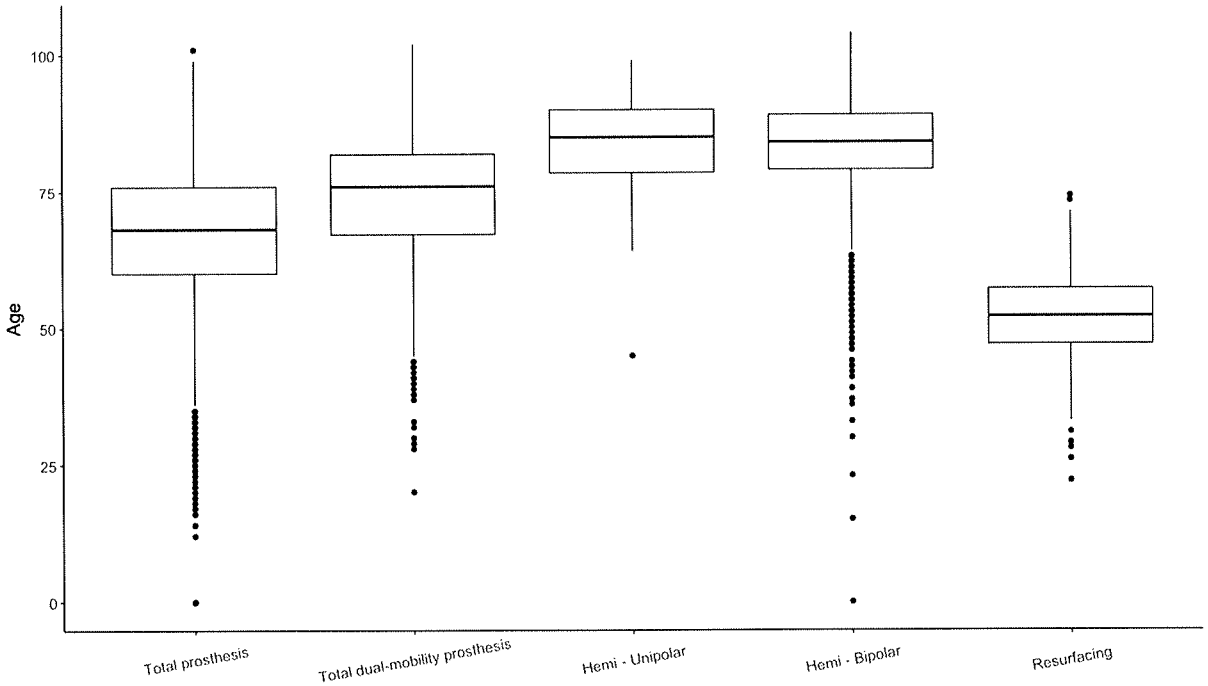
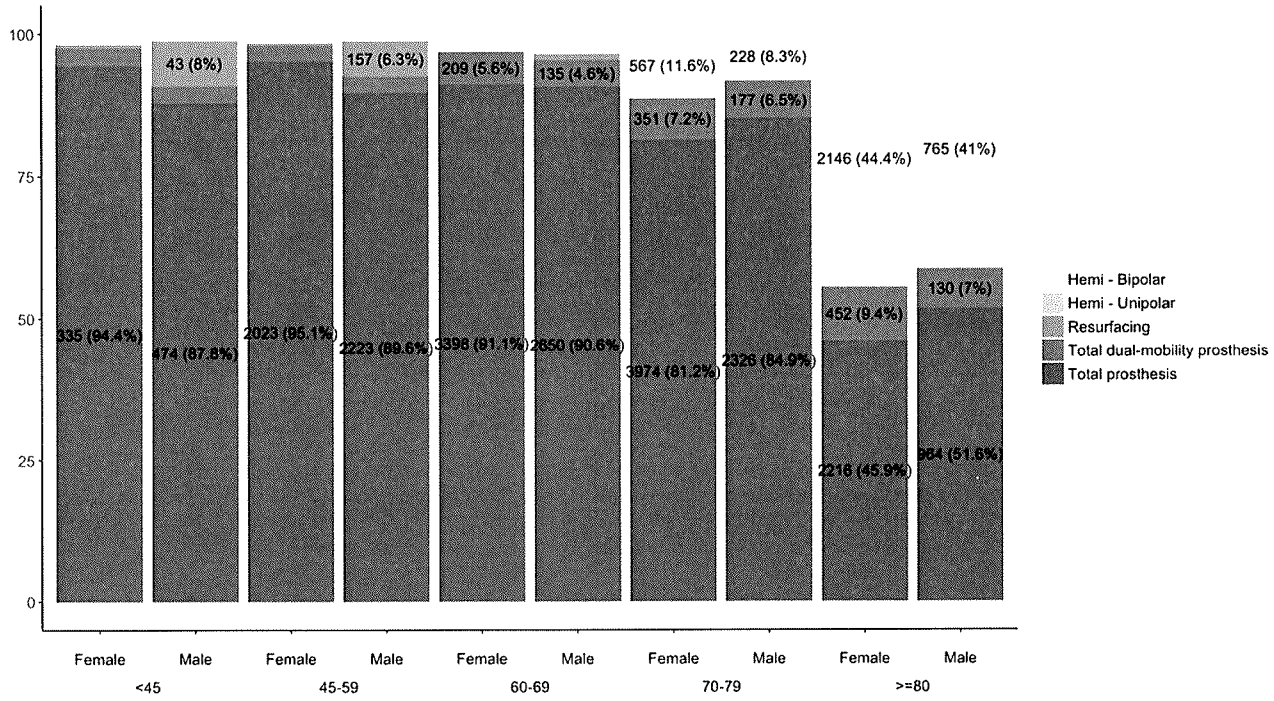
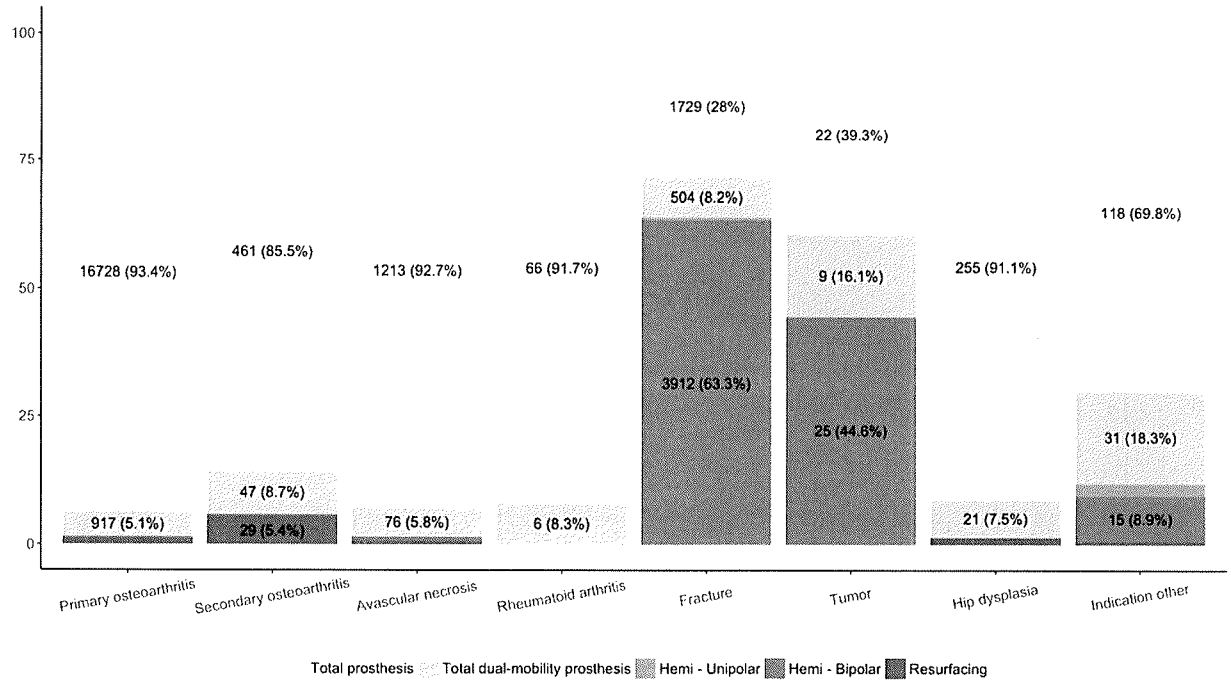


Figure 3.5 Type of primary hip replacement procedures by age groups and gender



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 4% 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=20592	**N=1611**	**N=1611**	**N=4012**	**N=250**
	% (N)	**% (N)**	**% (N)**	**% (N)**	**% (N)**
Metal - Polyethylene	5,9 (1224)	53 (854)	94 (1515)	68 (2730)	1,6 (4)
Ceramic - Polyethylene	32,5 (6700)	45,3 (730)	0 (0)	27,7 (1110)	0 (0)
Metal - Metal	0,2 (39)	0 (0)	0 (0)	1,2 (47)	98,4 (246)
Ceramic - Ceramic	59,5 (12248)	0 (0)	0 (0)	1,5 (59)	0 (0)
Other	1,9 (381)	1,7 (27)	6 (96)	1,6 (66)	0 (0)

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

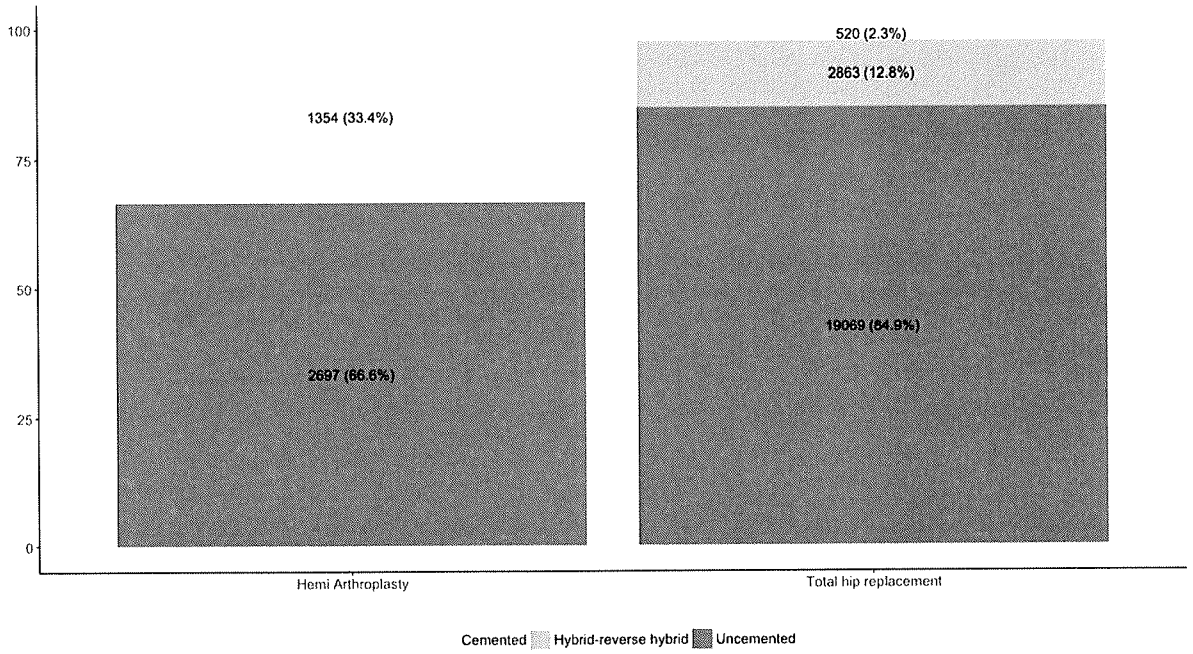


Figure 3.8 Fixation of total primay hip prosthesis according to age category

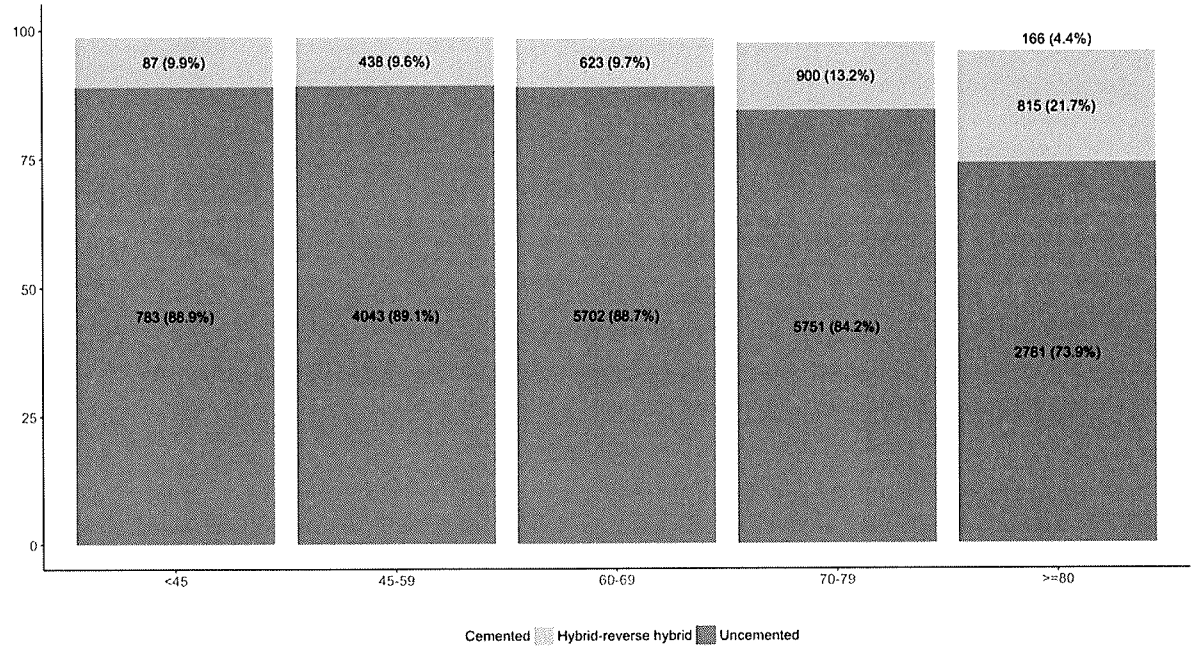


Figure 3.9 Approach used during primary hip replacement according to gender

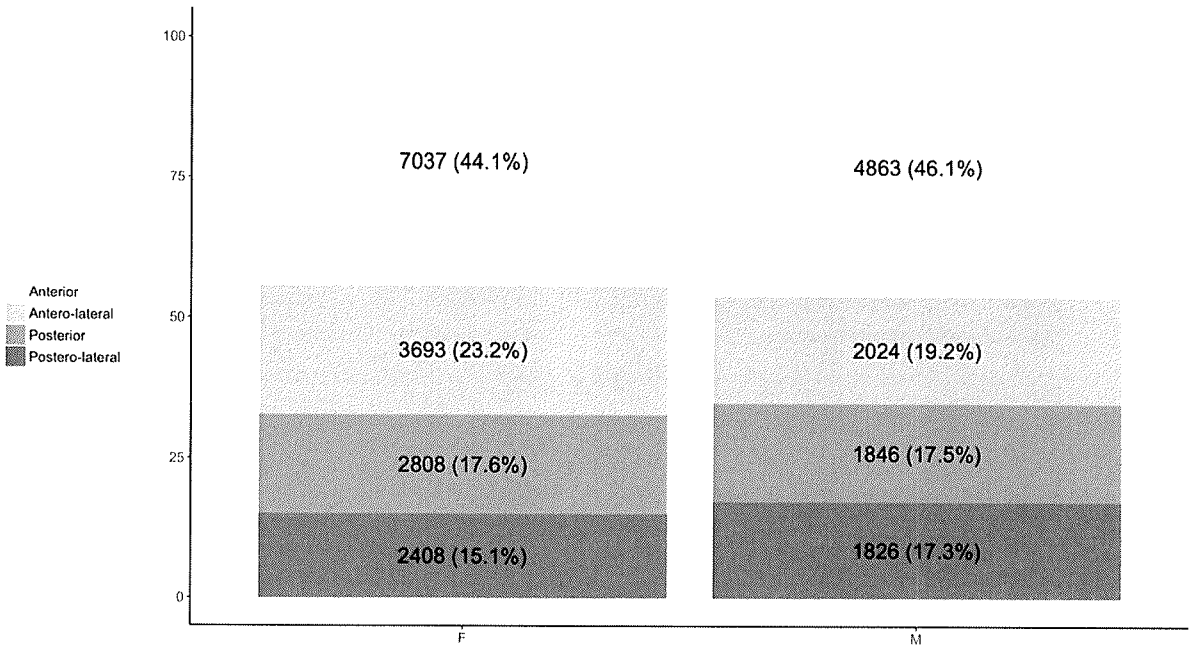


Figure 3.10 Approach used during primary hip replacement according to prosthesis type

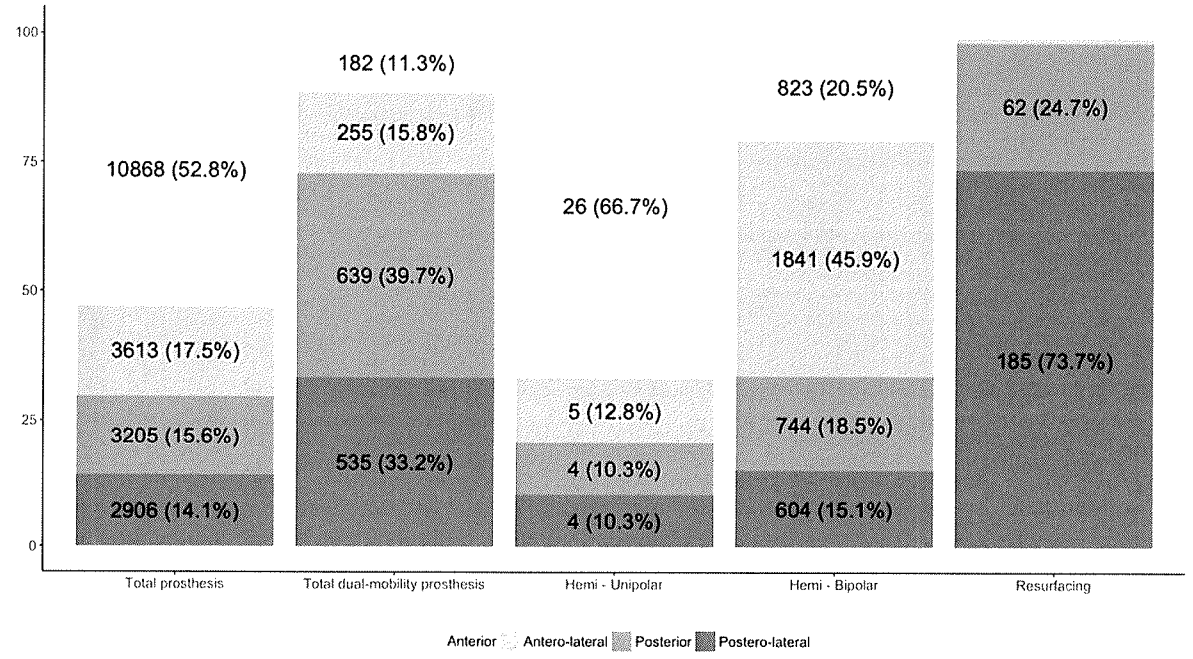


Table 3.6 Usage of custom made guides, computer assisted navigation and bone grafts during primary hip procedures

	Count	Percentage of total
Custom made guides	68	0,3%
Computer assisted navigation	17	0,1%
Bone grafts	416	1,5%
Autografts	366	1,4%
Allografts	39	0,1%
Auto and allografts	11	< 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	1816	8,8%
Total dual-mobility prosthesis	157	9,7%
Hemi - Bipolar	451	11,2%
Total	**2424**	**9,2%**

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

		Count	Percentage of total modular necks used
Frontal	**Valgus**	31	1,3%
	Varus	468	19,3%
	Neutral	1925	79,4%
Lateral	**Anteversion**	524	21,6%
	Retroversion	124	5,1%
	Neutral	1776	73,3%
Offset	**Extended**	613	25,3%
	Standard	1811	74,7%

3.2 REVISIONS AFTER PRIMARY HIP REPLACEMENT

3.2.1 Demographics

Table 3.9 Age, gender and indications for hip revision procedures

	N=2673	
	Mean	**SD**
Age (yrs)	71,2	12,7
	Count	**N %**
Age categories		
<45	83	3,1
45-59	395	14,8
60-69	610	22,8
70-79	792	29,7
>=80	790	29,6
Gender		
Female	1559	58,3
Male	1114	41,7
Indication		
Aseptic loosening	908	34,0
Infection	360	13,5
Instability	426	15,9
Periprosthetic fracture	581	21,7
Pain	277	10,4
Wear	263	9,8
Other indication	327	12,2

Figure 3.11 Hip revision burden according to age category

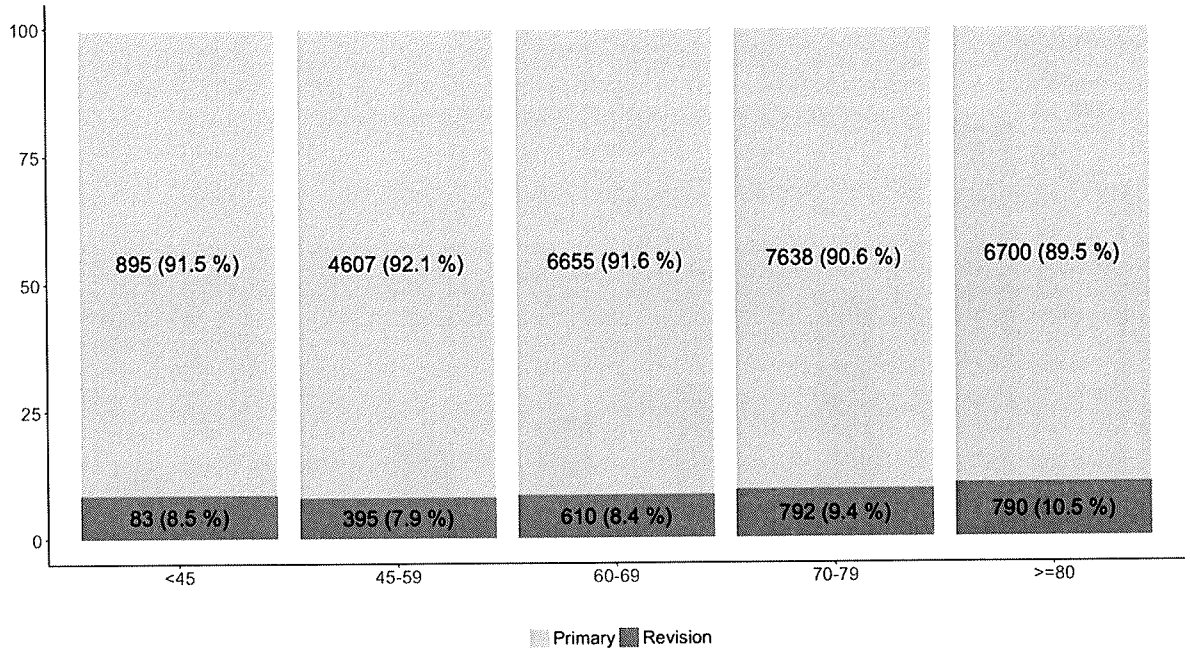


Figure 3.12 Age and gender by number of hip revision procedures

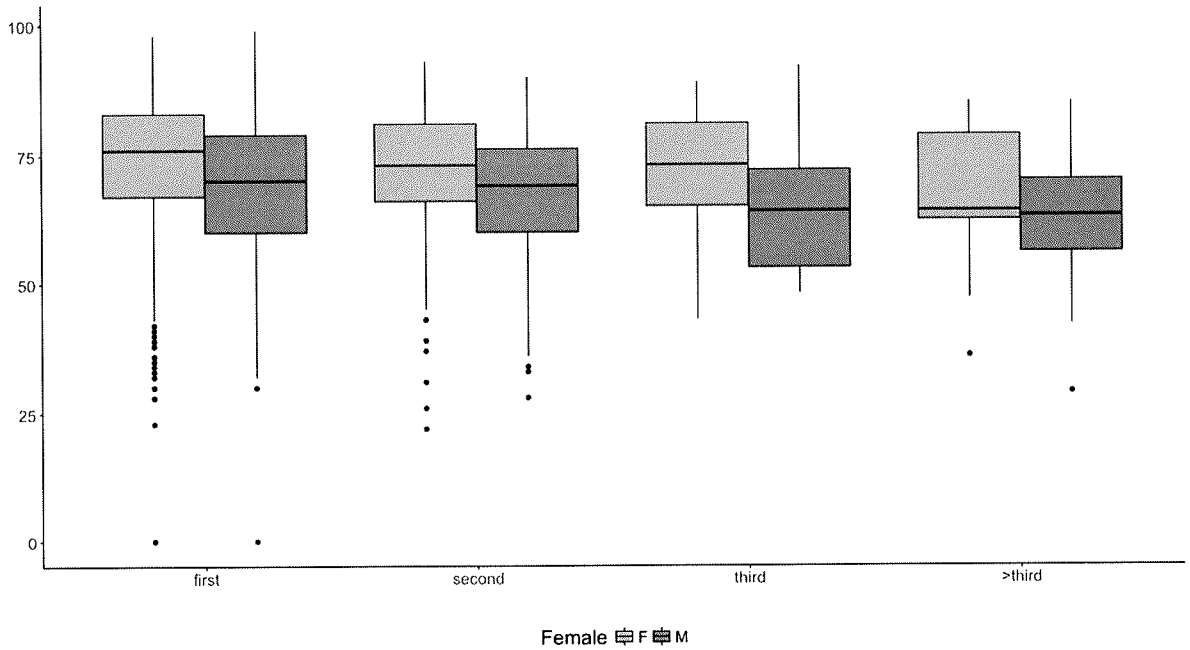
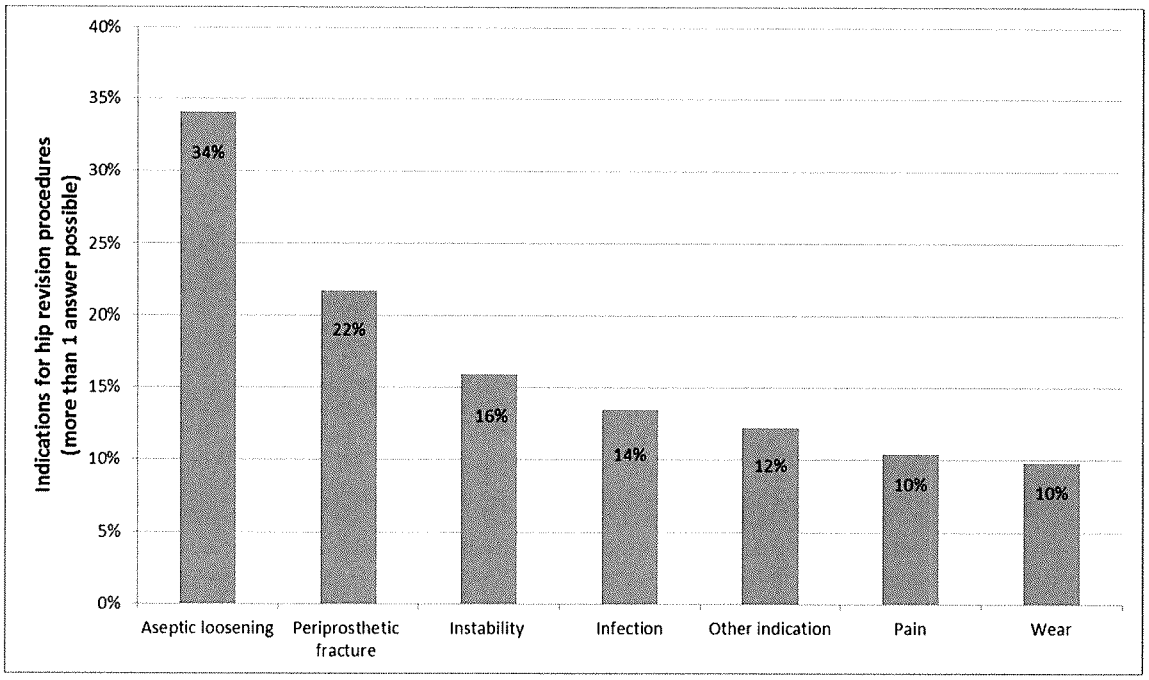


Figure 3.13 Indications for hip revision procedures



3.2.3 Surgical technique and implant characteristics

Figure 3.14 Combinations of revised components during hip revision procedures

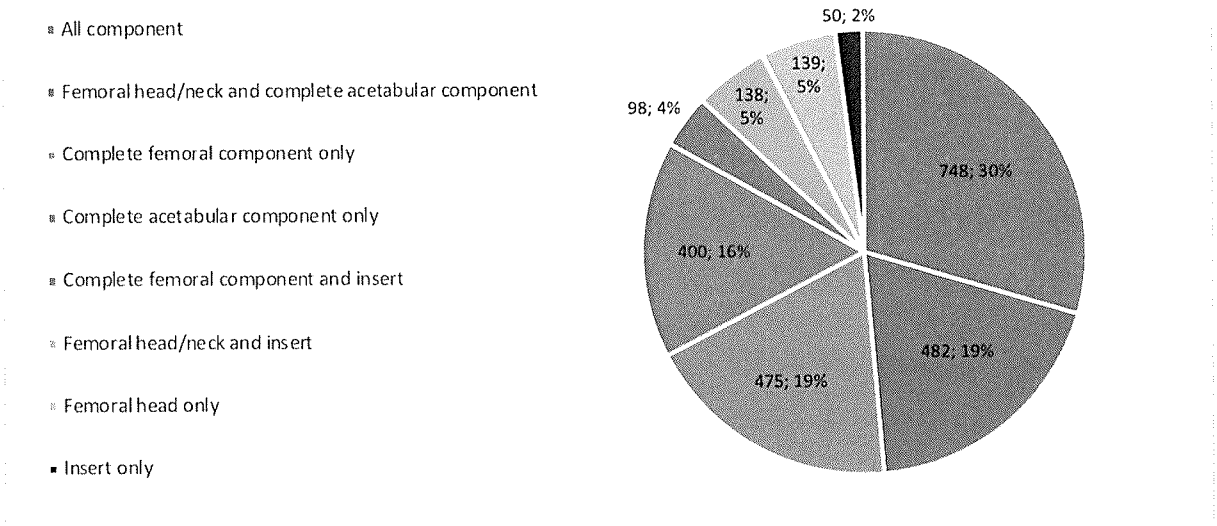


Table 3.10 Numbers and percentages of implanted hip types during hip revision procedures

	Number	Percentage of total
Total prosthesis	1658	66,7%
Total dual-mobility prosthesis	753	30,3%
Hemi - Unipolar	2	0,1%
Hemi - Bipolar	69	2,8%
Insert only	1	< 0,1%
Total number of procedures	**2484**	**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=1654	**N=753**	**N=753**	**N=69**
	% (N)	**% (N)**	**% (N)**	**% (N)**
Metal - Polyethylene	15,7 (260)	56,4 (425)	93,5 (704)	59,4 (41)
Ceramic - Polyethylene	52,2 (864)	41,4 (312)	0 (0)	37,7 (26)
Metal - Metal	0,8 (13)	0 (0)	0 (0)	1,4 (1)
Ceramic - Ceramic	28,2 (466)	0 (0)	0 (0)	1,4 (1)
Other	3,1 (51)	2,1 (16)	6,5 (49)	0,0 (0)

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

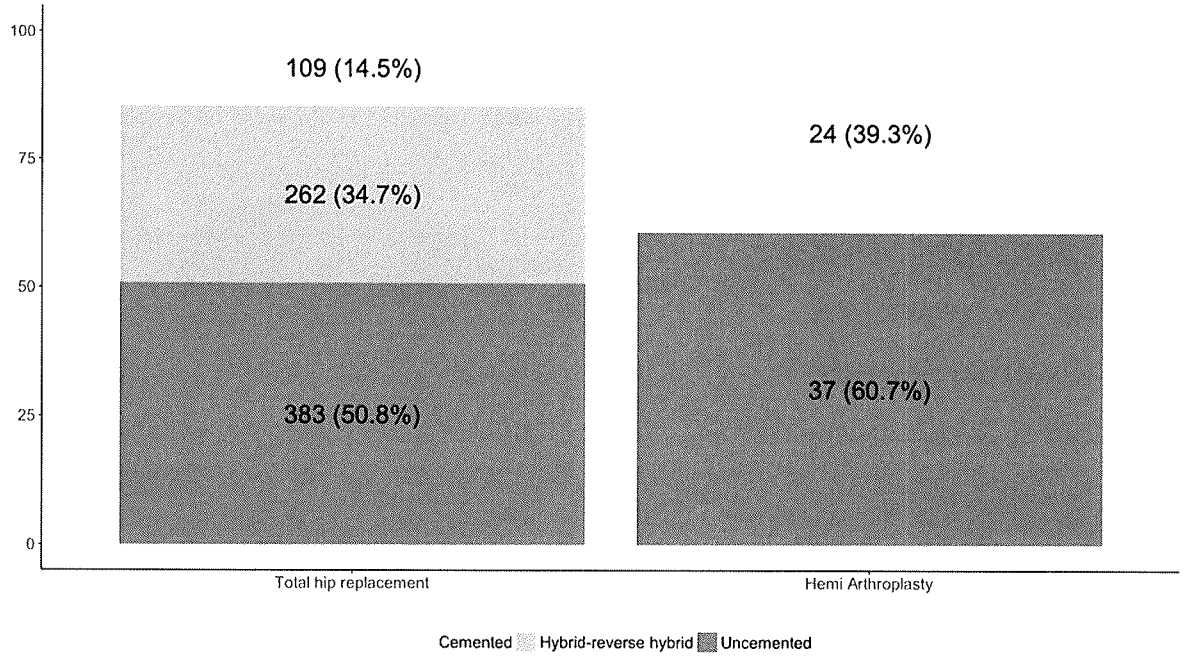


Figure 3.16 Approach used during revision hip replacement according to prosthesis type

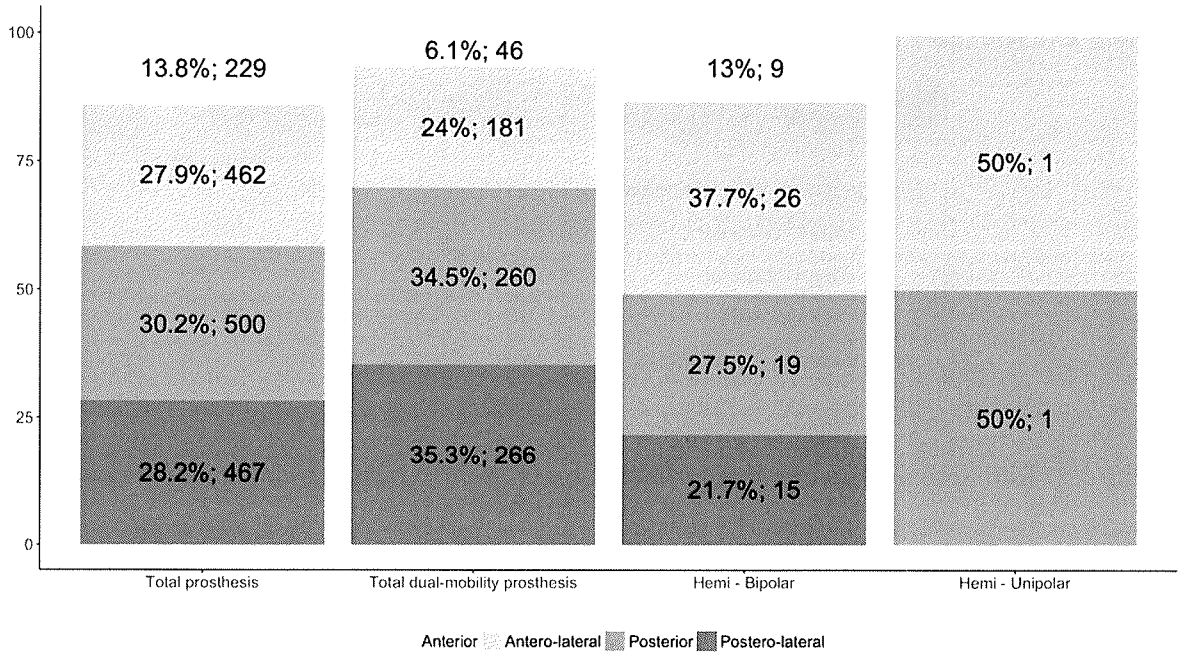


Table 3.12 Usage of custom made guides, computer assisted navigation and bone grafts during hip revision procedures

	Count	Percentage of total
Custom made guides	19	0,8%
Computer assisted navigation	7	0,3%
Bone grafts	591	23,8%
Autografts	92	3,7%
Allografts	469	18,9%
Auto and allografts	30	1,2%

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

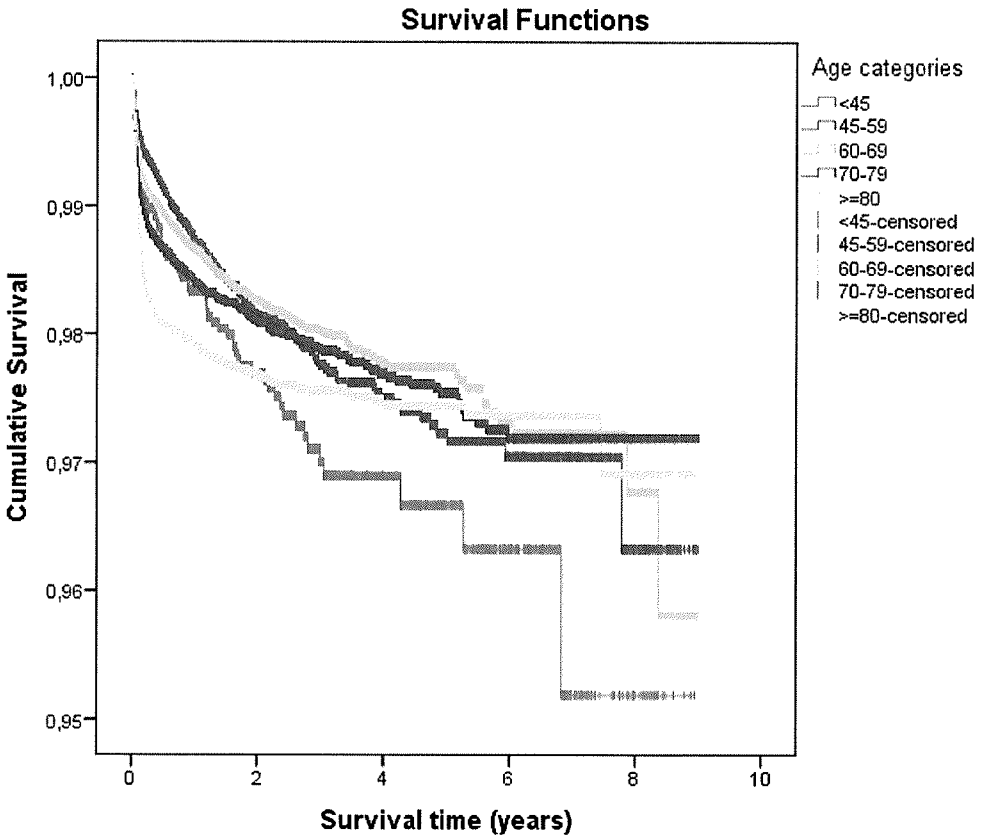
	Count	Percentage of total
Total prosthesis	231	15,6%
Total dual-mobility prosthesis	87	15,3%
Hemi - Bipolar	9	13,0%
Total	**327**	**15,4%**

Table 3.14 Usage of modular femoral neck types

		Count	Percentage of total modular necks used
Frontal	**Valgus**	4	1,2%
	Varus	57	17,4%
	Neutral	266	81,3%
Lateral	**Anteversion**	122	34,3%
	Retroversion	7	2,1%
	Neutral	208	63,6%
Offset	**Extended**	85	26%
	Standard	242	74%

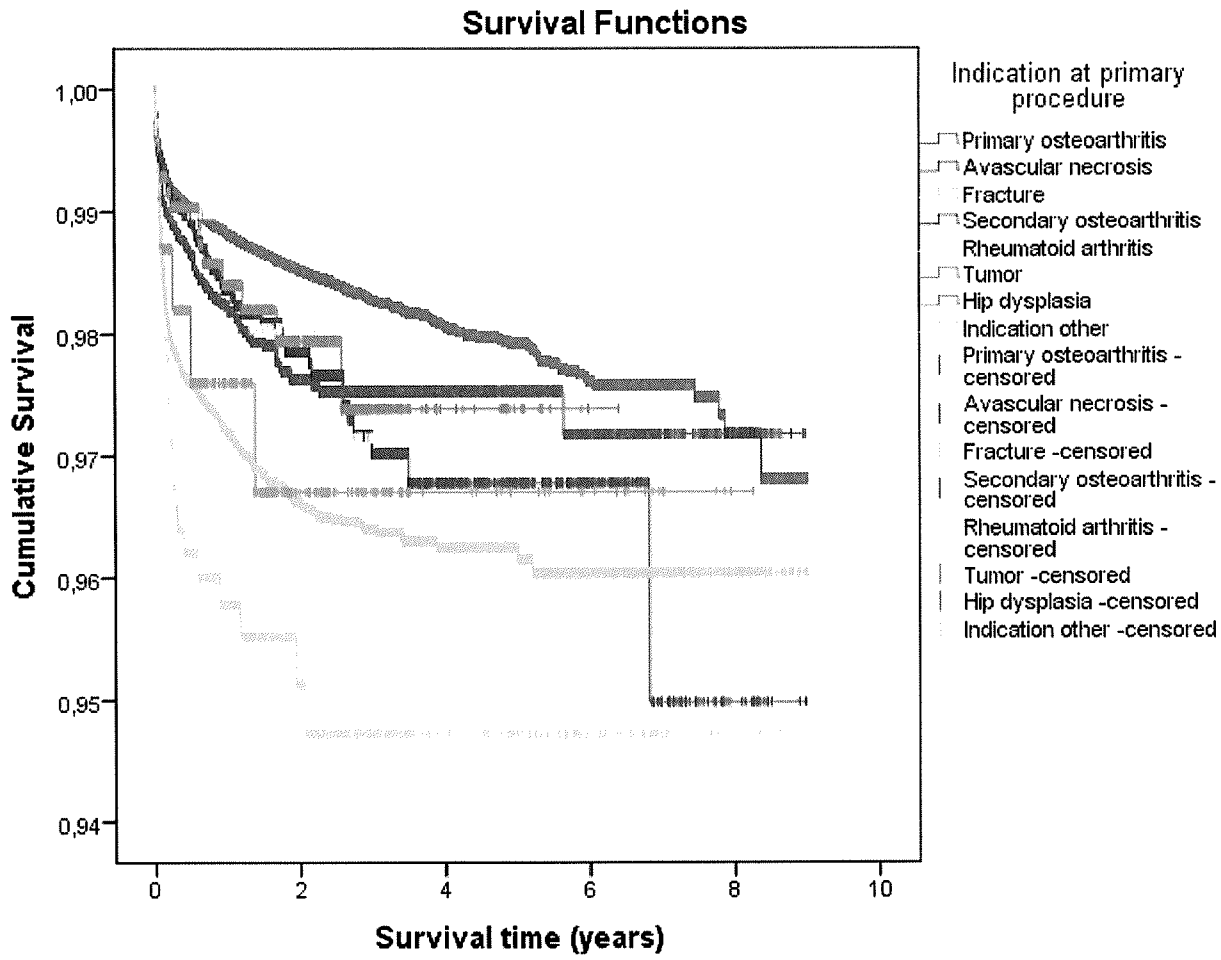
3.2.4 Implant survival after primary procedures

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



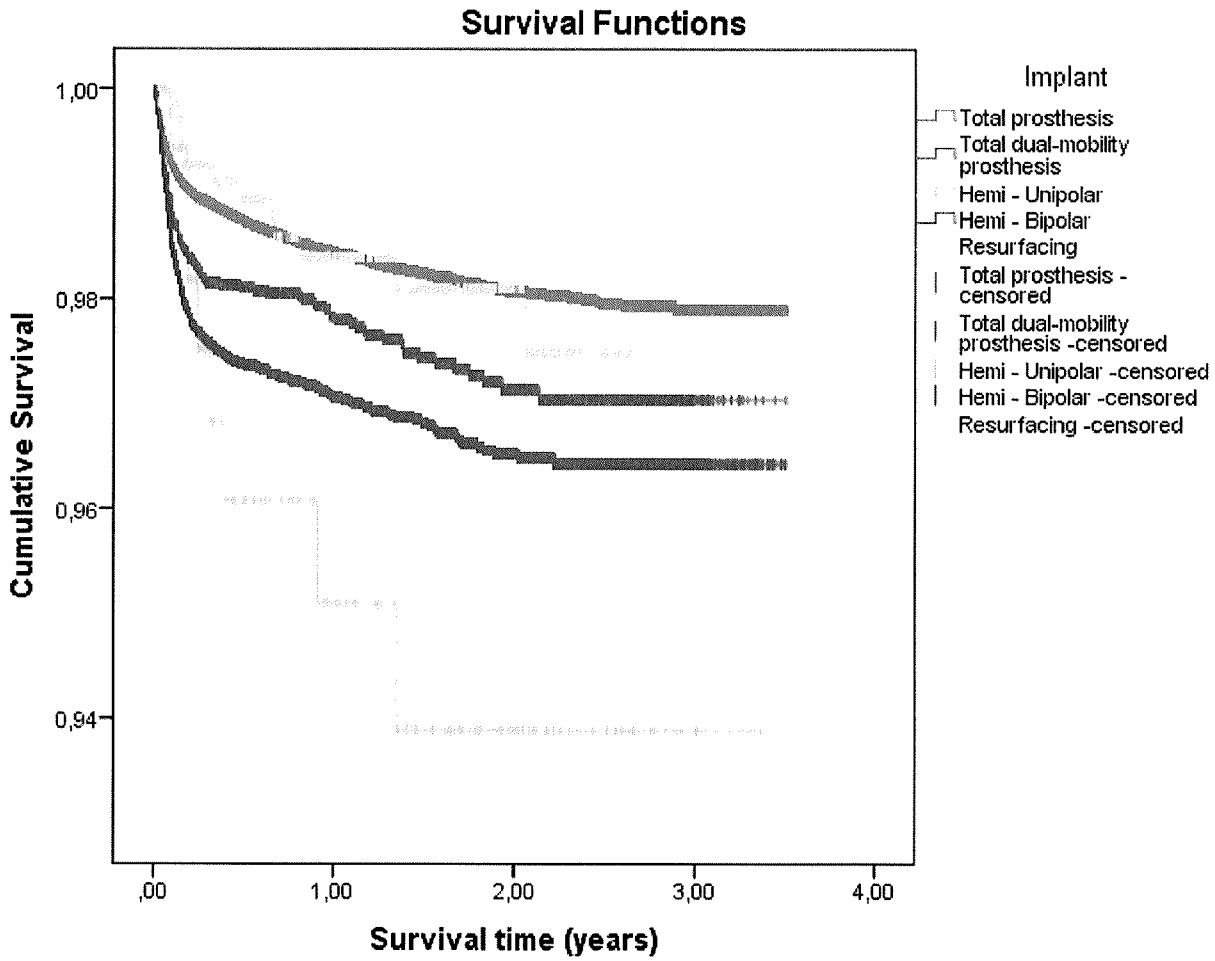
	Number of events/Number at risk									
	0	1	2	3	4	5	6	7	8	9
<45	56/3571	14/2624	9/1706	1/906	1/465	1/317	1/184	0/61	0/22	0/0
45-59	203/17473	62/12613	22/8081	8/4328	5/2232	2/1430	0/753	1/308	0/94	0/0
60-69	331/26237	63/19123	24/12212	11/6689	1/3359	7/2088	1/1098	1/469	1/174	0/0
70-79	451/30130	58/21603	23/13794	10/7782	5/4047	7/2470	0/1386	0/592	0/203	0/1
>=80	502/26093	35/16664	10/9972	4/5515	0/2617	1/1577	0/798	1/325	0/104	0/0

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



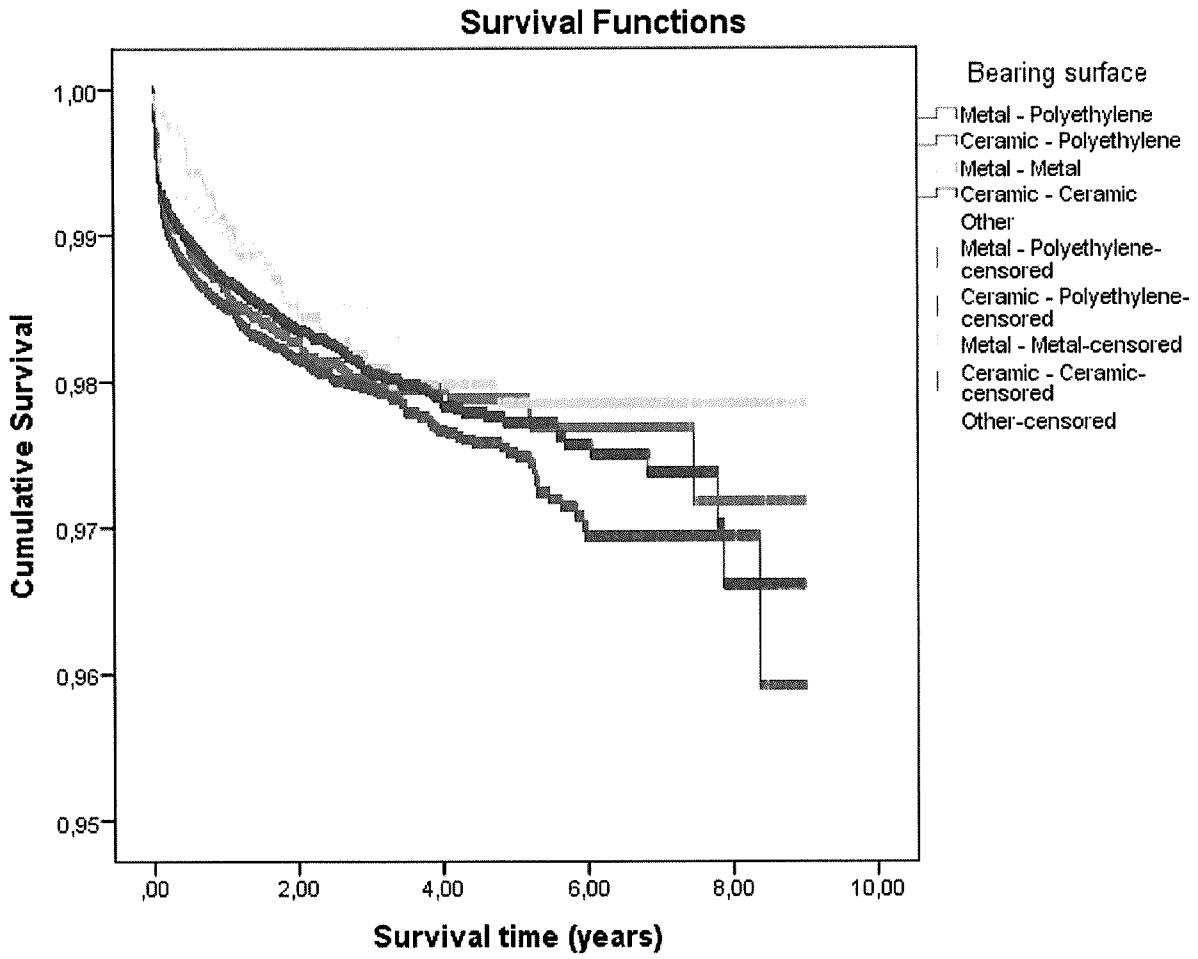
	Number of events/Number at risk									
	0	1	2	3	4	5	6	7	8	9
Primary osteoarthritis	798/71030	132/52129	62/33738	29/18972	11/9930	15/6149	1/3402	3/1420	1/485	0/1
Avascular necrosis	88/5293	20/3860	2/2414	0/1261	0/618	1/413	0/205	0/73	0/28	0/0
Fracture	581/23103	66/13803	14/7809	4/4067	0/1742	2/1022	0/463	0/197	0/65	0/0
Secondary osteoarthritis	33/2173	7/1593	7/1097	1/639	0/321	0/217	1/111	0/46	0/16	0/0
Rheumatoid arthritis	3/311	2/237	1/154	0/85	1/47	0/36	0/19	0/7	0/1	0/0
Tumor	5/234	1/128	0/73	0/42	0/23	0/18	0/13	0/6	0/1	0/0
Hip dysplasia	12/837	2/546	1/299	0/85	0/23	0/10	0/1	0/0	0/0	0/0
Other indication	24/608	2/399	1/241	0/123	0/65	0/50	0/26	0/10	0/3	0/0

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



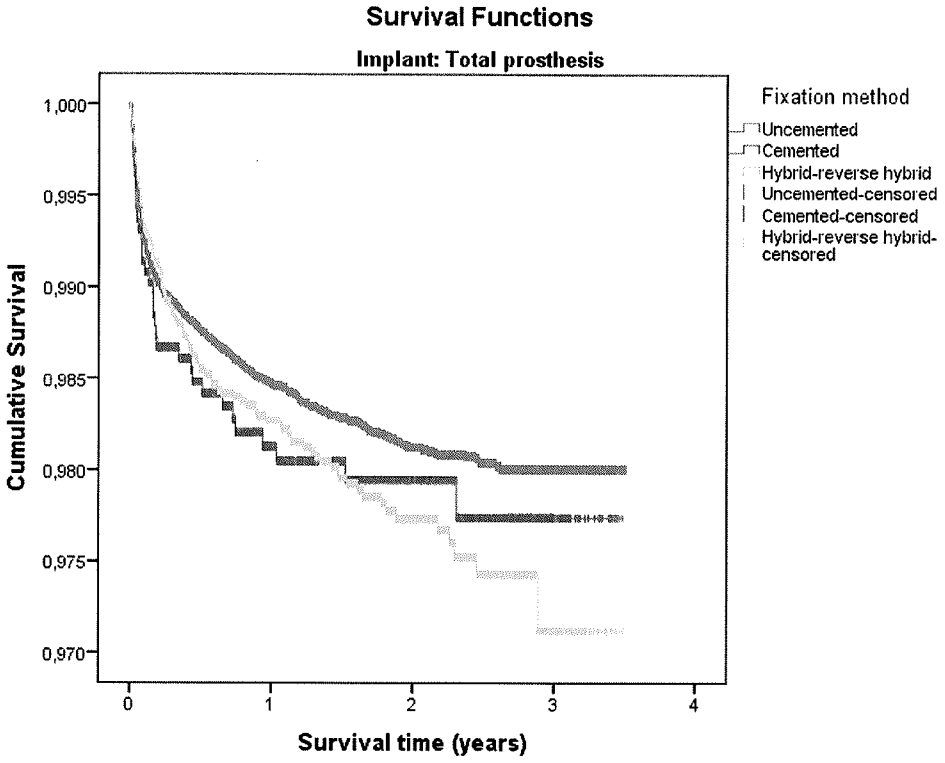
Number of events/Number at risk				
	0	1	2	3
Total prosthesis	878/60701	107/38724	17/17824	0/993
Total dual-mobility prosthesis	98/4877	15/2940	1/1209	0/44
Hemi - Unipolar	7/189	1/93	0/41	0/4
Hemi - Bipolar	328/12724	24/6324	2/2489	0/209
Resurfacing	10/706	1/445	1/177	0/6

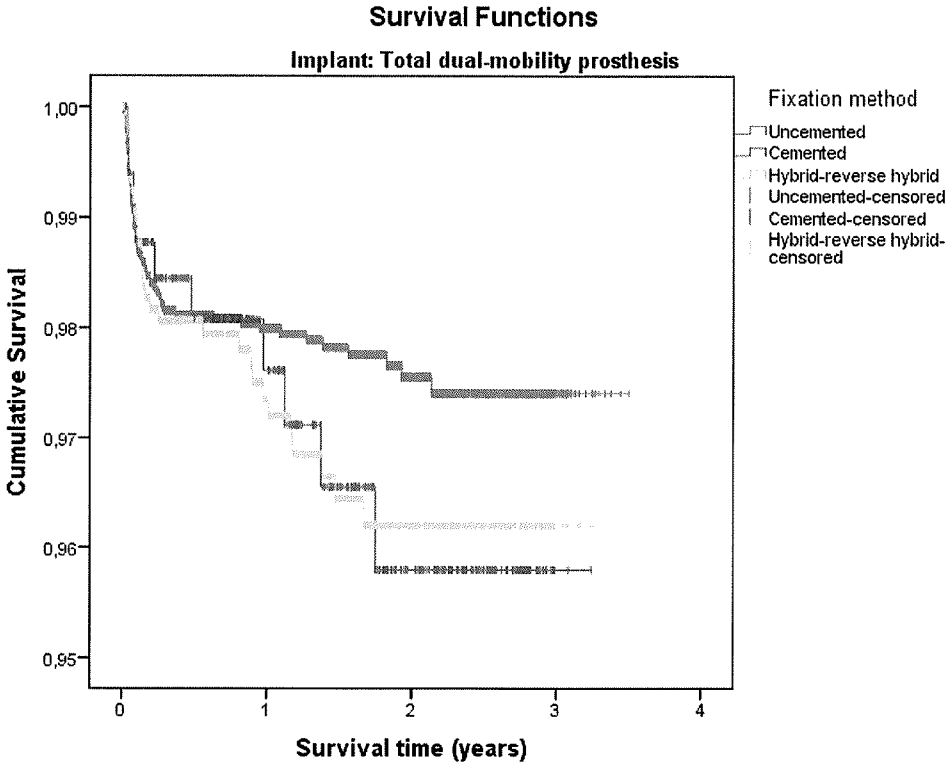
Figure 3.20 Kaplan-Meier curve for bearing surface for total hip prostheses at primary hip replacement

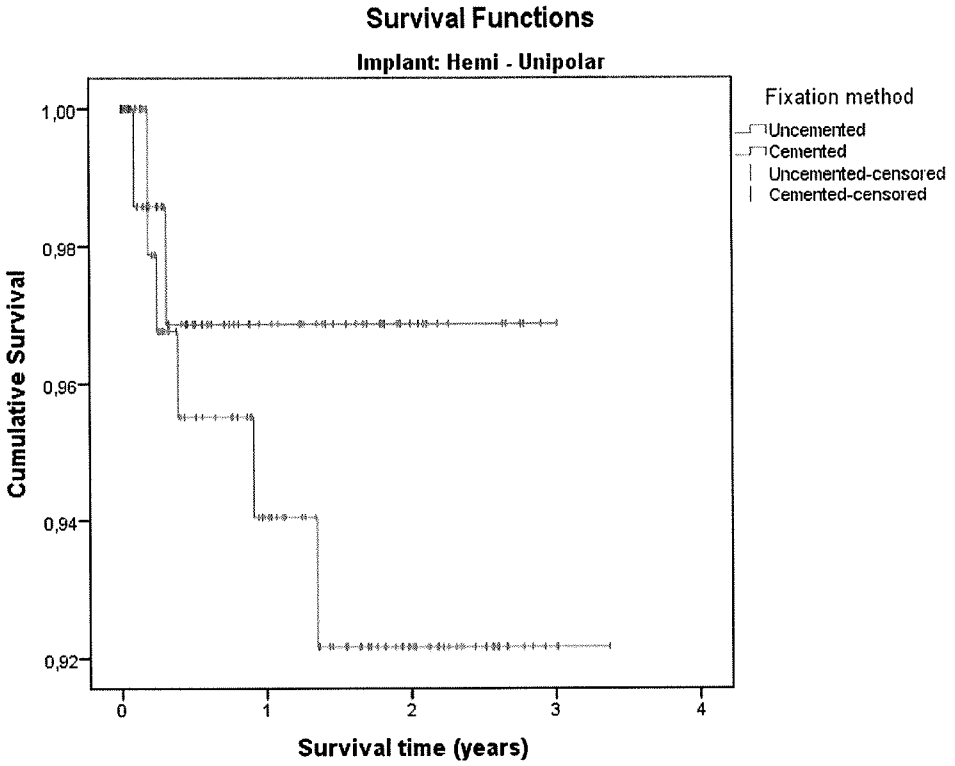


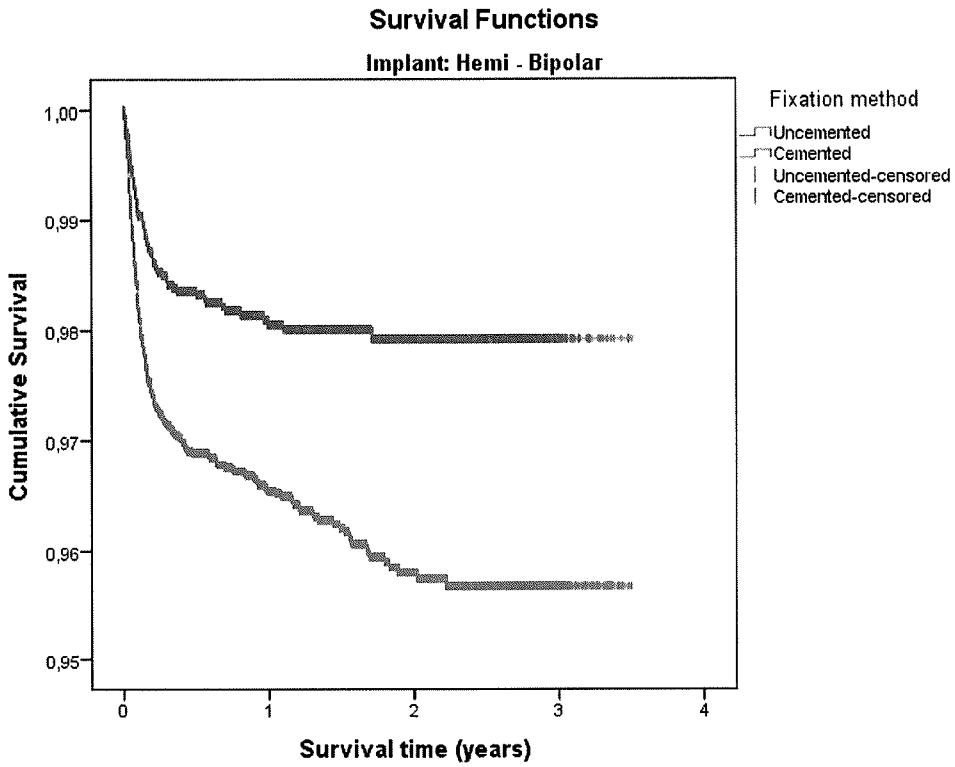
	Number of events/Number at risk									
	0	1	2	3	4	5	6	7	8	9
Metal – Poly-ethylene	91/6964	18/5534	11/4245	1/2970	1/1587	2/1083	0/620	1/257	0/108	0/0
Ceramic – Poly-ethylene	385/27369	64/20093	23/13495	17/8282	6/4738	12/2848	0/1360	0/491	1/164	0/1
Metal - Metal	11/1265	8/1213	4/1157	1/1026	1/823	0/719	0/521	0/241	0/86	0/0
Ceramic - Ceramic	558/45572	91/32588	41/20016	14/10135	4/4476	3/2664	2/1431	2/609	0/197	0/0
Other	18/1878	3/1458	2/996	1/601	0/318	0/150	0/93	0/46	0/4	0/0

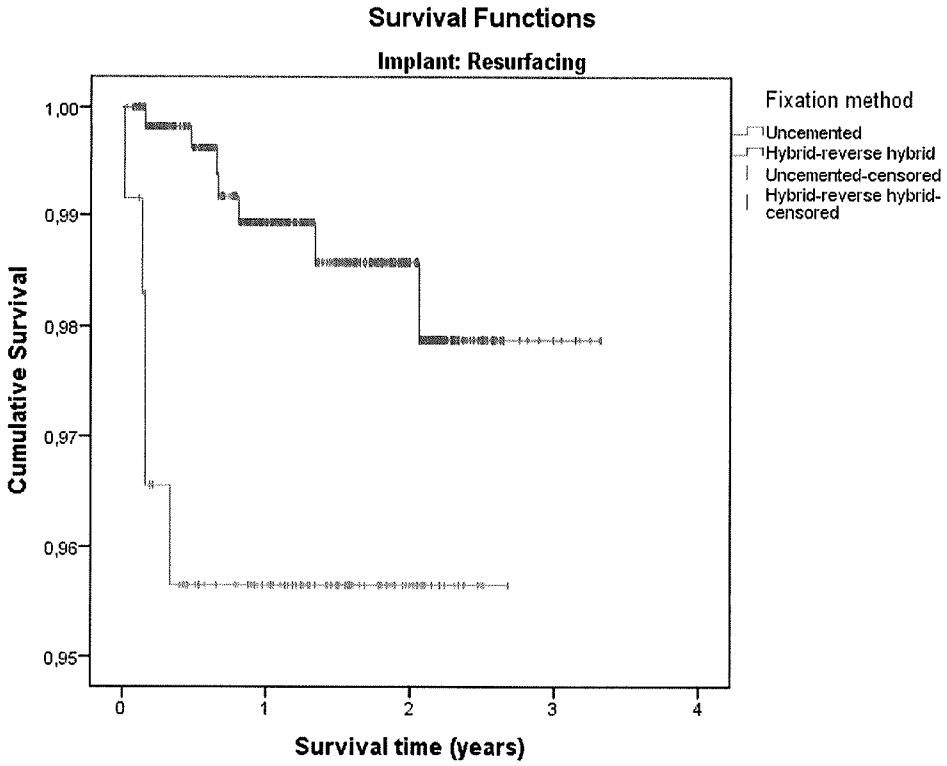
Figure 3.21 Kaplan-Meier curves for method of fixation according to primary hip replacement prosthesis type





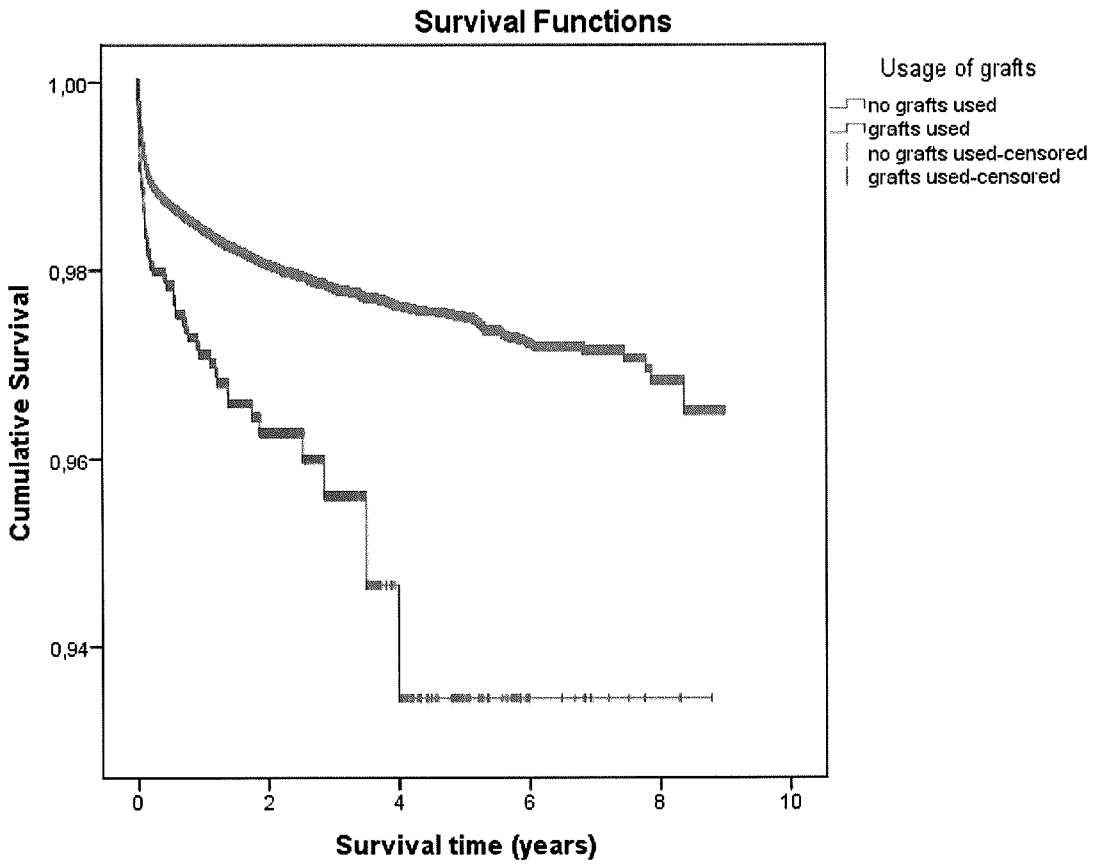

Survival Functions
Implant: Hemi - Unipolar
Fixation method
Uncemented
Cemented
Uncemented-censored
Cemented-censored
Cumulative Survival
1,00
0,98
0,96
0,94
0,92
0
1
2
3
4
Survival time (years)


Survival Functions
Implant: Hemi - Bipolar
Fixation method
Uncemented
Cemented
Uncemented-censored
Cemented-censored
Cumulative Survival
1,00
0,99
0,98
0,97
0,96
0,95
0
1
2
3
4
Survival time (years)



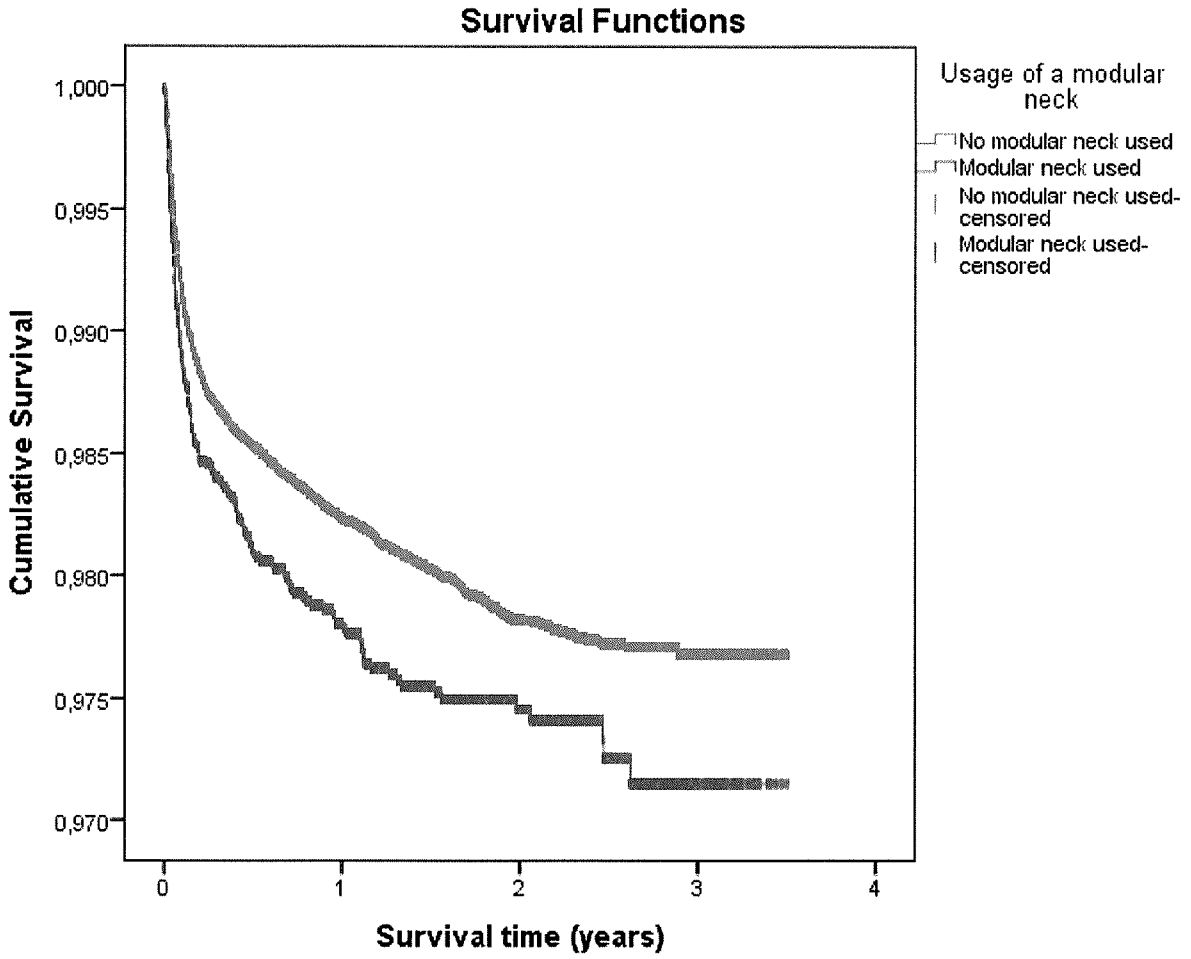
Number of events/Number at risk					
		0	1	2	3
Total prosthesis	Uncemented	737/52040	87/33072	11/15160	0/842
	Cemented	31/1749	2/1246	1/693	0/56
	Hybrid	110/6912	18/4406	5/1971	0/95
Total dual-mobility prosthesis	Uncemented	66/3465	6/2106	1/835	0/36
	Cemented	7/334	3/211	0/100	0/2
	Hybrid	25/1078	6/623	0/274	0/6
Hemi - Unipolar	Uncemented	5/115	1/60	0/29	0/3
	Cemented	2/74	0/33	0/12	0/1
Hemi - Bipolar	Uncemented	256/8416	22/4128	2/1680	0/161
	Cemented	72/4308	2/2196	0/809	0/48
Resurfacing	Uncemented	5/118	0/83	0/22	0/0
	Hybrid	5/582	1/358	1/152	0/6

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



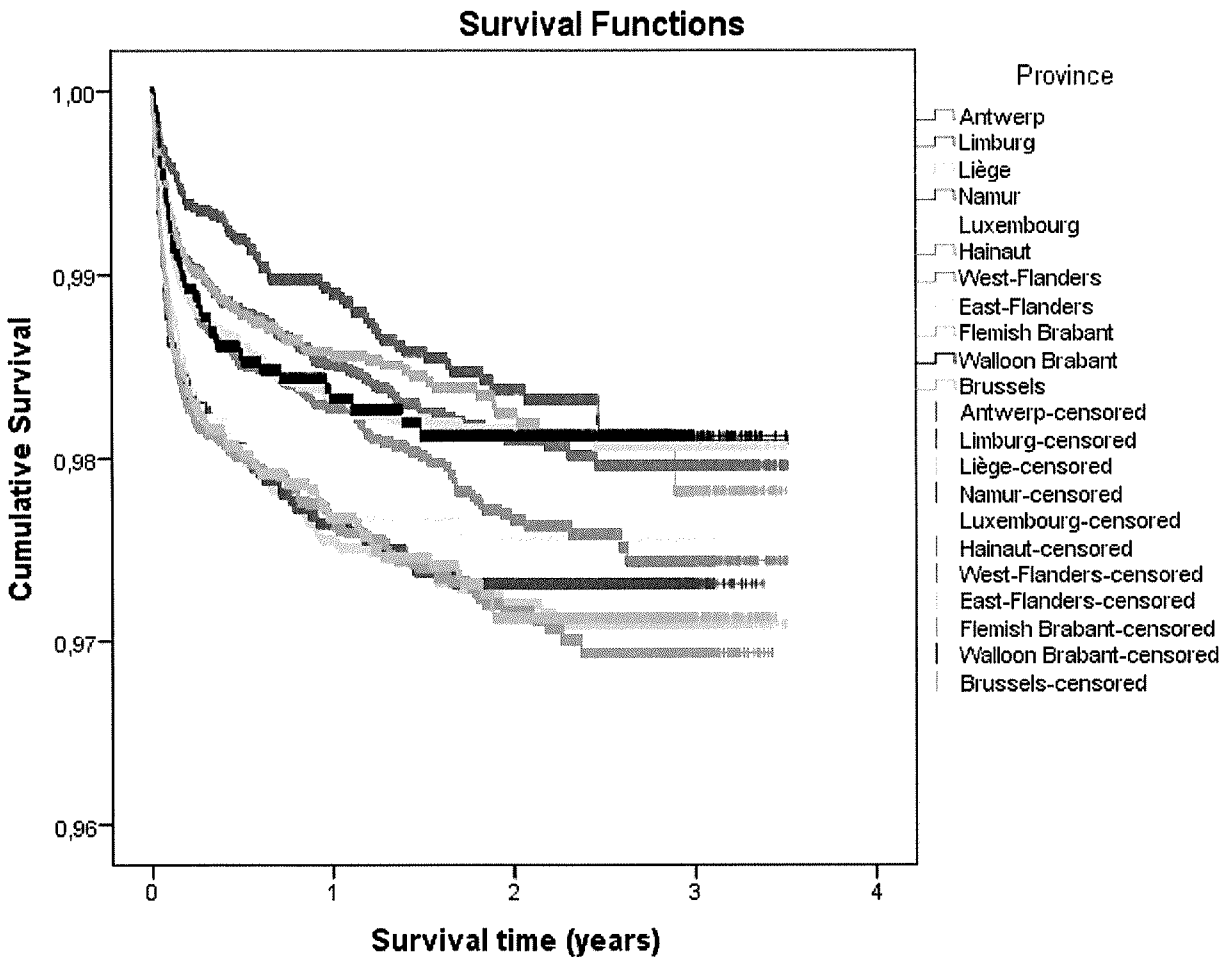
	Number of events/Number at risk									
	0	1	2	3	4	5	6	7	8	9
No grafts used	1502/102018	225/71635	86/45296	32/25071	12/12694	18/7873	2/4228	3/1753	1/596	0/1
Grafts used	42/1571	7/1060	2/529	2/203	0/75	0/42	0/12	0/6	0/3	0/0

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
No modular neck used	1140/70282	131/42889	16/19234	0/1026
Modular neck used	164/8021	15/5100	4/2288	0/220

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



	Number of events/Number at risk			
	0	1	2	3
Antwerp	166/12328	23/7369	3/3258	0/256
Limburg	62/6300	16/3911	3/1731	0/32
Liège	170/7587	12/4734	2/2167	0/135
Namur	78/3571	6/2209	0/1000	0/42
Luxembourg	43/2128	3/1327	0/626	0/37
Hainaut	201/9291	21/5643	4/2415	0/78
West-Flanders	175/11026	31/6857	4/3160	0/173
East-Flanders	163/10680	10/6508	2/2937	0/230
Flemish Brabant	91/6923	9/4211	3/1824	0/120
Walloon Brabant	44/2878	3/1746	0/814	0/38
Brussels	107/5019	12/3035	0/1363	0/93

3.3 NINETY-DAYS MORTALITY AFTER HIP REPLACEMENT PROCEDURES

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	75574	97,2%	2185	2,8%
Revision with new prosthesis	7544	96,9%	244	3,1%
Resection with spacer	413	94,9%	22	5,1%
Resection without spacer	26	86,7%	4	13,3%
Total	**83557**	**97,1%**	**2455**	**2,9%**

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

	Alive 90 days post-procedure		Died before 90 days post-procedure	
<45	2940	99,9%	4	0,1%
45-59	14256	99,7%	47	0,3%
60-69	21157	99,4%	124	0,6%
70-79	24269	98,4%	398	1,6%
>=80	20908	91,7%	1882	8,3%
Total [Missing]	**83530 [27]**	**97,1%**	**2455**	**2,9%**